

THE EFFECTS OF THE COVID-19 PANDEMIC ON SPORT: MENTAL HEALTH IMPLICATIONS ON ATHLETES, COACHES AND SUPPORT STAFF

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THE EFFECTS OF THE COVID-19 PANDEMIC ON SPORT: MENTAL HEALTH IMPLICATIONS ON ATHLETES, COACHES AND SUPPORT STAFF

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Table of Contents

- 06** *Modulators of the Personal and Professional Threat Perception of Olympic Athletes in the Actual COVID-19 Crisis*
Vicente Javier Clemente-Suárez, Juan Pedro Fuentes-García, Ricardo de la Vega Marcos and María José Martínez Patiño
- 13** *The 2020 Coronavirus Pandemic as a Change-Event in Sport Performers' Careers: Conceptual and Applied Practice Considerations*
Roy David Samuel, Gershon Tenenbaum and Yair Galily
- 24** *Mental Health Measurement in a Post Covid-19 World: Psychometric Properties and Invariance of the DASS-21 in Athletes and Non-athletes*
Robert S. Vaughan, Elizabeth J. Edwards and Tadhg E. MacIntyre
- 38** *Covid-19 Has Turned Home Advantage Into Home Disadvantage in the German Soccer Bundesliga*
Markus Tilp and Sigrid Thaller
- 48** *Written Emotional Disclosure Can Promote Athletes' Mental Health and Performance Readiness During the COVID-19 Pandemic*
Paul A. Davis, Henrik Gustafsson, Nichola Callow and Tim Woodman
- 59** *Where Did All the Sport Go? Negative Impact of COVID-19 Lockdown on Life-Spheres and Mental Health of Spanish Young Athletes*
Juan Pons, Yago Ramis, Saul Alcaraz, Anna Jordana, Marta Borrueco and Miquel Torregrossa
- 68** *The 4Ds of Dealing With Distress – Distract, Dilute, Develop, and Discover: An Ultra-Brief Intervention for Occupational and Academic Stress*
Warren Mansell, Rebecca Urmson and Louise Mansell
- 76** *Anxiety and Motivation to Return to Sport During the French COVID-19 Lockdown*
Alexis Ruffault, Marjorie Bernier, Jean Fournier and Nicolas Hauw
- 83** *"Time for Recovery" or "Utter Uncertainty"? The Postponement of the Tokyo 2020 Olympic Games Through the Eyes of Olympic Athletes and Coaches. A Qualitative Study*
Violetta Oblinger-Peters and Björn Krenn
- 98** *The Impact of COVID-19-Related Shutdown Measures on the Training Habits and Perceptions of Athletes in the United States: A Brief Research Report*
Andrew R. Jagim, Joel Luedke, Austin Fitzpatrick, Greg Winkelman, Jacob L. Erickson, Andrew T. Askow and Clayton L. Camic
- 104** *The Coronavirus Pandemic as a Game-Changer: When NBA Players Forced America to Think. Again.*
Yair Galily
- 107** *A Cross-Cultural Exploratory Study of Health Behaviors and Wellbeing During COVID-19*
Montse C. Ruiz, Tracey J. Devonport, Chao-Hwa (Josephine) Chen-Wilson, Wendy Nicholls, Jonathan Y. Cagas, Javier Fernandez-Montalvo, Youngjun Choi and Claudio Robazza

- 123 ***The Impact of the COVID-19 Lockdown on Coaches' Perception of Stress and Emotion Regulation Strategies***
Giampaolo Santi, Alessandro Quartiroli, Sergio Costa, Selenia di Fronso, Cristina Montesano, Francesco Di Gruttola, Edoardo Giorgio Ciofi, Luana Morgilli and Maurizio Bertollo
- 131 ***The Impact of Coronavirus Disease 2019 Lockdown on Athletes' Subjective Vitality: The Protective Role of Resilience and Autonomous Goal Motives***
Natalia Martínez-González, Francisco L. Atienza, Inés Tomás, Joan L. Duda and Isabel Balaguer
- 142 ***Sport Cyberpsychology in Action During the COVID-19 Pandemic (Opportunities, Challenges, and Future Possibilities): A Narrative Review***
Olivia A. Hurley
- 157 ***Sporting Resilience During COVID-19: What Is the Nature of This Adversity and How Are Competitive Elite Athletes Adapting?***
Sahen Gupta and Paul Joseph McCarthy
- 171 ***The Importance of Nature Exposure and Physical Activity for Psychological Health and Stress Perception: Evidence From the First Lockdown Period During the Coronavirus Pandemic 2020 in France and Germany***
Florian Javelle, Sylvain Laborde, Thomas Jean Hosang, Alan James Metcalfe and Philipp Zimmer
- 182 ***Mood Responses and Regulation Strategies Used During COVID-19 Among Boxers and Coaches***
Reece J. Roberts and Andrew M. Lane
- 195 ***How Does a Sport Psychological Intervention Help Professional Cyclists to Cope With Their Mental Health During the COVID-19 Lockdown?***
Maurizio Bertollo, Fabio Forzini, Sara Biondi, Massimiliano Di Liborio, Maria Grazia Vaccaro, Emmanouil Georgiadis and Cristiana Conti
- 211 ***Psychological Impact of the COVID-19 Pandemic on Athletes***
Clifford C. Uroh and Celina M. Adewunmi
- 218 ***Using Slow-Paced Breathing to Foster Endurance, Well-Being, and Sleep Quality in Athletes During the COVID-19 Pandemic***
Uirassu Borges, Babett Lobinger, Florian Javelle, Matthew Watson, Emma Mosley and Sylvain Laborde
- 226 ***Toward Improved Triadic Functioning: Exploring the Interactions and Adaptations of Coaches, Parents and Athletes in Professional Academy Soccer Through the Adversity of COVID-19***
James Maurice, Tracey J. Devonport and Camilla J. Knight
- 243 ***Comparing Mental Health of Athletes and Non-athletes as They Emerge From a COVID-19 Pandemic Lockdown***
Christopher Knowles, Stephen Shannon, Garry Prentice and Gavin Breslin
- 254 ***Development of a Salutogenesis Workshop for SPPs to Help Them, Their Athletes, and the Athlete's Entourage Better Cope With Uncertainty During the COVID-19 Pandemic***
Sascha Leisterer, Franziska Lautenbach, Nadja Walter, Lara Kronenberg and Anne-Marie Elbe

- 266** *Emotional Reactions and Adaptation to COVID-19 Lockdown (or Confinement) by Spanish Competitive Athletes: Some Lesson for the Future*
José Carlos Jaenes Sánchez, David Alarcón Rubio, Manuel Trujillo, Rafael Peñaloza Gómez, Amir Hossien Mehrsafari, Andrea Chirico, Francesco Giancamilli and Fabio Lucidi
- 281** *Effects of Physical Activity and Training Routine on Mental Health During the COVID-19 Pandemic and Curfew*
Jelena Sokić, Stanislava Popov, Bojana M. Dinić and Jovana Rastović
- 295** *Exploring the Perceived Impact of the COVID-19 Pandemic Social Distancing Measures on Athlete Wellbeing: A Qualitative Study Utilising Photo-Elicitation*
Lindsay Woodford and Lauren Bussey
- 311** *The Potential Benefits of Non-skills Training (Mental Toughness) for Elite Athletes: Coping With the Negative Psychological Effects of the COVID-19 Pandemic*
Neil Dagnall, Kenneth Graham Drinkwater, Andrew Denovan and R. Stephen Walsh



Modulators of the Personal and Professional Threat Perception of Olympic Athletes in the Actual COVID-19 Crisis

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The COVID-19 pandemic is now a major global health issue, affecting world population and high-performance athlete too. The aim of the present research was to analyze the effect of psychological profile, academic schedule, and gender in the perception of personal and professional threat of Olympic and Paralympic athletes facing the 2021 Tokyo Olympiad in the actual COVID-19 crisis. We analyzed in 136 Olympic (26.4 ± 6.2 years) and 39 Paralympic athletes (31.8 ± 9.3 years) academic and sport variables, individual perceptions about COVID-19 crisis, personality, loneliness, psychological inflexibility, and anxiety. Paralympic athletes perceived higher negative impact in their training and performance by the confinement than Olympic athletes ($+24.18$, $p < 0.005$, $r = 0.60$). Neuroticism and psychological inflexibility presented the greatest negative feelings for female athletes ($+32.59$, $p < 0.000$, $r = 0.13$) and the perception that quarantine would negatively affect their sports performance. Finally professional athletes showed lower values in personality tests (*Agreeableness* factor) about COVID-19 crisis than non-professionals (-40.62 , $p < 0.012$, $r = 0.88$).

Keywords: Olympic, psychological inflexibility, personality, anxiety, stress

INTRODUCTION

The COVID-19 pandemic is now a major global health issue, representing the most serious respiratory virus since the 1918 H1N1 influenza pandemic (Casadevall and Pirofski, 2020). Spain is the second most affected nation in the world, after the United States, with 152,446 confirmed cases, and the first in the world in the number of deaths, with 15,238, being the country, with a number of 350, with more deaths of Covid-19 per million people on April 11, 2020 (World Health Organization, 2020). On March 14, the Spanish Government declared a nationwide lockdown ordering people to stay at home (Gobierno de España, 2020).

The COVID-19 crisis is a new threat that put the adaptive mechanisms of the human being, both physiologically and psychologically, through its paces. The human being is a highly adaptative organism, for this reason we developed in our evolution different physiological and psychological

defense mechanism that allow us to overcome different eliciting contextual scenarios, but some of these phylogenetic defense system could produce non adaptative behavior in current society and specially in exceptional situations (Clemente-Suárez et al., 2020). In the current global home confinement situation due to the COVID-19 pandemic, most individuals are exposed to an unprecedented stressful situation of unknown duration, being a focus of stress, anxiety, fear, and depression or disrupt sleep due to a negative appraisal of the situation and self-protection behaviors (Altena et al., 2020; Li et al., 2020). The lack of vaccines and the actual no population immunity due to the herd effect increase the feeling of danger and uncertainty in this health crisis (Clemente-Suárez, 2020). The perception of uncertainty and lack of control is a source of psychophysiological variations as sympathetic autonomic branch activity, cortisol, and catecholamine release may increase, allowing different pathologies and psychopathologies, such as anxiety or even depression (Clemente-Suárez et al., 2020). Previous researches found how confinement produce altered immune functions paralleled by changes in stress hormone levels, being dependent to the specific characteristics of the confined environment (Strewe et al., 2015). At psychological level evaluated depression, moods state fluctuations and perception of fatigue were also found (Basner et al., 2014). A recent review highlights the importance of providing effective a rapid information for people in quarantine (in addition to medical supplies) (Brooks et al., 2020). They also suggested that the confinement period should be short, and the duration should not be changed unless in extreme circumstances (Brooks et al., 2020). In Spain, in response to COVID-19 pandemic, confinement has extended more than 6 weeks, and subject to changes.

One of the populations that could suffer more the confinement are athletes, especially professional ones. Their daily routines in where primary outdoor activities counteract with the current situation of home confinement. This fact could be a source of loss of performance adaptations, limiting the acquisition of new abilities as well as limiting their performance improvements. Within this group, the Olympic and Paralympic athletes suffer an even more eliciting situation, since they have been preparing the Tokyo Olympiad for 4 years and their postponement is a more added stressor. This setback and the threat of the Coronavirus can cause the athlete to lose concentration, motivation and the desire to continue preparing for the Olympiad with the same energy as he did up until then. the perception of threat of this virus, the psychological profile of the athlete, as well as their psychological skills (Belinchon-deMiguel and Clemente-Suárez, 2018; Belinchon-Demiguel and Clemente-Suarez, 2018; Belinchón-deMiguel et al., 2019; Sánchez-Conde et al., 2019) would be fundamental to understand their stress response and to define professional interventions on these athletes so that they continue to prepare for the Olympiad at the highest level. Other factors as social support, academic level, gender or cultural differences could also modulate the behaviors in eliciting situations (Bellido et al., 2018; Beltrán-Velasco et al., 2019, 2020) making the knowledge of theses parameters and their relationships important factors in actual moments. Then, in the specific population of Olympic and Paralympic athletes

the understand of factors that could be controlled, such as their coping styles and psychological flexibility, their social environment and institutional support, may be the basis to apply specific measures in this exceptional state that we are currently experiencing, allowing therefore, that their sports performance does not suffer negative effects.

Then, the aim of this research was to analyze the effect of academic schedule, gender, the individual perceptions about COVID-19 crisis, and psychological profile (personality, loneliness perception, psychological inflexibility, and anxiety), in the perception of personal and professional threat of Olympic and Paralympic athletes facing the 2021 Tokyo Olympiad in the actual COVID-19 crisis.

METHODS

This study was performed online using the Spanish Google Forms internet platform¹. A correlational design with incidental sampling for convenience was used. During lockdown, this methodology was the most appropriate for obtaining information.

Participants

In the present study were analyzed 175 Olympic and Paralympic athletes classified or in process to the Olympic Games in Tokyo 2021 ($M = 27.62$ years; $SD = 7.33$). 136 Olympic ($M = 26.4$ years; $SD = 6.2$) (Artistic gymnastics: 13, Athletics: 64, Golf: 8, Hockey: 42, Judo: 2, Swimming: 1, Triathlon: 2, Volleyball: 1, Wrestling: 3) and 39 Paralympic athletes ($M = 31.8$ years; $SD = 9.3$) (Athletics: 8, Basketball: 6, Canoe: 1, Cycling: 4, Football: 1, Judo: 1, Swimming: 9, Table tennis: 5, Taekwondo: 1, Triathlon: 2, Weightlifting: 1), gender (72 men, 103 women). Before participation, experimental procedures were explained to all the participants who gave their voluntary written informed consent in accordance with the Declaration of Helsinki. All the procedures were approved by the Commission of Bioethics and Biosecurity of the University of Extremadura (Spain) (approval number: 57/2020).

Procedure

Due to the COVID-19 crisis and the limitation of free movement, an intentional opinion-type sampling type was used. The call to participate in the study was made through a link sent by the federations of the different sports (De La Vega et al., 2020). The questionnaire was sent to 338 athletes: 230 Olympic athletes, answering 136 (59%), and 108 Paralympic athletes, answering 39 (36%). The participation criteria for the athletes was to be over 18 years of age and to be confined in Spain at the time of the study. Athletes who completed the online survey gave their passive consent to participate at the time of participating in the research. This study was completely voluntary, and no personal data was requested through which the participants could be identified.

Data collection lasted for 15 days (from March 24 to April 12, 2020). At that time all the Olympic and Paralympic athletes were in a situation of confinement by order of the Spanish government.

¹<https://www.google.es/intl/es/forms/about>

Firstly, they filled the informed consent and then completed the following items.

Academic and sport related information:

- Academic training (High school, University, Professional).
- At this moment, I am qualified for the Tokyo 2021 Olympics (Yes, No).

Individual perceptions about COVID-19 crisis in a Likert 1–5 scale (De La Vega et al., 2020):

- Level of personal concern about COVID-19.
- Perception of social alarm by COVID-19.
- Control perception level to avoid getting infected by COVID-19.
- Level of personal care to avoid contagion by COVID-19.
- Personal consideration about the postponement of Olympics Games to 2021 by COVID-19?
- I consider that high-performance athletes must comply with the confinement regulations to avoid contagion by COVID-19, even at the risk of diminishing their performance in the short and medium term.
- I consider that, because of the current confinement rules, my options to get my best performance in the next Olympics, in Tokyo 2021 (in the case of qualifying), may be affected.
- I am satisfied with the level of support that, in this context of COVID-19, public institutions have had with athletes with options to qualify for the next Olympics.
- Consider that the current situation generated by COVID-19 has greatly affected my training routines.

Psychological profile, by the following questionnaires:

- Personality by a Brief Version of the Big Five Personality Inventory, where extraversion, agreeableness, conscientiousness, neuroticism, and openness to experiences factors were analyzed on a Likert scale from 1 = “I am completely disagree” to = “I am completely agree” (Rammstedt and John, 2007).
- Loneliness by the short version of the UCLA Loneliness Scale. This scale has three items and it measures the perceived social isolation. It is answered on a Likert scale from 1 = “never” to 3 = “always” (Hughes et al., 2004).
- Psychological inflexibility was measured by the Acceptance and Action Questionnaire-II. It is a 7-item questionnaire where participant must respond in a 1 to 7 scale. This scale allow to analyze the psychological inflexibility considered a transdiagnostic process across psychological disorders (Ruiz et al., 2013).
- Anxiety by the State-Trait Anxiety Inventory (STAI) short form composed by six items responded in a 1 to 4 scale (Marteau and Bekker, 1992).

Statistical Analysis

The recruited data ($N = 175$), were grouped on the bases of age ($M = 27.62$; $SD = 7.33$), gender [$N_{\text{male}} = 72$ (41.1%), $N_{\text{female}} = 103$ (58.9%)], level of education [$N_{\text{highschool}} = 39$ (22.2%), $N_{\text{professional}} = 25$ (14.3%), $N_{\text{university}} = 111$ (63.5%)], Olympic and Paralympic participation [$N_{\text{olympic}} = 136$ (77.7%),

$N_{\text{paralympic}} = 39$ (22.3%)], and sport specialty [$N_{\text{individual}} = 124$ (70.9%), $N_{\text{collective}} = 51$ (29.1%)]. The inclusion criteria used for the present research was that athletes were actually classified or in process to classify to the Tokyo 2021 Olympic Games.

Before the data analyses, the normal distribution of the dependent variables was tested with the Kolmogorov–Smirnov and Shapiro–Wilk tests. All test results were statistically significant ($p < 0.005$ for all tests). Consequently, nonparametric tests were used. Group differences in the dependent variables were tested with the nonparametric Mann–Whitney U test, which is recommended for smaller samples and might be less sensitive to sample size differences between the groups (Fagerland, 2012). In case of three groups (i.e., age-groups), the Kruskal–Wallis H test, also known as the analysis of variance on ranks, was used. A bivariate correlation analysis between all variables was performed using Spearman correlation analysis r , which is used to measure the effect size of differences between variables according to the following thresholds: small ($|r| = 0.1$), medium ($|r| = 0.3$), large ($|r| = 0.5$), and very large ($|r| = 0.7$) (Fritz et al., 2012).

RESULTS

Descriptive data of all variables are presented in **Table 1**. The findings suggesting that the neuroticism was greater in female compared to male group (+32.59 points), which was also justified by the U Mann–Whitney test [$Z = 18.110$, $p < 0.000$, effect size (r) = 0.13, small]. This trend with higher scores in the group of women is also observed in *Inflexibility*, [+15.34 points, $Z = 3.900$, $p < 0.048$, effect size (r) = 0.29, small].

Regarding the academic training received, the U Mann–Whitney test reveal that athletes with university studies obtain

TABLE 1 | Age, individual perception about COVID-19 crisis and psychological variables.

	N	M	SD
Age	175	27.62	7.00
Personal concern	175	3.67	0.97
Perception of social alarm	175	4.18	0.79
Perception of control to avoid contagion	175	4.15	0.85
Personal care to avoid contagion	175	4.51	0.66
Agreement for the delay of the Olympics	175	4.69	0.71
Agreement with the confinement of high performance athletes	175	4.11	1.05
Altered options for maximum performance	175	2.82	1.28
Satisfaction with institutional support	175	3.00	1.26
Alteration of training routines by COVID-19	175	4.59	0.80
Extraversion	175	5.46	1.67
Agreeableness	175	5.71	1.43
Conscientiousness	175	8.1	1.61
Neuroticism	175	5.12	1.95
Openness to experience	175	7.39	1.82
Loneliness	175	4.17	1.64
Psychological inflexibility	175	14.98	6.27
Anxiety	175	13.15	3.93

lower scores than the other groups regarding the assessment that high-performance athletes remain confined [−27.59 points, $Z = 11.247$, $p < 0.004$, effect size (r) = 0.85, very large]. This trend with lower scores in the group of university studies was also observed in the perceived support of public institutions [−20.42 points, $Z = 7.018$, $p < 0.030$, effect size (r) = 0.53, large]. On the other hand, in the personality test results, differences appear in the athletes of professional training with respect to the other categories. These differences are in the sense of obtaining lower scores on the *Agreeableness* factor [−40.62 points, $Z = 8.836$, $p < 0.012$, effect size (r) = 0.88, very large]. In *psychological Inflexibility*, the results show higher scores of the group with Secondary Education, compared to the others [+28.62 points, $Z = 7.028$, $p < 0.030$, effect size (r) = 0.53, large]. Regarding the type of sport practiced, only significant differences in *Agreeableness* appear. In this sense, individual athletes obtain higher scores than those who practice collective sports [+17.85 points, $Z = 4.746$, $p < 0.029$, effect size (r) = 0.35, medium].

When the results are compared between Olympic and Paralympians athletes, three variables appear with statistically significant differences. First, Paralympic athletes have higher scores on the importance they place on the confinement of high-level athletes [+24.18 points, $Z = 8.017$, $p < 0.005$, effect size (r) = 0.60, large]. Paralympic athletes also receive more perceived support from public institutions than the Olympic athlete group [+13.56 points, $Z = 28.457$, $p < 0.000$, effect size (r) = 0.21, small]. On the other hand, the only differences that appear in the personality variables are those that refer to Paralympic athletes obtain higher *Conscientiousness* scores [+23.73 points, $Z = 6.944$, $p < 0.008$, effect size

(r) = 0.52, large]. Finally, a correlational analysis is shown in **Table 2**.

DISCUSSION

The aim of the present research was to analyze the effect of academic schedule, gender, the individual perceptions about COVID-19 crisis, and psychological profile (personality, loneliness perception, psychological inflexibility, and anxiety), in the perception of personal and professional threat of Olympic and Paralympic athletes facing the 2021 Tokyo Olympiad in the actual COVID-19 crisis. We found differences in psychological and social parameters between the athletes analyzed.

The present situation of confinement could be a source of stress that could be perceived and somatized increasing levels of anxiety, resulting from the perception of lack of control to adapt to the contextual demands, the imposition of liberty restriction and the non-voluntary self-isolation perception (Halabchi et al., 2020). Its health impact may be related to the duration of the quarantine (longer periods are associated with poorer mental health, avoidance behaviors, and anger), the fear of infection, frustration, and boredom, inadequate supplies (e.g., water, clothes, accommodation) or inadequate information (Brooks et al., 2020). In the present study we found how anxiety levels were in line with non-pathological population, showing no impact of the quarantine in the anxiety response of Olympic and Paralympic athletes. This fact could be related with the higher cognitive resources and large experience of these high-performance athletes in coping with anxiety contexts as competitions (Belinchón-deMiguel et al., 2019). These

TABLE 2 | Correlational analysis of study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Concern	1																
2. Alarm	0.17*	1															
3. Control	0.08	0.03	1														
4. Personal care	0.21**	0.13	0.51**	1													
5. JJO delay	0.17*	0.01	0.12	0.16*	1												
6. Sports confinement	0.17*	0.03	0.04	0.13	0.15*	1											
7. Influence performance	0.02	0.05	0.05	−0.07	0.12	−0.28**	1										
8. Institutions support	0.09	−0.03	0.14	0.03	0.15*	0.41**	−0.16*	1									
9. Training routines	0.03	0.09	−0.02	0.07	0.03	−0.08	0.28**	−0.08	1								
10. Extraversion	0.00	−0.02	−0.14	−0.15*	−0.08	−0.05	−0.08	0.05	−0.16*	1							
11. Agreeableness	0.01	0.03	−0.02	0.11	−0.07	0.09	0.17*	0.02	0.01	−0.17*	1						
12. Conscientiousness	0.19*	0.13	0.00	0.18*	0.08	0.03	0.06	0.15*	−0.04	0.01	−0.03	1					
13. Neuroticism	0.11	0.01	−0.10	−0.11	−0.01	0.00	0.28**	−0.16*	0.18*	0.00	0.09	−0.03	1				
14. Openness	−0.10	0.05	0.22**	0.23**	−0.01	0.04	0.04	0.07	0.09	−0.57**	0.03	0.10	−0.03	1			
15. Loneliness	−0.07	−0.02	−0.05	−0.08	−0.02	−0.05	0.172*	0.06	0.20**	−0.20**	0.08	−0.13	0.26**	0.11	1		
16. Psychological inflexibility	0.06	0.01	−0.03	−0.12	−0.10	0.01	0.25**	−0.14	0.21**	−0.08	0.08	−0.23**	0.56**	−0.08	0.42**	1	
17. Anxiety	0.03	0.11	0.05	0.03	−0.07	−0.04	−0.04	−0.04	0.10	−0.21**	0.03	−0.09	0.04	0.12	−0.01	0.02	1
M	3.67	4.18	4.15	4.51	4.69	4.11	2.82	3	4.59	5.46	5.71	8.1	5.12	7.39	4.17	14.98	13.15
SD	0.97	0.80	0.85	0.66	0.71	1.06	1.28	1.26	0.80	1.68	1.43	1.61	1.95	1.82	1.65	6.27	3.939
N	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175

* $p \leq 0.05$; ** $p \leq 0.01$.

characteristics could be also explaining the high punctuation in conscientiousness personality factor, fact related with the aim of to control every aspect of training, nutrition, life... that can finally affect competition. In this line, athletes presented a high perception of social alarm, but the concern about COVID-19 pandemic is medium, probably due to the high control perception to avoid contagion and personal care to avoid contagion.

The Olympic games are the most important sport event for athletes, and much of them depend on this event for their sports scholarships and sponsorships. Therefore, the importance of an Olympiad is extremely high for this population. Even so, there was a high agreement on the suspension of the Tokyo Olympics and the confinement of high-performance athletes. Probably due to the perception that confinement may not adversely affect their options for achieving highest athletic performance, even though alteration of training routines by COVID was high. Nevertheless, athletes with higher studies (university) presented lower agreement with the confinement of high-performance athletes. This fact could be related with a lower understanding of the situation and the no possibility to use the facilities of the high-performance centers that they used to train. Probably university athletes could blame public institutions for the lack of access to sports facilities, perceiving that fact as a lack of support, showing lower support perception from public institutions than athletes with less education.

Olympic and Paralympic athletes require a large investment of physical and psychological effort. The economic and professional future of many of these athletes depends on the result of a single competition that is held every 4 years. This is a major factor of uncertainty, pressure and stress (Kellmann and Günther, 2000). Therefore, having an adaptive and resilient personality, as well as, capable to control anxiety is a key factor in achieving success (Fletcher and Sarkar, 2012). Currently, in addition to all these factors, the COVID-19 pandemic appears as a new factor of uncertainty and lack of control, becoming a new stressor for Olympic and Paralympic athletes. Olympic and Paralympic athletes presented low psychological inflexibility, loneliness, and anxiety values, characteristic psychological profile of these population (Bond et al., 2011; Belinchón-deMiguel et al., 2019). Nerveless, athletes with lower studies (high school) presented higher psychological inflexibility than athletes with higher studies. Avoidance and psychological inflexibility are basic psychological characteristics to be able to overcome any negative event that may present, allowing us to become more adaptively to the context. In this line, previous authors have already found a negative relationship between educational level and psychological inflexibility (Wicksell et al., 2010) a factor that would further strengthen educational programs in professional athletes. Paralympic athletes presented higher scores on the importance they place on the confinement of high-level athletes, provably due to their limitation to train at home, perceiving how confinement could have a greater effect on their performance. Furthermore, and since they receive more support from public institutions than the Olympic, and this support depends on their results, its logical these higher values in this parameter.

Correlation analysis shown how neuroticism personalities perceived that confinement would have a higher impact in their performance, negatively affecting their training routines and feeling low institutional support. The negative emotions associated to this personality trait may be behind this poor adaptive thinking in the confinement situation (Harkness et al., 1995). By contrary, openness trait presented higher control and personnel care perceptions, more adaptative to the confinement than the neuroticism ones. In this line the psychological inflexibility also showed to be related with poor adaptive response to the confinement situation since higher psychological inflexibility presented higher negative perception in their sport performance, training routines and more loneliness feeling, and neuroticism trait. Psychological inflexibility is a psychological factor that has been related to worse states of health and less contextual adaptability (Woodruff et al., 2014). In the case of the present study, we found how high psychological inflexibility athletes experienced the greatest negative feelings, thinking that quarantine may affect them the most. This fact shows us the importance of psychological training in high performance athletes in order to maintain a positive mood and more flexible and positivist coping strategies, fundamental parameters to achieve high sports performance (Mummary et al., 2004).

Study Limitation and Future Research Lines

One of the limitations of the study was the no control of stress related hormones, fact that could improve the effect of the health crisis in the stress response of athletes. Future research must seek these issues. In this line, as a future research line, it would be interesting to analyze the impact of COVID-19 crisis in different performance level athletes as well as in young categories.

Practical Applications

The present research showed the impact of the unexpected health crisis due to the COVID-19 and how the government measures as confinement directly impact Olympic athletes. According to the results obtained we could recommend specific program to support Olympic and Paralympic athletes in this difficult and eliciting moment, specially at psychological level. In this line, interventions to improve psychological flexibility and coping would be the most recommended in order to reach an optimal and adaptative psychological status of athletes, allowing them to adapt their personal and professional life to the changing events that are occurring.

CONCLUSION

Olympic and Paralympic athletes showed negative perception of confinement with regards to their workouts, but not to their performance, in light of the Tokyo Olympics suspension. The confinement was perceived by Paralympic athletes more negatively than Olympic athletes in their training and performance. Regarding differences between sexes, female athletes perceived negatively in neuroticism and psychological inflexibility, as well as their perception of sports

performance incidence. Finally, the personality tests scored lower in professional athletes than in non-professional athletes.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

All the procedures were approved by the Commission of Bioethics and Biosecurity of the University of Extremadura (Spain) (approval number: 57/2020). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JF-G and MM conceived the study and funding acquisition. VC-S supervised the manuscript. VC-S and RV designed the

questionnaire. MM collected the data. JF-G and RV analyzed the data. VC-S, JF-G, RV, and MM interpreted the results of the research and, provided critical revisions and the formal analysis on the successive drafts. RV and JF-G designed the figures and tables. VC-S and JF-G wrote and edited the manuscript. All authors approved the manuscript in its final form.

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The 2020 Coronavirus Pandemic as a Change-Event in Sport Performers' Careers: Conceptual and Applied Practice Considerations

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The Coronavirus experience (CE) presents a highly challenging period for sport performers (e.g., athletes, coaches, referees), with potential effects on their lives and career trajectories. In this article, we initially conceptualize the CE using the scheme of change for sport psychology practice (Samuel and Tenenbaum, 2011a). Within this framework, the CE is understood as a longitudinal, multifaceted, unpredicted, non-controlled change-event, with four distinct stages: (a) a pre-Coronavirus stage with unique career contextual conditions (i.e., stable engagement or a transitional period), (b) Coronavirus stage-A accompanied by instability and confusion, emotional response, and cognitive appraisal, (c) Coronavirus stage-B characterized by active coping or regression, and (d) Coronavirus stage-C; instability endures or decreases, depending on career trajectory. The CE presents sport performers with modifications in various dimensions, including physical and physiological, motor skills, psychosocial and self-identity, relationships, performance and achievement, motivation and aspirations, organizational-occupational, and micro- and macro-cultural issues. Sport performers can exhibit several emotional responses (i.e., positive, negative, neutral), and consequential coping endeavors. The development of the change process is underlined by key decisions, manifested in sport performers' attempts to implement responsive change in these dimensions (e.g., adapt their diets, sleep routines, and exercise regimen). The second part of the article discusses applied practice considerations, presenting various techniques and methodologies which practitioners can apply while consulting from a change-based perspective. Ethical issues pertaining to the formation of effective therapeutic relationships during this period are also assessed. The conclusions offer future avenues for researchers and practitioners when attempting to evaluate and cope with this global phenomenon.

Keywords: athletes, coaches, referees, COVID-19, quarantine, detraining

INTRODUCTION

The year 2020 was foreseen as a peak year for many sport performers (i.e., athletes, coaches, referees), during which the realization of dreams and abilities would be achieved. However, the emergence of the Coronavirus pandemic during February-March 2020 resulted in major global changes, including quarantine and lockdown, social distancing, and cessation of commercial flights.

Naturally, these had a considerable effect on the world of sport, as athletes could not train or compete, as well as travel to international meets. Thus, most major sport events planned for 2020, such as the Tokyo Olympic Games (OGs), the Euro (European Championships in association football), and the Wimbledon tennis tournament, were either delayed or ultimately canceled (BBC Sport, 2020). Athletes were faced with considerable modifications of their lifestyle and routines, interpersonal relationships, financial status (e.g., a loss of a job or a sponsor), as well as with the loss of aspirations and self-fulfillment (Taku and Arai, 2020). Those who got infected by the Corona Virus Disease 2019 (COVID-19), experienced health concerns as well as insecurity related to physical, performance, and occupational status. Other sport performers, such as coaches and referees were also experiencing meaningful changes to their sport engagement and career trajectories, feeling less publicly essential than they were used to (Taku and Arai, 2020). It was suggested that elite referees faced issues, such as quarantine, time away from families and loved ones, a lack of ongoing contact with colleagues, and fiscal concerns (Webb, 2020).

In an attempt to evaluate the effects of the Coronavirus pandemic on Olympic/Paralympic athletes, the International Society of Sport Psychology (ISSP) published three editorials and commentaries. It was suggested that: "The postponement of the Olympic and Paralympic games represents a significant career disruption. It potentially involves a loss of identity, motivation and meaning" (Henriksen et al., 2020, p. 1). In another ISSP publication, this new situation was regarded as a "crisis transition," with potential stress responses including decreased sleep and appetite, increased rumination, loneliness, and fear of the uncertain future and the alternation of the Olympic cycle (Schinke et al., 2020a). In a third publication, the influence of cultural context was considered as important in how professional athletes might respond to social distancing. Also, a centralized athletic identity might hinder psychological responses to social distancing during the quarantine period (Schinke et al., 2020b). Similarly, the Association for Applied Sport Psychology (AASP) suggested that during this period athletes might experience an emotional rollercoaster due to "the constant influx of information, changes to daily routines, uncertainty with personal health and the health of others coupled with rapidly changing reports." This organization also published practical recommendations for athletes and practitioners to maintain mental health and effective support during this period (Byrd et al., 2020).

Pillay et al. (2020) circulated an online survey to elite and semi-elite South African athletes during the final phase (last week of April 2020) of their domestic level 5 lockdown. The results revealed that sleep patterns changed significantly during the quarantine period (79%; $p < 0.01$) and that a significant number of athletes consumed excessive amounts of carbohydrates (76%; $p < 0.01$). During this period, most athletes trained alone (61%; $p < 0.01$), daily (61%; $p < 0.01$) at moderate intensity (58%; $p < 0.01$) and for 30–60 min (72%). Furthermore, many athletes reported feeling depressed (52%) and have struggled to keep themselves motivated to exercise

(55%). Concerning the return to competitive sport, 35% of the athletes expected to return within 1–3 months whilst 31% felt unsure. Only 50% of them were comfortable with returning upon authority approval, naming requirements, such as established protocols, risk mitigation strategies, and guidance/support from sports federations.

In a similar vein, di Fronso et al. (2020) have examined the perceived stress and the psychobiosocial states of competitive Italian athletes representing individual (e.g., tennis, golf, swimming; $n = 539$) and team (e.g., soccer, basketball, rugby; $n = 593$) sports, a month after the beginning of the Italian lockdown. The findings suggested that compared with the preceding period (i.e., data was generated from Italian norms of these factors), the COVID-19 crisis was associated with athletes' higher levels of perceived stress and dysfunctional psychobiosocial states, and lower levels of functional psychobiosocial states. These effects were more dominant for women athletes. Moreover, Elite/expert athletes reported lower perceived stress and higher functional psychobiosocial states scores than novice performers, potentially reflecting their more attuned coping resources. As part of their coping efforts, most of the athletes (80%) reported being in contact via the web with their coaches or other professionals, emphasizing the importance of "staying connected."

Likewise, Clemente-Suárez et al. (2020) surveyed 175 Olympic and Paralympic athletes from several sport disciplines, who had been confined in Spain at that time (March 24 to April 12, 2020). Academic and sport variables, individual perceptions about the COVID-19 crisis, and psychological factors were assessed. The findings indicated that Olympic and Paralympic athletes showed negative perceptions of the confinement with regards to their workouts, but not to their performance. Also, no significant impact of the quarantine in the anxiety responses of the athletes was evident. This could be attributed to the coping skills and experience of these high-performance athletes in coping with anxiety. Paralympic athletes felt a stronger impact of the confinement in their training and performance than Olympic athletes, suggesting that every athletic population might be unique in its response.

Reframing the Coronavirus experience (CE) within the various contexts of sport performers' careers is imperative to enable the sport community to effectively respond and cope with this new and demanding situation. While many sport performers were negatively affected by this situation, others might have perceived it rather positively (Taku and Arai, 2020). For example, injured athletes had more time to recover and inexperienced Olympians had time to improve their skills (Henriksen et al., 2020; Schinke et al., 2020a). Thus, specific career contextual conditions can be seen to influence sport performers' perceptions of and reactions to this unique situation. To allow effective support, it is vital to accurately define this experience, using valid conceptual frameworks. Thus, in this article, the CE is first evaluated using the scheme of change for sport psychology practice (SCSPP; Samuel and Tenenbaum, 2011a). Then, applied practice considerations are discussed. Finally, recommendations are suggested for future research.

THE SCSPP

The SCSPP (Samuel and Tenenbaum, 2011a) suggests that the athletic career is highly dynamic and is characterized by the appearance of various types of change-events that can disrupt the athletic engagement status quo, cause instability, and initiate a demand for change. Change-events can be characterized with a negative (e.g., *injuries*), a positive (e.g., *a transition to a higher level*), or a moderate (e.g., *modifications in sport regulations*) emotional profile, pertaining to perceived significance, perceived severity, emotional and cognitive reactions, perceived control, and effective/ineffective coping (Samuel and Tenenbaum, 2011b; Samuel et al., 2020a). The perceived significance of a change-event is related to athletic identity (AI; Brewer et al., 1993) as well as to the impact it creates in the athlete's career (i.e., how much imbalance it creates to the career status quo). It is suggested that change-events which are "closer," or more related, to athletic identity (e.g., injuries, transitions among professional levels) would be perceived by athletes as more significant and emotionally severe (i.e., either negatively or positively) in the context of the athletic career (Samuel and Tenenbaum, 2011a).

Upon experiencing a change-event in their careers, athletes engage in an appraisal process, in which they consider the characteristics of the event in the context of their careers, their existing coping resources, and potential solutions. Unique characteristics of change-events include: the perceived significance (i.e., how much change it creates in the athlete's career), its temporal nature (i.e., whether it is a distinct event vs. a longitudinal process), whether it involves merely the athlete (e.g., an injury) or additional individuals (e.g., a conflict with a coach or a colleague), the dimensions in which the change occurs (i.e., whether it is mostly sport-related or includes various life dimensions), the timing in which the change occurs in athletes' lives and careers, and the affective nature of the event (i.e., whether it is positive or negative; Samuel and Tenenbaum, 2011a).

Cognitively appraising the new situation, athletes then make a strategic decision as to how to initially respond to the change-event: (a) deny/ignore it, (b) cope independently, (c) consult with others, or (d) consult with a sport psychologist. Various factors might affect athletes' strategic decisions, including: their perceived control over the situation, sport motivation (i.e., quality and intensity), athletic identity, existing coping skills, and available support (Samuel and Tenenbaum, 2011a). In deciding to avoid change, athletes typically remain in a state of emotional instability, unless the situation is favorably resolved without the need for coping or intervention. On the other hand, a decision to change means that the athlete is applying all necessary adjustments to effectively cope with the new situation. This conscious decision is moderated by the athlete's motivation and capacity for change, the application of therapeutic processes (independently or professionally), and existing psychological support.

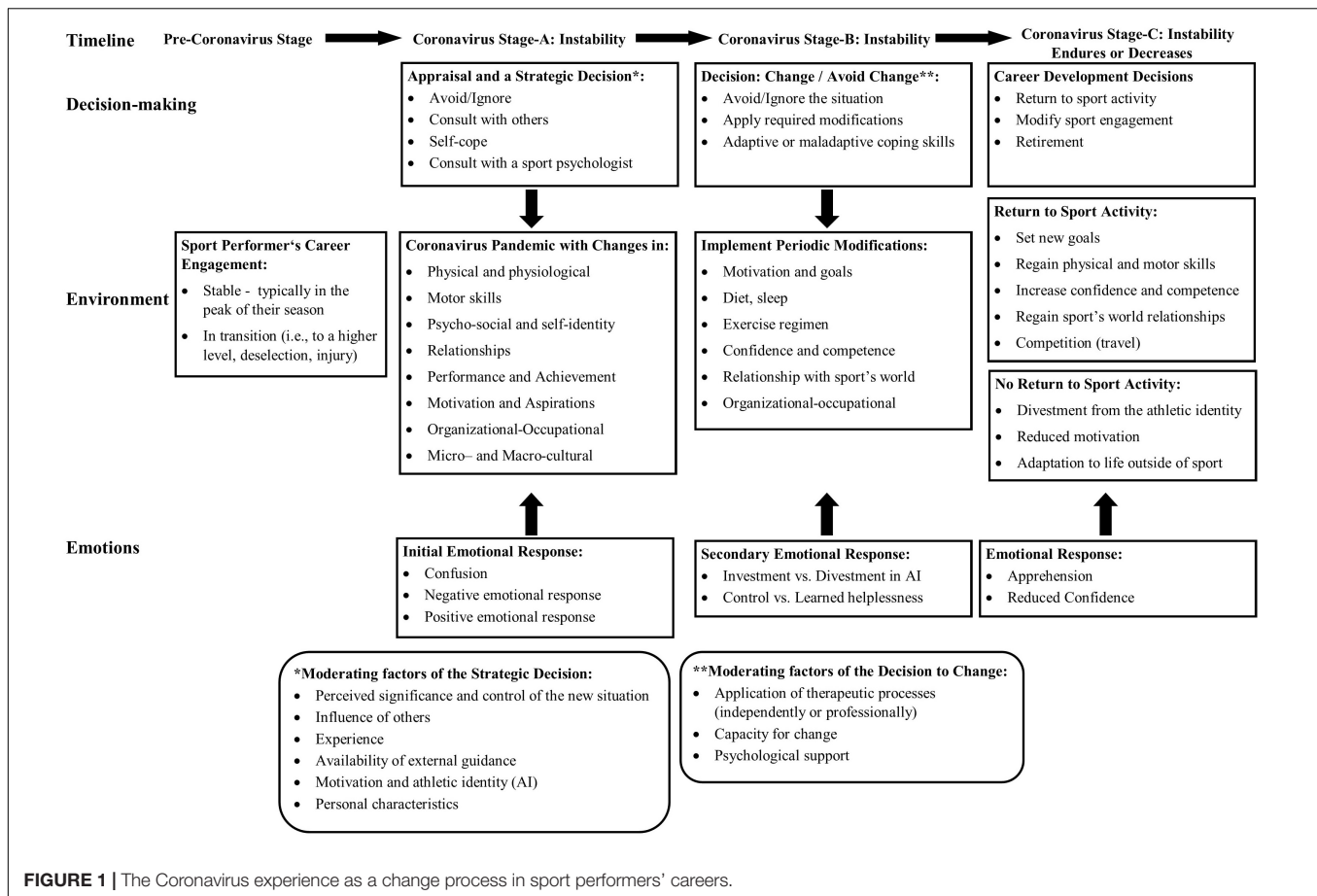
It is further assumed that motivated athletes who also maintain a capacity for change, and who receive adequate psychological support, will make the decision to change. Then athletes will attempt to implement the change in the relevant

dimensions of their athletic engagement. In implementing the change, athletes will feel in control and will assume responsibility for initiating the change. As a result, they will tend to perceive the outcome of the change process more positively. However, a probabilistic perspective is adopted, recognizing that various factors can affect the outcome of the change process. The SCSPP has received empirical (e.g., Samuel and Tenenbaum, 2011b; Knowles and Lorimer, 2014) and applied practice support (Samuel, 2013). It was also expanded to examine the career change-events of additional sport performers, including coaches (Samuel et al., 2020a) and sport referees (Samuel et al., 2017; Samuel, 2019).

CE AS A CAREER CHANGE-EVENT

The conceptualization of the CE as a career change-event is presented in **Figure 1**. The development of the change process is presented along the time plane, the environment plane, the decision-making plane, and the emotional plane. Several career trajectories are consequently foreseen during and following the CE. Considering the unique characteristics of the CE and the changes it posed on sport performers' careers, it could be classified as a longitudinal, multifaceted, unpredicted, non-controlled change-event. To a degree, we can compare the complexity of this unique experience to a severe injury or illness, which presents itself unexpectedly and forces sport performers to considerably change their sport engagement (see Samuel et al., 2015). However, dissimilar to an injury, which is an individual experience, the CE presents a shared-cultural experience; performers in comparable geographical locations were faced with the same challenges.

The sport performer typically experiences four stages of the change process: (a) a pre-Coronavirus stage with unique career contextual conditions (i.e., stable engagement or a transitional period), (b) Coronavirus stage-A accompanied by instability and confusion, emotional response (i.e., positive or negative), and cognitive appraisal, (c) Coronavirus stage-B characterized by active coping or regression, and (d) Coronavirus stage-C; instability endures or decreases, depending on career trajectory. In the pre-Coronavirus stage, sport performers were experiencing a stable sport engagement, typically being at the peak of their season or getting close to it (i.e., around February). At this stage, they had a specific career status (i.e., general sporting circumstances) pertaining to motivation, skills, and performance as well as personal lives, which could have affected their initial response to the Coronavirus emergence. Alternatively, performers could enter this new situation in an unstable and transitional status, affecting their readiness and capability to cope with the new situation. These included a transition to a higher professional level (e.g., cadets to junior, junior to senior, transition to a professional league, signing a new contract), contemplating of moving to play internationally, experiencing deselection from a club or national team, or approaching contract termination. They were required to manage these processes under much uncertainty, and making new decisions pertaining to their career development. For example, professional team-sport



players who had contemplated moving to play abroad, now needed to decide whether to take professional and personal risks (e.g., travel internationally, financial uncertainty) and actualize this move in order to promote their careers, or alternatively maintain stability and remain playing in their domestic countries.

In the second stage, the Coronavirus had emerged, and sport performers were potentially experiencing career instability (Coronavirus stage-A, see **Figure 1**). They were perhaps required to reconsider the new situation and its potential impact on their careers. The initial emotional response might have typically involved confusion as there was much uncertainty. Athletes could have experienced changes in all facets of their engagement, as indicated in **Figure 1**. Depending on their evaluations of the new situation within the particular career context, certain athletes have arguably responded with a negative emotional response (i.e., maladaptive) while others have responded with a positive emotional response (i.e., adaptive). It is suggested that this stage also included active decision-making related to their initial response. In this stage, there were athletes who decided to disregard the new situation, cope with it independently, or consult with others. Among the latter, some also acknowledged the severity of this situation and obtained the advice of a sport psychology consultant. This strategic decision was moderated by various factors (e.g., perceived significance, motivation, experience), as indicated in **Figure 1**.

Following the initial perception of the new situation, athletes moved to the third stage, which arguably required them to maintain high motivation and invested athletic identity. While in many cases athletes did not have control over the environmental circumstances (e.g., whether their regular sport activity had returned or not), they still needed to assume control over their emotional response and their willingness to adapt their routines accordingly. Some athletes made a conscious decision to change, apply any required modifications to daily and weekly routines and lifestyle. For example, shotput coach, Dale Stevenson, commented on how adaptive athletes were during this period (World Athletics, 2020):

In the circumstances I've had to make a big shift away from control and to trust the athletes to self-direct... One athlete has improvised by using sandbags in training, although it is hard to know the weight of the sandbags. There are now great volatility and variations in terms of the training elements.

To effectively cope with the uncertainty, athletes could use adaptive coping strategies (Carver, 1997), including (a) instrumental support from coaches, fitness trainers, and nutritionists, (b) emotional support from family, friends, and consultants, (c) making action plans and taking direct actions to enhance their physical and psychological well-being, and (d)

increasing their efforts be open to the new experience and vent their negative emotions out. Alternatively, athletes could decide to ignore the uncertain times and divest themselves from their sport engagement. The latter is well reflected in the following quote from tennis legend, Roger Federer (Khanna, 2020):

The truth is I'm not training because, to be honest, I don't see a reason to do it right now. I'm physically fine and I think it will be a long time before we compete again. It's important for me to take a good rest now. I don't miss tennis so much, although when we are close to returning and I have a goal to train, I will be super motivated.

As indicated in **Figure 1**, during stages B and C, athletes probably experienced a range of changes in their sport engagement, requiring them to make psychological and behavioral adaptations. Considering the *physical and physiological dimension*, athletes and referees were forced to gradually or abruptly (i.e., depending on their global location and type of activity) reduce their training regimen, as they became more and more secluded. They could not exercise regularly, abandoned their competitive apparatus, and ignored their physical routines. Many athletes experienced “a detraining syndrome”; a clinical condition that might develop when athletes with a long endurance-training history suddenly abandon their regular physical activity (Andreato et al., 2020). This syndrome is characterized by a mixture of physical and psychological negative effects (Mujika and Padilla, 2000). For example, detraining had an impact on caloric balance and metabolism (i.e., increase in body fat and decrease in muscle mass), resulting in expected modifications to sleep and diet practices. Not being able to use their body as they were used to, athletes and referees might have felt restless, experiencing somatic anxiety and negative mood (Jukic et al., 2020).

Complementing the detraining effects, the longitudinal stress induced by the quarantine or lockdown, during stage-C, might have resulted in a feeling of *learned helplessness* (LH; Maier and Seligman, 2016), with ramifications for athletes' physical and mental health. LH is a maladaptive motor and behavioral deficit in response to neural compromise. It was suggested that following an anterior cruciate ligament reconstruction, athletes are prone to experience LH as a result of being in a longitudinal inactive state, among other factors (Burland et al., 2019). To prevent the maladaptive syndromes athletes must have maintained in a high functioning neural and sensorimotor state during Coronavirus related quarantines/lockdowns. The fluctuations in stress and the modifications in exercise routines could result in athletic injuries or illness (Brink et al., 2010; Ivarsson et al., 2017).

In the *motor skills dimension*, the lack of engagement in physical activity could have led to reductions in speed, technical accuracy, sensorimotor coordination, and movement flow (Tran et al., 2017; Jukic et al., 2020). There is evidence that only 2–4 weeks of training cessation can cause a significant and marked loss of performance in both active populations and elite athletes (see Sousa et al., 2019). Athletes might feel that well-established movements (i.e., motor programs) are being lost as time passes. This feeling is especially relevant for those athletes who were at

the peak of their season (e.g., attempting to qualify for the OGs). Similarly, referees might experience reductions in movement coordination and decision-making speed and accuracy (see Samuel et al., 2020). In addition, the uncertainty about coming back to training forms a high sense of frustration, as skills are diminishing continuously.

Injured athletes are a sub-population that could have experienced the CE in a somewhat conflicting manner. On one hand, this period allowed recuperation and the ability to resume fundamental skills as well as gain confidence in their physical readiness. Athletes could adhere to rehabilitation protocols more sensibly. On the other hand, those who refrained from medical support, might have experienced a highly negative period, which potentially slowed down their recovery. Loss of rehabilitation motivation could result in negative feelings and helplessness (Burland et al., 2019).

The *psych-social and self-identity dimensions* were also heavily influenced. Friesen and Orlick (2010) suggested that elite athletes may have extraordinary physical talents and capacities, but they are still “regular people.” While this contention may be important for consultants of elite athletes, in the minds of elite athletes they might not be “regular individuals.” Thus, having to face ordinary adversity pertaining to limited basic foods and supplies, physical and medical insecurity, social isolation, and financial insecurity, might have been very challenging for elite and professional athletes. They were no longer the center of attention as they were used to be, potentially experiencing a significant challenge to their AI.

Furthermore, to effectively cope with this new and uncontrollable condition, it is possible that athletes, coaches, and referees might have begun to distance themselves from the sport performer's role. When asked by their surrounding how they were feeling, many responded: “I'm just fine”; yet, in fact, their lack of emotional turmoil reflected the divestment of identification with the athlete/coach/referee role. This process is experienced in athletes following a retirement (Lavalley et al., 1997) or deselection (Grove et al., 2004). In this context, Samuel et al. (2015) demonstrated the importance of maintaining a high AI during longitudinal rehabilitation from a severe injury. Therefore, athletes might feel a conflict between their desire to maintain a high AI and their athletic engagement being considerably modified. As suggested by Coulter et al. (2016), unlike traits, people choose their goals in light of the social contingencies afforded to them. They can be defined through their goals, values, and other characteristic adaptations. In the CE, sport performers compromise between conflicting values, for example, their wish to maintain recognition and their wish to maintain physical health at all costs. For example, Newcastle United football player, Danny Rose, commented (Skilbeck, 2020): “But just off the fact people are suggesting we should go back to football, it's basically like we're guinea pigs or lab rats, that we're going to go back to this phase and see if it works or not.” Furthermore, athletes were required to adapt their self-narrative perspective to meet the new situation. Narrative identities give lives their unique and culturally anchored meanings (Coulter et al., 2016). For example, by accepting that they must train differently or that the financial situation of clubs has changed. In

this context, coaches, referees, and supporting staff might have begun to feel as “non-essential” individuals and were required to modify this narrative to become useful and “continue to be a resource” for athletes, peers, and family (Byrd et al., 2020; Taku and Arai, 2020). Olympic track coach, Mersha Asrat, for example, believes his role during these challenging times is to put a plan in place to “survive the storm.” He commented that (World Athletics, 2020): “All my athletes need to be strong – a role model for others with their behavior. . . As a coach, I have to tell them that this will pass.”

In addition, sport performers were typically required to adapt to abrupt changes in *relationships with others*. Regularly, sport performers engage in many social interactions with the external world (e.g., fellow athletes, coaches, referees, support staff, fans, and media) and were now reduced to interactions with their close ones. Being confined to their homes, athletes were forced to adapt to a new role, “a family person,” which could have been overwhelming for some. Moreover, sport performers are used to engaging in a transnational lifestyle and now lost much of their sense of freedom. For example, The Brazilian horizontal jumps coach, Nelio Moura, found himself coaching in China when the Coronavirus emerged. Together with his athletes he had experienced the difficulties of international traveling and associated quarantine. He commented on this period: “with so much uncertainty regarding the outdoor season and beyond, the biggest challenge is to keep everybody motivated and positive about the future.” Furthermore, during this period he identified communication as a key. Therefore, Moura uses an Athlete Monitoring System to send training schedules and monitor training plans (World Athletics, 2020).

Athletes might also experience challenges associated with having a family member, friend, or close acquaintance become seriously ill or die due to COVID-19. The relevance of this issue may vary depending on the reach of this pandemic in a given athlete's country or region. Athletes who experience COVID-19 related loss and grief might experience a range of physical, cognitive, emotional, and behavioral symptoms (see Anderson, 2010) as well as potential modifications in their identity and motivation, both in life and in the sport domain. In addition, as the family is often an important support resource in athletes' careers, such a misfortune might significantly impair athletes' ability to maintain their regular activity. For example, mixed martial arts fighter, Khabib Nurmagomedov, had lost his father and coach, Abdulmanap Nurmagomedov, on July 3, 2020, at the age of 57, after suffering a heart attack and pneumonia following a positive test for COVID-19. The athlete confessed the pain is still raw as he continues to grieve. He also revealed how challenging it has been for him to continue his athletic engagement (Jones, 2020):

We were like friends. He was my father and coach, we were always together. We were very close. . . Of course, I'm sad. If I tell you with a straight face that it doesn't affect my training, that'd be a lie. It does affect me, I think about him all the time.

Considering the *performance and achievement dimensions*, in most cases, athletes and elite referees coped with an abrupt cessation of their seasons. For many of them, this occurred in March-April 2020, when a number of sports were in the midst of their competitive engagement (e.g., entering the playoffs, attempting to secure Olympic qualification). Not being able to satisfy their achievement motivation and perform was highly demanding. Initially, there was much confusion concerning what would happen with the world of sport. The governmental-organizational decisions concerning the delay of the Tokyo OGs and other major sport competitions, which developed over a few weeks, could be perceived as detrimental for many athletes who wished to actualize their current abilities. Thinking of maintaining their form for another year, or perhaps even required to requalify for the OGs, was challenging (Schinke et al., 2020a). However, for those who were not in their peak ability and for those injured athletes, this break could also be perceived as beneficial (Taku and Arai, 2020). Thus, for inexperienced Olympic athletes or those with “ability gaps,” gaining an additional year of preparation was perceived favorably (Henriksen et al., 2020; Schinke et al., 2020a). On the other hand, for athletes who expected to retire from their athletic engagement following the Tokyo Games or to begin a dual-career, the postponement was undesirable. For example, both Tom Ransley, a double Olympic medalist on the British rowing team, and Eddie Dawkins, the Rio Olympic track cycling silver medalist, had announced their retirement (Taku and Arai, 2020).

Naturally, performance and achievement modifications as well as parallel change processes had posed a great challenge to the athletes' *motivation and future aspirations*. They were required to reevaluate the relationships with their sport engagement and reposition the role of sport in their lives. The uncertainty concerning the future combined with the absence of achievement goals could typically result in reduced effort to exercise and maintain physical ability during the quarantine (Pillay et al., 2020). This effect was intensified as most athletes were isolated from teammates and coaches (Byrd et al., 2020; Henriksen et al., 2020).

Considering the *organizational dimension*, athletes, coaches, and referees experienced much uncertainty and instability. The international and domestic governing bodies, as well as the sport clubs, entered into an unspecified period of financial insecurity and debated or decided to reduce the salaries of athletes, coaches, and referees. For example, the NBA announced a 25% reduction in players' salaries (NBA, 2020). American college football coaches were also asked to make financial concessions (Sallee and Kercheval, 2020). In many cases, this resulted in mistrust and further affected the athletes' and coaches' motivation and confidence. Vealey and Vernau (2010) had emphasized the imperative role of “organizational confidence” in building athletes' self-confidence. In addition, there were several conflicts concerning the return to play protocols while considering quarantine and testing (MacInnes, 2020). Furthermore, in foresight, it seems that players and coaches would need to adapt to a changing international market, with fewer financial resources available worldwide leading to modifications in their market

value, thereby creating alternated career trajectories (Transfer Market, 2020).

Athletes further experienced changes pertaining to the *micro- and macro-cultural dimensions*. In macro, they were exposed to global and national ramifications of the Coronavirus concerning quarantine and lockdown, health issues, death toll, and national morale. Some cultures maintain tighter family relationships and were heavily affected by the inability to meet with their extended family members (Schinke et al., 2020b). In micro, each nation and sport discipline reacted differently to the new situation and posed specific regulations. For example, while the French first league football season was canceled by the French government, in other nations there was a decision to continue or resume playing (Aarons and Lowe, 2020). Sport performers affiliated to sport disciplines that were canceled for the season might feel disappointed and even embarrassed by the organizations' inability to resume activity. In addition, it is also possible that the meaning of values that society places on sports (i.e., societal values, such as "athletes are supposed to make a full commitment for training and win for the country") have been challenged by the COVID-19 pandemic. This is especially eminent when an athlete's personal values (e.g., "my priority is to enjoy each moment regardless of the consequences") might contradict the societal ones (Taku and Arai, 2020).

Finally, athletes experienced modifications in the *technical-technological dimension*. During Coronavirus stage-B, they adapted to new technologies, such as Zoom-based workouts and other new communications. Archers, for example, were inclined to improvise home-made targets to maintain their skills. Coaches were required to present athletes (and referees) with new training methods, considering social distancing as well as their unique physical and mental conditions. For example, marathon coach, Patrick Sang, commented on the challenges involved in long-distance coaching (World Athletics, 2020):

Our coaching is very much one on one and the "coach's eye" is an instrument we use to see how the individual athletes are responding to the workload at any given time. The activation of the coach's eye in these circumstances is not possible. You are relying on the feedback of the athletes.

Therefore, each of them must have maintained adequate physical and mental abilities to cope efficiently as possible with the pandemic constraints. For those who lacked with the twenty-first century skills (e.g., technical-technological skills, information management and communication skills, creativity), the transformation to a technological world might have been overwhelming (Ritter et al., 2018).

The last stage of the change process (Coronavirus stage-C, see **Figure 1**) typically involves the athletes getting out of the quarantine/lockdown and returning to sport activity under domestic restrictions. This period is characterized by much apprehension and a need to regain confidence as active performers. Those who decided to return to active engagement are required to set new goals for this period, regain their physical and motor skills, increase general self-confidence as performers and specific skill related competence, and reestablish

their relationships with their sport environment. When possible, athletes (and referees) would need to regain their competitive edge, initially by competing domestically and later by traveling internationally. The latter would remain challenging until the Coronavirus is globally eradicated. Those who got infected with COVID-19 might feel embarrassment and guilt for potentially affecting their colleagues (Cox, 2020). Older coaches might feel at risk for infection and experience a conflict between maintaining their careers and risking their health (Young, 2020). In addition, it is possible that sport performers would experience a circular process going back and forth between attempts to restart their competitive activity and going into quarantine or lockdown.

Furthermore, the challenge of quickly returning to sport activity, and at the same time adapting to the new demands of the environment (i.e., maintaining social distancing, apprehension of becoming infected with COVID-19) could also result in heightened stress response and risk of injury (Ivarsson et al., 2017; Andreato et al., 2020) or illness (Brink et al., 2010). Competing or refereeing in high frequency, as part of an intense effort to finish domestic leagues, might also lead to overwhelming physical and mental demands. For example, 14 cases of injuries were reported in German football Bundesliga and Bundesliga 2 over the first weekend of return to action (MARCA, 2020).

In addition, the need to compete in the absence of a crowd can be challenging for those motivated by such factors. For example, at the beginning of March 2020, NBA star, LeBron James provided the following quote (The Guardian, 2020):

We play games without the fans? Nah, that's impossible. . . I ain't playing if I ain't got the fans in the crowd. That's who I play for. I play for my teammates, and I play for the fans. That's what it's all about. So, if I show up to an arena and there ain't no fans in there, I ain't playing. They can do what they want to do.

Interestingly, James, as his fellow NBA players, continued to play the 2020 NBA season without the presence of a live crowd. This, perhaps, is an indication that sports participants had to adapt to this new reality. Therefore, in terms of the change process, it is predicted that sport performers who adopt this career trajectory would gradually feel less instability, as they return to the status quo.

APPLIED PRACTICE CONSIDERATIONS

Consisting of the conceptual tenets of the SCSPP, Samuel (2013) developed a six-phase consultation framework to support sport performers in change-events. The initial three phases involve *assessment*: (a) identifying the change-event experienced, (b) understanding the client's perception of the change-event experienced, and (c) recognizing coping efforts/strategies and support resources. The final three phases involve *application*: (d) activating processes of change, (e) offering a decision to change, and (f) supporting the client's attempts to implement this decision. This framework has been used with various athletic populations, including athletes (Samuel, 2013; Samuel et al., 2020b) and referees (Samuel, 2019).

At the emergence of the Coronavirus, the world of sport could not immediately evaluate all aspects of this change-event. Moreover, data or research findings concerning the psychological impact of such events on athletes were unavailable. Thus, practitioners must have considered how this event could modify sport performers' lives and careers. Educating athletes and their affiliates about the range of changes they are potentially experiencing is initially recommended, as this is a new phenomenon that they encounter. Engaging in a dialogue with the athletes and their affiliates better allows practitioners to assess their perceptions of the change-event and provide more effective support. It must be considered that sport performers are not necessarily negatively affected.

Having a "point of reference" is vital in psychological consultation. The fact that practitioners and athletes cannot accurately define the situation is impeding. For example, some clients might view the situation as a *break* or *off-season period* while others might perceive it as a *catastrophe* to their engagement. Thus, to maintain the athletes' motivation and AI, practitioners can address this condition as an *injury recovery period*. Typically, during the recovery phase of an injury, athletes assume perceptions of control and apply high efforts to actively cope with the injury while adapting their lifestyle and routines (Samuel et al., 2015). By conceptualizing the situation like an injury recovery phase, rather than a break, practitioners might keep sport performers within the world of sport. For those who would return to competitive activity after 2–3 months, this could prove to be vital.

As part of the *assessment phase* of the consultation process, it is also vital to evaluate the client's *coping efforts* and *support resources*. Here, it begins to be evident which sport performers are relying on their environment for support and who is instigating a divestment from the sport's role. Using short inventories, like the Brief COPE (Carver, 1997), practitioners can assess whether sport performers are using adaptive or maladaptive coping strategies. For example, using a follow-up procedure to capture their active plans can result in a purchase of home fitness equipment and in a modification of their practice routines (World Athletics, 2020). Such a procedure might also assist in detecting disengagement behaviors or even substance use.

The *application phase* of the consultation process focuses on reaching a *decision to change*, using the *processes of change*. The latter reflect "the covert and overt activities that people engage in to alter affect, thinking, behavior, or relationships related to a particular problem or more general patterns of living" (Prochaska and Norcross, 1994, p. 12). In the CE, the decision to change reflects the athletes' willingness to stay close to their sport engagement despite the uncertainty, and maintaining high AI and motivation. Practitioners can apply *consciousness-raising* to make their clients aware of the new situation and suggest potential cures (Prochaska and Norcross, 1994). *Catharsis* allows clients to express their negative emotions, such as fear and anxiety, frustration, and insecurity (Prochaska and Norcross, 1994). This can be achieved by discussing past experiences when they have dealt with adversity. Furthermore, practitioners can promote *self-reevaluation* which involves assessing how feelings

and thoughts about oneself with respect to a problem, and includes techniques, such as *value clarification*, *healthy role models*, and *corrective emotional experience* (Prochaska et al., 1994). For example, during April–May 2020, "The Last Dance" series was broadcasted on Netflix (co-produced with ESPN films), featuring Michael Jordan and the Chicago Bulls. Discussing with athletes the adversity and coping in these players' careers can increase awareness of the athletes' own coping efforts and allow them to be inspired to assume control over their careers. This would be an example of the use of a process of change termed *dramatic relief* (Prochaska and Norcross, 1994) in which the athlete observes emotional scenes in the environment, such as movies, and reacts with cathartic feelings (Samuel, 2013).

Engaging in *self-liberation*—the process in which individuals are becoming more aware of their needs, their barriers and alternatives, believe that they can create change, and commit to this belief—is also important for generating a healthy life routine. Likewise, they can apply *contingency management*; a process of change that refers to the modification of contingencies in the environment to create a behavioral change in a particular direction (Prochaska and Norcross, 1994). These changes are manifested in setting new goals for the quarantine period (e.g., maintain fitness and strength levels) and thereafter for the return to activity period (e.g., increase speed and technical skills). It is further manifested in modifying dietary and sleep routines to accommodate for detraining effects as well as engaging in a home-based exercise regimen. Here, the practitioner must work with clients to self-regulate their stress levels to ensure that physical demands will prevent illness or injury. It is advised to introduce clients to mindfulness interventions/applications which allow stress management and increase sleep quality during this period (Li et al., 2018).

Another recommendation is to assist athletes in maintaining sensorimotor activation of their nervous system. For example, using a 15-min daily Zoom-based program in which athletes (and referees) respond to auditory (e.g., the practitioner's clap of hands) and visual (e.g., the practitioner's fist opens and closes) cues produced by the practitioner. Also, athletes can build tactical plans related to their sports and practice imagery scripts. For example, a judoka may watch videos of their potential competition opponents, identifying their main techniques and tactical behavior. Then, s/he can relax, close their eyes and visualize a competition fight against this opponent.

Practitioners are advised to discuss the influence of the situation on the athletes' identities (Henriksen et al., 2020). On one hand, maintaining a high AI may prove beneficial for their coping and return to the sport. On the other hand, a centralized sport identity may lead to social isolation and increased anxiety in case of an unexpected postponement of the return to activity (Schinke et al., 2020b). In this context, practitioners must try to assist in preventing major reductions in their self-confidence and sport competence. Furthermore, professional, high-profile, athletes might find themselves in an internal conflict whether to engage in their sport at all costs (e.g., risk of getting infected with COVID-19; reduced salaries) including competing with no crowd, or whether to postpone their return. In a sense, this

situation (i.e., competing with no crowd) poses a demand to deprive esteem needs to fulfill self-actualization needs.

The decision to change is also manifested in maintaining working relationships with fellow athletes and not disengaging from such relationships. Relationships during quarantine might reduce in quality and attention is required to regain rapport. Finally, practitioners must facilitate athletes' attempts to reorganize and define their relationships with their organizations and employers. This may involve signing new contracts and finding viable solutions to various problems. During this phase, the practitioner must be aware of the dynamic nature of the CE, which might develop in a non-linear manner. Thus, establishing a task-oriented mentality (Duda, 2005) using short-term goals can prove useful during the implementation phase. Self-regulation (Vealey and Vernau, 2010), through self-feedback sheets and coach's feedback, is also imperative to increase skill competence and prevent an injury.

Athletes' and their affiliates' attempts to reach a decision to change are further moderated by their capacity for change and existing psychological support. The individual's capacity for change is a multidimensional concept comprising of motivation for change, the expectancy of therapy, and coping styles (Samuel and Tenenbaum, 2011a). As indicated by Roger Federer's quote, not all sport performers are motivated to respond to this new situation with an adaptive change. Also, practitioners are recommended to tailor the type of psychological support to suit their client's coping style. *Internalizers* are self-critical, withdrawn, and self-reflective (Beutler et al., 2002). They would mostly benefit from insight-oriented therapy in which they discuss the CE in the context of their careers as well as their identity modifications. *Externalizers* are impulsive, action or task-oriented, and lacking insight (Beutler et al., 2002). They would mostly benefit from symptom-focused and skill-building therapy, involving goal-setting, imagery, and sensorimotor activity. In addition, it is important to assess the therapeutic alliance between the consultant and the client (Bordin, 1994). During the Coronavirus period, practitioners redefined their relationships with their clients, addressing issues, such as payments and methods of delivery (e.g., through online applications, such as Zoom). Clients must feel that they trust the guidance of consultants in such an unstable period of their careers. It is possible, that developing new therapeutic relationships during such a period and reaching "a bond" (i.e., the association of shared activity that is felt in terms of liking, trusting, and respect for each other, Bordin, 1994) can be highly risky and perhaps ineffective for practitioners.

From an ethical standpoint, it is not easy for practitioners to demand that sport performers act positively and that they can continue maintaining healthy sportive lifestyles. Without a clear future and sport-related goals, what gives practitioners the right to keep a positive mindset? Yet, considering the alternative, and the debilitating effects of detraining and learned helplessness on their clients' physical and mental health, practitioners must assume a generally positive standpoint. In doing so, they must first assess their own perceptions of the situation and consider its effects on their lives. Many

practitioners probably experience financial and occupational challenges; yet must continue serving as anchors in their clients' lives, by modeling effective coping. Nevertheless, maintaining a caring and non-judgmental consulting perspective (Friesen and Orlick, 2010) during such a change process is also imperative, as each individual can perceive this event differently, with much influence to his or her current unique career and life situational context. Practitioners must acknowledge that creating an effective therapeutic setting using online applications, such as Zoom is challenging for both themselves and their clients. Certain clients might experience emotional as well as procedural (e.g., noise, unstable internet service) issues in therapeutic online sessions and should be supported (Van Bavel et al., 2020). As recently suggested by Van Bavel et al. (2020), the widespread term "social distancing," implying that one needs to cut off meaningful interactions, is better replaced by "physical distancing" because it allows social connection even when people are physically separated. This issue must be discussed with athletes when practitioners are establishing non-physical therapeutic, web-based, therapeutic engagements.

CONCLUSION AND FUTURE RECOMMENDATIONS

This article presents an initial conceptualization of athletes' and other sport performers' responses to the CE. The dynamic and longitudinal nature of this change-event suggests a highly complex and individualized experience. Many factors influence athletes and their affiliates in parallel, and thus the psychological response can be overwhelming. Therefore, much research is required to evaluate the influential factors as well as the athletes' responses to this unique situation. A distinction must be made between the emotional response to the CE and the coping response. Athletes can react with negative emotions and still produce effective change processes as a result of active decisions and adaptive coping efforts. Alternatively, they might respond positively to the CE yet begin to divest from their sporting role.

The present global situation offers researchers a unique opportunity to concurrently evaluate the CE. From a career transition standpoint, this is methodologically invaluable. Still, as for most sport performers, the change process is not concluded; and so, it is also difficult to genuinely evaluate this experience within the context of their careers. Thus, in addition to concurrent longitudinal investigations, it is vital to conduct a future assessment of this type of change-event. Cross-national designs are also required, as the unique national and cultural contexts can affect the way this change-event is manifested in the sport career.

It is also worth evaluating the effectiveness of tele-consulting (Brueckner, 2019) during the CE, when sport performers are experiencing issues in various dimensions of their lives and sport engagement. Can practitioners and clients engage in meaningful and effective therapeutic counseling or rather focus on mental skills training? Finally, researchers and

practitioners must acknowledge their own contexts as they have also been experiencing CE. This article was written by Israeli authors. The first author was fortunate to continue his teaching and applied practice with athletes, coaches, and soccer referees throughout the CE. The other two authors were engaged in teaching and research throughout this period. This has influenced our optimistic and positive perspective of this situation. We are, aware, however, that in each country, sport scientists are dealing with

complex situations that would ultimately influence their attitudes toward the CE.

AUTHOR CONTRIBUTIONS

RS, GT, and YG wrote the lit review, study, and conclusions. All authors contributed to the article and approved the submitted version.

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Mental Health Measurement in a Post Covid-19 World: Psychometric Properties and Invariance of the DASS-21 in Athletes and Non-athletes

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Psychological science faces a call to action researching the implications of the corona virus disease 2019 (Covid-19) pandemic. Rapid reviews have reported that maintaining rigorous research standards is a priority for the field, such as ensuring reliable and valid measurement, when investigating people's experience of Covid-19 (O'Connor et al., 2020). However, no research to date has validated a measure mental health symptomology for an athlete population. The current research addresses this gap by examining the internal consistency, factor structure, invariance, and convergent validity of the Depression Anxiety and Stress Scale (DASS-21; Lovibond and Lovibond, 1995) in two athlete samples. Participants completed the DASS-21 and sport-specific measures of mental health such as the Profile of Mood States – Depression subscale (POMS-D), Sport Anxiety Scale-2 (SAS-2), Athlete Burnout Questionnaire (ABQ), and Athlete Psychological Strain Questionnaire (APSQ). In sample one ($n = 894$), results of exploratory structural equation modeling indicated that a three-factor model provided good fit to the data, but a bifactor model provided better fit. Factor loadings indicated minimal misspecification and higher loadings on the general-factor. Invariance testing suggested equivalence across gender, athletic expertise, sport type, and injury status. Further, latent mean differences analyses indicated that females and injured athletes scored higher than male and non-injured athletes on all DASS-21 factors reporting higher mental health symptomology, those with more expertise scored higher on the general-factor and depression and those with less expertise scored higher on anxiety and stress, and no differences between team and individual athletes. In sample two ($n = 589$), the bifactor structure was replicated. Results largely supported the scales convergent validity with depression predicting POMS-D scores, whereas all three subscales predicted the SAS-2, ABQ, and APSQ scores. Internal consistency was acceptable in both samples. The current work provides initial support for use of the DASS-21 as an operationalisation of mental health symptomology in athletes. Theoretical and practical implications of these results are discussed.

Keywords: depression, anxiety, stress, athletes, mental health, psychometrics

INTRODUCTION

Psychological science faces a call to action researching the implications of the corona virus disease 2019 (COVID-19) pandemic. Rapid reviews have reported that maintaining rigorous research standards is a priority for the field, such as ensuring reliable and valid measurement, when investigating peoples experience of COVID-19 (O'Connor et al., 2020). However, no research to date has validated a measure of mental health symptomology for an athlete population prior to or during the global lockdown. If the findings of research investigating the implications of COVID-19 for athletes are to be considered robust, and considering calls in the literature, then measurement accuracy and consistency needs to be established. That is, measurement assumptions are critical for the field moving forward ensuring confidence in findings which may inform policy, training, or treatment of athlete mental health.

Research has highlighted the psychological uniqueness of athlete populations (Reardon and Factor, 2010). For example, the athlete environment produces unique stressors as a result of high-pressure circumstances, constant mental effort, and experiences such as injury which may negatively impact mental health (Rice et al., 2016). It is plausible that these circumstances create difficulty when assessing or comparing athlete mental health with measures developed for the general population (Lebrun and Collins, 2017). Research has called for indices of mental health to be validated in athlete samples (Chiu et al., 2016). A popular measure of mental health is the Depression, Anxiety, and Stress Scale (DASS-21; Lovibond and Lovibond, 1995). Whilst research comparing athletes and non-athletes on the DASS-21 are scarce and inconsistent (Moghadasin et al., 2014; Bardhoshi et al., 2016; Demirel, 2016), no study has examined the invariance of mental health measures between elite, amateur and non-athletes. If effects are to be attributed to grouping factors rather than methodological reasons, the assumption of measurement invariance will be important (Marsh et al., 2011). Additionally, the psychometric properties of the DASS-21 are yet to be evaluated in a sport context, a gap addressed by the current work.

Athlete Mental Health

O'Connor et al. (2020) suggest that COVID-19 will have severe and far reaching psychological consequences for society's mental health. This effect is compounded considering the implications of COVID-19 for athletes such as restrictions on training, periods of isolation and cancelation of competition. Interest in athlete mental health has increased and is reflected in consensus statements regarding mental health identification in sport (Moesch et al., 2018; Henriksen et al., 2019). Much of this work highlights a link between the athlete environment and experiences of depression and anxiety. For example, serious injury causing early retirement and loss of identity, organizational-level pressures and occupational demands, public scrutiny of performance and person, have all been linked with mental health disorders (Foskett and Longstaff, 2018). Nonetheless, research examining athlete mental health is equivocal, with mental health prevalence reported at similar, below, and above general population rates (Rice et al., 2016;

Lebrun et al., 2018). It is possible that differences may be attributed to limitations in measurement (Chiu et al., 2016), however, the most likely explanation for such discrepancies is that scales developed to measure constructs related to mental health in sport, are not direct tests of depression, anxiety, or stress (e.g., Sport Anxiety Scale-2, Smith et al., 2006) but contextualized operationalizations in relation to athlete performance (Smith et al., 2006). An evidence-based understanding of athlete mental health is lacking, therefore evaluation of appropriate scales is the first step in addressing this (Marsh et al., 2011, 2013). This is particularly important in a post COVID-19 world with researchers focusing on the mental health implications of the disease.

Psychometric Properties

The DASS-21 (Lovibond and Lovibond, 1995) is a general measure of symptoms of depression, anxiety and stress (i.e., in the last 7 days). The scale was devised as a 42-item instrument discriminating symptoms of the non-diagnostic general depression-anxiety disorder or negative-affect into measures of depression, physical arousal, and psychological tension and agitation (Antony et al., 1998). The shortened 21-item scale, the focus of the current work, performs as well as the original and is considered the preferred version of the scale (Antony et al., 1998; Henry and Crawford, 2005). Although not yet validated with an athlete sample, much work outside of sport has supported the utility of the DASS-21 (e.g., Henry and Crawford, 2005), and psychometric examination consistently supports its internal consistency (Antony et al., 1998; Henry and Crawford, 2005; Osman et al., 2012; Wang et al., 2016; Shaw et al., 2017; Fox et al., 2018).

Whilst examination of the factor structure of the DASS-21 generally supports the three-factor model proposed by Lovibond and Lovibond (1995) across clinical, community, and non-clinical samples (Antony et al., 1998; Clara et al., 2001; Henry and Crawford, 2005), different countries, cultures, and languages (Mellor et al., 2015; Wang et al., 2016; Scholten et al., 2017; Kyriazos et al., 2018), those with and without obstructive sleep apnoea (Nanthakumar et al., 2017), or those with and without cancer diagnoses (Fox et al., 2018), there is debate regarding its optimal representation. That is, despite strong empirical support, the common underlying core of the DASS-21 supports the idea of a bifactor framework allowing use of total and subscale scores (i.e., tapping general negative-affect and specific factors simultaneously; Osman et al., 2012; Shaw et al., 2017; Kyriazos et al., 2018). Empirical work supports this notion. For example, Osman et al. (2012) reported that a bifactor model provided best fit to the data in two student samples. The factor loadings were acceptable, and the negative-affect or general-factor predicted more variance on a measure of mixed depression and anxiety. Shaw et al. (2017) proposed that the general-factor in a bifactor framework was a better representation of the DASS-21 items due to higher loadings and that the specific factors were non-invariant over adolescent ages groups.

Other work, however, contests a bifactor representation (Kyriazos et al., 2018). Kyriazos et al. (2018) examined the factor structure of the DASS-21 using exploratory (EFA) and

confirmatory factor analysis (CFA), and exploratory structural equation modeling (ESEM) in a sample of 2,272 Greek adults. Despite reporting high indices of fit in a bifactor model, the authors suggested that the misspecification in the factor structure was unacceptable (e.g., several instances of cross and misloading items). However, it should be noted that some misspecification in the factor structure may be unavoidable in ESEM due to the multidimensional hierarchical framework specified by scales such as the DASS-21 (e.g., the moderate intercorrelations specified in order to obtain suitable internal consistency; Vaughan et al., 2018). Interestingly, Kyriazos et al. (2018) is the only example subjecting the DASS-21 to ESEM. The three-factor ESEM model reported better fit than the bifactor and final accepted three-factor CFA. Nonetheless, the authors rejected this model due to misspecification in the factor structure.

Research has advocated the benefits of ESEM in that it avoids the strict item specification requirements of CFA by allowing cross-loadings on non-intended factors, like in EFA, whilst providing robust indicators of model fit (Marsh et al., 2011, 2013). Research has integrated the bifactor framework into ESEM which may be especially relevant for the DASS-21 as it allows for estimation of both the hierarchical nature of the constructs being assessed (i.e., the co-existence of global and specific components within the same measurement model), and the degree of accuracy associated with the constructs' indicators (i.e., how well items load on their target construct and the degree of overlap with non-target constructs; Henry and Crawford, 2005; Morin et al., 2016). A bifactor model specifies unique and common variance associated with the factors (Stenling et al., 2015). Regarding the DASS-21, bifactor ESEM would enable researchers to examine a general negative-affect factor and the specific depression, anxiety, and stress factors concurrently (Lovibond and Lovibond, 1995), and extends on the work of Kyriazos et al. (2018) who did not examine a bifactor ESEM – a gap this paper addresses.

Measurement Invariance

Despite calls in the literature to validate measures of mental health with athletes, no study has examined the invariance of the DASS-21 in sport (Marsh et al., 2011; Chiu et al., 2016). To date, mixed support for invariance has been provided focusing largely on equivalence across countries. For example, Scholten et al. (2017) reported that the DASS-21 was invariant across the United States, Poland, Russia and the United Kingdom. Similarly, Mellor et al. (2015) reported invariance of the three-factor model across Australia, Chile, China and Malaysia. Invariance has also been supported over gender (Jafari et al., 2017; Lu et al., 2018). Other work reveals inconsistency over culture (e.g., Indonesia, Malaysia, Singapore, Sri Lanka, Taiwan, and Thailand) with several items omitted before acceptable model fit could be achieved (Oei et al., 2013). Additionally, measurement invariance across African-American/Black, Caucasian/White, Hispanic/Latino, and Asian could not be established due to large misspecification in the factor structures (Norton, 2007). It is possible that the use of idioms such as “wind down” in the item-set may create confusion outside non-native English speakers and thus discrepancy in the factor structure.

An implicit assumption of research when using the DASS-21 is that the items are interpreted the same across groups (Chen, 2007). Research in sport is scarce with findings reporting significant and non-significant differences between athlete groups (Moghadasin et al., 2014; Demirel, 2016). For example, Drew et al. (2017) indicated that female and injured athletes reported higher depression scores on the DASS-21, whereas Bardhoshi et al. (2016) reported significantly lower DASS-21 scores in senior games athletes compared to non-clinical normative data. One possible reason for this inconsistency is a lack of measurement invariance, that is, challenging the assumption that items operate equivalently across varying populations in respect of gender, age, and/or ability (Muthén and Muthén, 2017). Researchers are yet to examine this notion in sport (e.g., across gender, athletic expertise, sport type of injury status). Considering Marsh et al.'s (2011) suggestions not to use a scale across groups until invariance is confirmed, advancement of athlete mental health research will be dependent upon establishing whether differences between groups are attributable to theoretical or methodological reasons (Marsh et al., 2013). Validation of this assumption is vitally important as research increases investigating the impact of COVID-19 on athlete mental health.

Convergent Validity

Research has most frequently compared the subscales of the DASS-21 against general measures of depression and anxiety such as the Beck Depression Inventory or Beck Anxiety Inventory (Beck and Steer, 1990; Beck et al., 1996; Gloster et al., 2008; Wang et al., 2016). The DASS-21 correlates positively with these measures and other related measures such as the negative-affect subscale of the PANAS (Watson et al., 1988). Support for the depression and anxiety subscales are consistent, however, support for the stress subscale is lacking. For example, Gloster et al. (2008) reported a positive relationship between the stress subscale and the negative-affect subscale of the PANAS, the Beck Depression Inventory, and the Beck Anxiety Inventory. Whilst it appears the stress subscale is tapping negative-affect and other measures of mental health, the lack of a stress specific measure creates difficulty in ascertaining whether the scale is measuring general disorders or specific stress symptoms. Similarly, Andreou et al. (2011) reported positive correlations between the DASS-21 subscales and the Perceived Stress Subscale (Cohen et al., 1983). Together, this work provides a foundation for assessing the DASS-21's convergent validity and whether the scale is transferable to a sport context capable of capturing elements of depression, anxiety and stress in athletes. Although well-established outside of sport, little work has examined the relationship between the Profile of Moods State – Depression subscale (i.e., depression; Grove and Prapavessis, 1992), the Sport Anxiety Scale-2 (i.e., anxiety; Smith et al., 2006), and the DASS-21.

Research has suggested that examination of the DASS-21's convergent validity is lacking despite its critical importance (Lee, 2019). For example, convergence analysis between the DASS-21 Stress subscale and the Athlete Burnout Questionnaire (Raedeke and Smith, 2001) would demonstrate

if this subscale is able to capture the athlete-specific concept of burnout. Burnout in sport manifests as a response to chronic stress produced by the demanding nature of the athlete environment and is considered incomparable to burnout experienced in other contexts (e.g., occupational settings; Gustafsson et al., 2018). De Francisco et al. (2016) reported a positive relationship between the stress subscale and athlete burnout in a structural equation modeling framework. However, this research failed to control for the overlap between the depression and anxiety subscales of the DASS-21.

Synonymous with mental health is the concept of psychological strain, a combination of perceived stress and difficulty coping, that has recently been operationalised in sport (Rice et al., 2019). Whilst research posits a positive relationship between the constructs outside of sport (Leung et al., 2009), it is unclear whether the DASS-21 is able to account for cross-domain differences in the conceptualisation of psychological strain, depression, anxiety or stress.

The Present Study

The aim of the present study was to determine the utility of the DASS-21 as an appropriate operationalisation of mental health in sport by assessing the psychometric properties of the DASS-21 across two samples of athletes. Establishing internal consistency, factorial validity, measurement invariance, and convergent validity in sport will ensure methodological rigor for future work investigating the implications of COVID-19 (O'Connor et al., 2020). In sample one, we examined the factor structure using ESEM comparing the original three-factor model, a single-factor model, and a bifactor model. Second, we examined the invariance of the scale across gender, athletic expertise, sport type, and injury status. Third, we tested group differences and internal consistency. Next, in sample two, we replicated the factor structure and inspected the convergent validity of the scale against sport-specific measures of stress, anxiety, depression and psychological strain providing a two-stage analysis of the DASS-21's psychometric properties. Although, little prior work exists with athletes we predicted that a bifactor model would provide the best fit to the data. We also hypothesized that the DASS-21 would be invariant and that scores would differ across gender, athletic expertise, sport type, and injury status groups. Finally, we expect the DASS-21 subscales to correlate significantly with measures of athlete burnout, competitive anxiety, depressive feelings, and psychological strain.

MATERIALS AND METHODS

Participants

Sample one comprised 894 participants (54.14% female) aged 17–57 years ($M^{age} = 32.66$, $SD = 12.14$). Participants were elite ($n = 252$), amateur ($n = 309$) and non-athletes ($n = 333$) from various team ($n = 329$) and individual ($n = 232$) sports (e.g., athletics, rugby, soccer, tennis, and volleyball) with ($n = 218$) and without ($n = 343$) injury. Classification of athlete status was based

on Swann et al. (2015) criteria similar to previous psychometric work with athletes (Vaughan et al., 2018). Non-athletes were those who did not compete in any sport and failed to score on Swann et al. (2015) criteria.

Sample two consisted of 589 athletes (57.21% male) aged 18–41 years ($M^{age} = 23.54$, $SD = 9.38$) with an average of 8.82 years playing experience. All athletes competed regularly in a range of sports at the time of participation (e.g., soccer and tennis).

Myers et al. (2017) recommend the use of Monte Carlo simulation for estimation of sample size in structural equation modeling, however, no guidelines exist for parameter estimation in ESEM. Therefore, applying CFA estimations with no missing data, standard error biases that do not exceed 10%, and coverage of confidence intervals set at 95%, sufficient power (80%) could be achieved with a sample size of 580 (Muthén and Muthén, 2017).

Materials

The DASS-21 (Lovibond and Lovibond, 1995) is a 21-item self-report questionnaire which assess recent experiences of stress (e.g., “I found it hard to wind down”), anxiety (e.g., “I felt close to panic”), and depression (e.g., “I felt that I had nothing to look forward to”). Each 7-item subscale is rated on a 4-point Likert scale ranging from 0 (Did not apply to me at all) to 3 (Applied to me very much). Higher scores represent greater symptomology.

The Sport Anxiety Scale-2 (SAS-2; Smith et al., 2006) is a 15-item self-report questionnaire of competitive anxiety. Responses are rated on a four-point Likert scale ranging from 1 (Not at all) to 4 (Very much) assessing somatic anxiety (e.g., “My stomach feels upset”), worry (e.g., “I worry that I will let others down”) and concentration disruption (e.g., “I lose focus on the game”), with five items each. Higher scores indicated increased anxiety. Previous research has provided psychometric support (e.g., measurement invariance across gender and sport type) for the scale (Ramis et al., 2015). Internal consistency was supported in the current work ($\Omega = 0.74$ – 0.78).

The Abbreviated Profile of Mood States Questionnaire (POMS-D; Grove and Prapavessis, 1992) is a 40-item self-report measure which assess seven different mood states (i.e., tension, anger, fatigue, depression, esteem-related affect, vigor, and confusion). Responses are provided on a five-point Likert scale ranging from 0 (Not at all) to 4 (Extremely) to an adjective checklist (e.g., tense, angry, sad, active, restless, proud). In the present research, only the depression subscale was used. Previous research has supported the psychometrics of the scale and the invariance of the POMS when used with athletes (Andrade and Rodriguez, 2018).

The Athlete Burnout Questionnaire (ABQ; Raedeke and Smith, 2001) is a 15-item self-report questionnaire of athlete burnout. Participants respond on a five-point Likert scale ranging from 1 (almost never) to 5 (almost always) assessing reduced sense of accomplishment (e.g., “I’m accomplishing many worthwhile things in [sport]”), emotional/physical exhaustion (e.g., “I feel physically worn out from [sport]”), and sport devaluation (e.g., “I’m not into [sport] like I used to be”). Previous research has supported the ABQs factor structure and

internal consistency (Gerber et al., 2018). Internal consistency was supported in the current work ($\Omega = 0.73$ – 0.79).

The Athlete Psychological Strain Questionnaire (APSQ; Rice et al., 2019) is a 12-item measure of sport-specific psychological strain. Responses are provided on a five-point Likert scale ranging from 1 (none of the time) to 5 (all of the time) assessing self-regulation (e.g., “I was less motivated”), performance (e.g., “I found training more stressful”), and external coping (e.g., “I took unusual risks off-field”). Higher scores indicate greater psychological strain. Rice et al. (2019) provided support for factorial, convergent, and divergent validity in APSQ’s development. Internal consistency was supported in the current work ($\Omega = 0.71$ – 0.73).

Procedure

Ethical approval was granted from a university ethics committee. Data were collected at designated laboratories at a university psychology department or during athletes training. Participants were briefed prior to data collection, informed of their ethical rights, and provided informed consent. Participants provided demographic information (e.g., age and sex), athlete status (e.g., participated in sport or not, which sport, how long, what level of competition, and highest level of success), and injury status. Participants then completed the DASS-21, SAS-2, POMS-D, ABQ, and APSQ. Data were first entered onto SPSSv24 for preliminary analyses and then Mplus 7.4 for model testing (Muthén and Muthén, 2017).

Design and Data Screening

We adopted a cross-sectional design with purposive sampling. A small amount of data were missing (1.4%). Following recommendations (Tabachnick and Fidell, 2007), we used ipstatized estimation of relevant cases. Multivariate skewness (33.15, $p > 0.05$) and kurtosis (56.97, $p > 0.05$) coefficients indicated no departure from normality (Muthén and Muthén, 2017).

Analytic Strategy

First, we calculated means, standard deviations, and internal consistency (omega; Dunn et al., 2014) for all variables (Table 1). Next, we tested a one and three-factor model using ESEM and then a bifactor-ESEM with latent means analysis (see Gucciardi and Zyphur, 2016). Then, we assessed measurement invariance across gender, athletic expertise, sport type, and injury status on the best fitting model (Muthén and Muthén, 2017). Measurement invariance was tested between the configural model (i.e., the same pattern of factors and loadings across groups), metric model (i.e., invariant loadings), and scalar model (i.e., invariant factor loadings and intercepts). For these analyses, we used the robust maximum likelihood estimator (Muthén and Muthén, 2017). The robust maximum likelihood estimator can handle instances of missing data, non-normality, categorical variables when there are at least five response categories, and is particularly suited to bifactor interpretations compared to other estimators (Stenling et al., 2015). We also assessed latent means differences between groups after measurement invariance is at least partially established (Vandenberg and Lance, 2000).

TABLE 1 | DASS-21 descriptive statistics across gender, athletic expertise, sport type, and injury status.

Scale	Overall	Gender		Athletic expertise			Sport type			Injury status		
		Male	Female	Non	Amateur	Elite	Team	Individual	Non-injured	Injured	d	Ω
		<i>M (SD)</i>	<i>M (SD)</i>	<i>d</i>	<i>M (SD)</i>	<i>d</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>d</i>	
Total score	6.92 (2.71)	4.87 (1.62)	8.93 (2.70)	0.04**	4.88 (1.61)	6.91 (1.64)	7.95 (1.67)	6.94 (2.65)	4.86 (0.69)	8.96 (2.74)	0.10**	0.84
Depression	5.54 (1.55)	4.59 (1.51)	6.52 (1.45)	0.03*	4.51 (1.57)	5.56 (1.51)	6.61 (1.48)	5.57 (1.61)	3.51 (1.52)	7.59 (1.54)	0.06**	0.82
Anxiety	4.43 (1.48)	3.41 (1.49)	5.48 (1.39)	0.04**	5.49 (1.47)	4.41 (1.45)	3.36 (1.48)	4.45 (1.49)	3.41 (1.47)	5.49 (1.42)	0.05**	0.79
Stress	7.86 (1.60)	6.82 (2.55)	8.89 (2.62)	0.03*	9.89 (2.61)	7.84 (2.52)	5.79 (1.56)	7.85 (1.61)	5.81 (2.58)	9.91 (1.62)	0.05**	0.81

N = 894. * $p < 0.05$; ** $p < 0.01$.

As an hypothesized model exists regarding the factor structure of the DASS-21, an oblique target and oblique-bifactor target rotation were used to estimate how the 21-items and latent factors of the DASS-21 were interrelated for the ESEM and bifactor-ESEM, respectively. An epsilon value of 0.50 was adopted to enable as many items as possible to be optimally identified within one component while minimizing the potential number of doublets (Comrey and Lee, 1992). To evaluate model fit, we examined the χ^2 statistic, comparative fit index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) with 95% Confidence Intervals (CI), and Standardized Root Mean Square Residual (SRMR) using the following criteria: $CFI > 0.90$, $TLI > 0.90$, $RMSEA < 0.06$, $SRMR < 0.06$ (Marsh et al., 2004).

In order to select the most parsimonious model, the Bayesian Information Criterion (BIC) and Akaike's Information Criterion (AIC) were used to compare models. The AIC and BIC assign a greater penalty to model complexity and therefore have a better propensity to select more efficient models. In addition, a change of less than 0.01 in the CFI and 0.015 in the RMSEA support an invariant model in relation to the previous model (Chen, 2007). Due to the exploratory nature of ESEM, standardized solutions were examined to evaluate the significance and strength of parameter estimates. The following criteria were used to evaluate the standardized factor loadings (>0.71 = excellent, >0.63 = very good, >0.55 = good, >0.45 = fair, >0.32 = poor; Comrey and Lee, 1992).

Finally, we used multiple linear regression with the DASS-21 factors as predictors to examine their influence on the sport-specific measures as outcome variables. Positive associations with similar concepts support convergent validity (Rice et al., 2019).

RESULTS

Preliminary Analyses and Reliability

Descriptive statistics were calculated for the total and subscale scores from sample one. Omega values were satisfactory ($\Omega = 0.79$ – 0.84) for a composite and subscale scores (see Table 1).

Factor Structure

The one-factor model did not provide a good fit to the data. The three-factor model provided improved and acceptable fit. However, a bifactor model provided the best fit to the data ($\chi^2 [194] = 1325.927$, $p < 0.05$; $RMSEA = 0.047 [0.044$ – $0.051]$; $SRMR = 0.043$; $TLI = 0.928$; $CFI = 0.945$; $AIC = 94784.621$; $BIC = 97153.232$). Model comparison revealed best fit with the bifactor model with lower AIC and BIC values compared to both one and three-factor representations (see Table 2).

The standardized factor loadings indicated higher loadings for the general-factor than for the specific factors with a range of fair to excellent loadings (e.g., 0.45 – 0.86). For each factor, six of the highest loading items were located on the general-factor except for items 16, 2, and 14 for the depression, anxiety and stress, respectively. Higher factor loadings in the general as opposed to specific factors supports

a bifactor representation highlighting the shared conceptual underpinning of the DASS-21 (Marsh et al., 2004). Whilst some significant cross-loadings were found (e.g., items 3, 13, 17, 4, 9, 19, 6, 11, and 14), none of these reached the predetermined cut-off (e.g., >0.32 ; Comrey and Lee, 1992). Positive correlations ($r = 0.52$ – 0.80) were found between latent factors (see Table 3).

Invariance Testing

Next, we tested invariance of the bifactor model across groups by comparing the configural (e.g., all parameters allowed to be unequal across groups) against the metric (e.g., holding loadings equal across groups) model which is a test of weak invariance followed by a test of strong invariance comparing the metric against the scalar (e.g., constraining factor loadings and intercepts across groups) model (see Table 2).

Invariance testing indicated equivalence across males and females. Subsequent increases in model constraint across gender revealed no significant difference between the configural and metric ($\Delta\chi^2 [87] = 148.979$, $p > 0.05$), and metric and scalar ($\Delta\chi^2 [35] = 89.668$, $p > 0.05$) models. Change in fit were within range of invariance and indicated acceptable fit to the data (Marsh et al., 2004; Chen, 2007). Also, the AIC and BIC were lowest for the configural model. Findings indicate that the DASS-21 remains invariant with each successive parameter restraint supporting the utility of the scale across gender.

Invariance testing indicated equivalence across elite, amateur and non-athletes. Subsequent increases in model constraint across athletic expertise revealed no significant difference between the configural and metric ($\Delta\chi^2 [110] = 529.791$, $p > 0.05$), and metric and scalar ($\Delta\chi^2 [53] = 406.685$, $p > 0.05$) models. Change in fit were within range of invariance and indicated acceptable fit to the data (Marsh et al., 2004; Chen, 2007). Also, the AIC and BIC were lowest for the configural model. Findings indicate that the DASS-21 remains invariant with each successive parameter restraint supporting the utility of the scale across athletic expertise.

Invariance testing indicated equivalence across team and individual athletes. Subsequent increases in model constraint across sport type revealed no significant difference between the configural and metric ($\Delta\chi^2 [67] = 87.595$, $p > 0.05$), and metric and scalar ($\Delta\chi^2 [36] = 140.700$, $p > 0.05$) models. Change in fit were within range of invariance and indicated acceptable fit to the data (Marsh et al., 2004; Chen, 2007). Also, the AIC and BIC were lowest for the configural model. Findings indicate that the DASS-21 remains invariant with each successive parameter restraint supporting the utility of the scale across sport type.

Invariance testing indicated equivalence across non-injured and injured athletes. Subsequent increases in model constraint across injury status revealed no significant difference between the configural and metric ($\Delta\chi^2 [66] = 66.129$, $p > 0.05$), and metric and scalar ($\Delta\chi^2 [58] = 57.402$, $p > 0.05$) models. Change in fit were within range of invariance and indicated acceptable fit to the data (Marsh et al., 2004; Chen, 2007). Also, the AIC and BIC were lowest for the configural model. Findings indicate that the DASS-21 remains invariant with each successive parameter restraint supporting the utility of the scale across injury status.

TABLE 2 | Model fit indices for sample one and two.

Sample	Model	χ^2	df	RMSEA (90% CI)	SRMR	TLI	CFI	AIC	BIC
One (N = 894)	ESEM (one factor)	2145.654	241	0.069 (0.064–0.071)	0.063	0.821	0.847	95325.854	98627.523
	ESEM (three factor)	1846.631	215	0.058 (0.054–0.060)	0.054	0.905	0.917	95174.681	97853.143
	Bifactor-ESEM	1325.927	194	0.047 (0.044–0.051)	0.043	0.928	0.945	94784.621	97153.232
	Gender configural	1897.582	425	0.058 (0.055–0.060)	0.054	0.912	0.924	94812.628	97329.674
	Gender metric	1748.603	512	0.056 (0.053–0.059)	0.052	0.909	0.919	94531.654	97214.971
	Gender scalar	1658.935	547	0.054 (0.051–0.056)	0.051	0.902	0.913	94413.369	97028.147
	Expertise configural	1987.267	628	0.058 (0.055–0.061)	0.057	0.917	0.924	93528.289	96107.927
	Expertise metric	2517.057	738	0.059 (0.056–0.062)	0.059	0.910	0.918	93824.317	96389.829
	Expertise scalar	2923.742	791	0.060 (0.057–0.063)	0.058	0.905	0.913	94153.974	96745.282
	Type configural	1954.923	451	0.057 (0.055–0.060)	0.053	0.913	0.922	94233.748	97592.382
	Type metric	1867.328	518	0.055 (0.052–0.058)	0.052	0.909	0.916	94117.825	97381.537
	Type scalar	1726.628	554	0.052 (0.050–0.055)	0.051	0.901	0.907	93924.743	97106.581
	Injury configural	2097.965	508	0.057 (0.054–0.059)	0.055	0.917	0.928	94344.627	97157.319
	Injury metric	2031.836	574	0.056 (0.054–0.059)	0.052	0.912	0.917	94187.323	96543.253
	Injury scalar	1974.434	632	0.058 (0.055–0.060)	0.051	0.904	0.911	93821.652	96204.826
Two (N = 589)	ESEM (three factor)	1745.358	215	0.056 (0.051–0.059)	0.055	0.914	0.926	95028.921	97641.638
	Bifactor-ESEM	1307.139	194	0.046 (0.046–0.052)	0.042	0.932	0.949	94121.347	97008.391

χ^2 = Chi-Square, RMSEA, Root Mean Square Error of Approximation; CI, Confidence Interval; SRMR, Standardized Root Mean Residual; TLI, Tucker Lewis Index; CFI, comparative fit index; AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion.

Parameter Estimates for Invariance Measurement Models

Comparison of factor loadings support invariance with minimal misspecification supporting Lovibond and Lovibond's (1995) model (see **Supplementary Material**). Inspection of the factor loadings and residual variances across gender indicate support for the hypothesized model (i.e., two cross-loading items per subscale). Similar levels of misspecification were found between genders with slightly larger loadings for females. Inspection of the factor loadings and residual variances across athletic expertise revealed a similar degree of misspecification (i.e., at least three cross-loading items per factor). The least amount of misspecification was noted for non-athletes, however, larger loadings were found for elite athletes. Factor loadings across sport type revealed three significant cross-loading in both team and individual athlete groups. Factor loadings were highest for team athletes. Comparison of the factor matrices across non-injured and injured athletes revealed the most amount of misspecification with at least four cross-loadings per factor. The smallest loadings and least amount of misspecification was noted for non-injured athletes. In most instances factor loadings were higher on the general-factor compared to specific factors (i.e., at least 4 items loaded highest on the general-factor across all models). The latent factor correlations indicated similar patterns across groups with positive relationships observed between the factors (see **Supplementary Material**).

Latent Mean Differences

As invariance estimates were reasonable based on the recommendations of Chen (2007) we proceeded to test latent mean differences (see **Table 1**). Results indicated small significant differences in Cohen's *d* between groups, with females and injured athlete scoring higher than males and

non-injured athletes on all factors indicating more mental health symptomology, those with more expertise scored higher on the general-factor and depression whereas those with less expertise scored higher on anxiety and stress, and no differences between team and individual athletes.

Replication of Factor Structure

In order to examine consistency of the model we tested the previously supported three and bifactor models in sample two (see **Table 2**). Similar to sample one, model fit was acceptable in both instances with better fit observed in the bifactor model ($\chi^2 [194] = 1307.139$, $p < 0.05$; RMSEA = 0.046 [0.042–0.052]; SRMR = 0.042; TLI = 0.932; CFI = 0.949; AIC = 94121.347; BIC = 97008.391). This model also indicated acceptable levels of internal consistency ($\Omega = 0.75$ –0.81). The factor loadings followed a similar pattern showing agreement with Lovibond and Lovibond's (1995) model with a range of fair to excellent loadings (0.45–0.81). However, the factor structure did differ. In sample two, five items for each subscale loaded onto the general-factor above their target factor. Additionally, misspecification was found with one significant cross-loading in each factor. Whilst each instance of misloading was significant and just above the 0.32 cut-off (Comrey and Lee, 1992), higher factor loadings were found on the target and higher again on the general-factor. Again, positive correlations were observed between the factors ($r = 0.49$ –0.76).

Convergent Validity

Multiple regression models were constructed to examine how the DASS-21 subscales predicted measures of depression, competitive anxiety, athlete burnout, and athlete psychological strain (see **Table 4**). Results indicated that the DASS-21 predicted 38% of the POMS-D variance with depression the largest and

TABLE 3 | Parameter estimates and latent factor correlations for bifactor model.

Item	Sample one (N = 894)				Sample two (N = 589)			
	General	Factor 1	Factor 2	Factor 3	General	Factor 1	Factor 2	Factor 3
Depression								
3. I couldn't seem to experience any positive feeling at all	0.635**	<u>0.592**</u>	0.203*	0.154	0.588**	<u>0.438**</u>	0.141	0.016
5. I found it difficult to work up the initiative to do things	0.762**	<u>0.587**</u>	0.115	0.178	0.417**	0.734**	0.108	0.047
10. I felt that I had nothing to look forward to	0.738**	<u>0.571**</u>	0.182	0.192	0.716**	<u>0.564**</u>	0.084	0.095
13. I felt down-hearted and blue	0.529**	<u>0.491**</u>	0.221*	0.144	0.513**	<u>0.457**</u>	0.027	0.104
16. I was unable to become enthusiastic about anything	0.407**	0.753**	0.134	0.117	0.421**	0.714**	0.039	0.029
17. I felt I wasn't worth much as a person	0.866**	<u>0.581**</u>	0.216*	0.191	0.748**	<u>0.627**</u>	0.326**	0.007
21. I felt that life was meaningless	0.467**	<u>0.421**</u>	0.156	0.147	0.492**	<u>0.449**</u>	0.109	0.061
Anxiety								
2. I was aware of dryness of my mouth	0.395**	0.142	0.799**	0.187	0.387**	0.055	0.781**	0.129
4. I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0.554**	0.217*	<u>0.451**</u>	0.105	0.729**	0.031	<u>0.477**</u>	0.131
7. I experienced trembling (e.g., in the hands)	0.836**	0.157	<u>0.468**</u>	0.114	0.691**	0.112	<u>0.492**</u>	0.321**
9. I was worried about situations in which I might panic and make a fool of myself	0.789**	0.216*	<u>0.491**</u>	0.141	0.407**	0.131	0.768**	0.094
15. I felt I was close to panic	0.637**	0.176	<u>0.573**</u>	0.186	0.583**	0.008	<u>0.524**</u>	0.092
19. I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0.731**	0.234*	<u>0.474**</u>	0.193	0.631**	0.004	<u>0.451**</u>	0.004
20. I felt scared without any good reason	0.622**	0.128	<u>0.582**</u>	0.139	0.604**	0.067	<u>0.575**</u>	0.055
Stress								
1. I found it hard to wind down	0.655**	0.151	0.163	<u>0.508**</u>	0.587**	0.008	0.117	<u>0.523**</u>
6. I tended to over-react to situations	0.851**	0.127	0.238*	<u>0.487**</u>	0.381**	0.044	0.154	0.806**
8. I felt that I was using a lot of nervous energy	0.634**	0.128	0.127	<u>0.492**</u>	0.639**	0.151	0.329**	<u>0.568**</u>
11. I found myself getting agitated	0.722**	0.215*	0.121	<u>0.495**</u>	0.722**	0.118	0.008	<u>0.463**</u>
12. I found it difficult to relax	0.836**	0.142	0.133	<u>0.528**</u>	0.546**	0.136	0.087	<u>0.507**</u>
14. I was intolerant of anything that kept me from getting on with what I was doing	0.402**	0.169	0.227*	0.852**	0.382**	0.071	0.112	0.794**
18. I felt that I was rather touchy	0.766**	0.111	0.172	<u>0.464**</u>	0.654**	0.035	0.061	<u>0.448**</u>
Latent Correlations								
General		0.780**	0.752**	0.803**		0.713**	0.648**	0.761**
Depression			0.518**	0.585**			0.487**	0.507**
Anxiety				0.570**				0.494**

Values in bold indicate highest loading on that factor. Values underlined are interpreted as a factor. General, General Factor; Factor 1, Depression; Factor 2, Anxiety; Factor 3, Stress; See Lovibond and Lovibond (1995) for DASS-21 publication manual. * $p < 0.05$; ** $p < 0.01$.

TABLE 4 | Summary of multiple linear regressions.

Model	POMS-D	SAS-2-S	SAS-2-W	SAS-2-CD	SAS-2-TA	ABQ-E	ABQ-RA	ABQ-SD	ABQ-B	APSQ-S	APSQ-P	APSQ-E	APSQ-T
R^2	0.38**	0.12**	0.19**	0.16**	0.15**	0.09**	0.21**	0.18**	0.16**	0.11**	0.16**	0.19**	0.27**
Depression	β 0.28**	β 0.11*	β 0.19**	β 0.11*	β 0.18**	β 0.11*	β 0.27**	β 0.23**	β 0.21**	β 0.17*	β 0.15*	β 0.16*	β 0.24**
Anxiety	β 0.06	β 0.16*	β 0.21**	β 0.16**	β 0.21**	β 0.10*	β 0.12*	β 0.18**	β 0.12*	β 0.13*	β 0.17*	β 0.16*	β 0.18**
Stress	β -0.00	β 0.14*	β 0.18**	β 0.09*	β 0.17**	β 0.13*	β 0.16**	β 0.20**	β 0.26**	β 0.11*	β 0.14*	β 0.15*	β 0.21**

N = 589. DASS, Depression Anxiety Stress Scale; POMS, Profile of Mood States; SAS-2, Sports Anxiety Scale; ABQ, Athlete Psychological Strain Questionnaire; DASS-S, DASS-21 Stress; DASS-A, DASS-21 Anxiety; DASS-21 Depression; POMS-D, Abbreviated POMS Depression; SAS-2-S, SAS Somatic; SAS-2-CD, SAS concentration disruption; SAS-2-TA, SAS Trait Anxiety; ABQ-E, ABQ Physical/Emotional Exhaustion; ABQ-RA, ABQ Reduced Sense of Accomplishment; ABQ-SD, ABQ Sport Devaluation; ABQ-B, ABQ Burnout; APSQ-S, APSQ self-regulation; APSQ-P, APSQ performance; APSQ-E, APSQ External coping; APSQ-T, APSQ Total; β , standardized beta coefficient; Part, semi-partial correlations. * $p < 0.05$; ** $p < 0.01$.

only significant predictor supporting the convergent validity. Results indicated that the DASS-21 predicted between 12 and 19% of the SAS-2 variance. The largest predictor was anxiety supporting convergent validity, however, depression and stress also positively predicted the variance questioning the scales convergent validity. Results indicated that the DASS-21 predicted between 9 and 21% of the ABQ variance. Whilst in most cases stress was the largest predictor supporting convergent validity, depression was the largest predictor of the reduced accomplishment and sports devaluation subscales. Moreover, depression and anxiety positively predicted the ABQ variance questioning its convergent validity. Results indicated that the DASS-21 predicted between 11 and 27% of the APSQ variance. Specifically, depression was the largest predictor of self-regulation, anxiety was the largest predictor of performance, depression and anxiety equally predicted external coping, and depression was the largest predictor of athlete psychological strain. It should be noted that depression, anxiety and stress were positively related to each APSQ score therefore supporting scale's convergent validity.

To further test the bifactor model, regression models indicated that the general factor significantly predicted between 8 and 36% of the POMS-D (i.e., depression), SAS-2 (i.e., somatic, worry, concentration disruption, trait anxiety), ABQ (i.e., exhaustion, reduced accomplishment, sport devaluation, and athlete burnout), APSQ (i.e., self-regulation, performance, external coping, and psychological strain) variance.

DISCUSSION

The aim of the present study was to assess the psychometric properties of the DASS-21 and provide evidence for its utility as a measure of athlete mental health in light of the COVID-19 pandemic. We investigated the fit of a one, three and bifactor representation. We explored measurement invariance of the DASS-21 across gender, athletic expertise, sport type and injury status and assessed the latent mean differences across these groupings. Along with replication, we also examined the convergent validity of the DASS-21 against sport specific measures of mental health. Results supported the psychometrics of the DASS-21 in a sport context thus providing researchers with a reliable and valid operationalisation of mental health moving forward (O'Connor et al., 2020). A bifactor representation provided the best fit to the data and was invariant across gender, athletic expertise, sport type and injury status. Whilst some misspecification was reported, these were below predetermined cut-offs. We also found small differences on the DASS-21 with females scoring higher than males, injured athletes scoring higher than non-injured athletes, those with more expertise scoring higher on the general factor and depression and those with less expertise scoring higher on anxiety and stress, and no differences between team and individual athletes (Moghadasin et al., 2014; Bardhoshi et al., 2016; Demirel, 2016). Also, we replicated the bifactor structure in an additional sample further demonstrating the scales utility. Factor matrices followed a similar pattern across samples and internal consistency was supported in both samples.

The differences reported corroborate previous research suggesting that athletes, particularly female and injured, will experience greater depression, anxiety, and stress symptomology (Demirel, 2016; Rice et al., 2016; Drew et al., 2017; Lebrun and Collins, 2017). The current research is the first to adopt an accepted framework of athletic expertise (Swann et al., 2015), revealing that those with more expertise experience greater negative-affect and depression whereas those with less expertise experience greater anxiety and stress. The differences reported on the negative-affect factor align with previous work suggesting that elite level sport may have negative impact on mental health (Moesch et al., 2018; Henriksen et al., 2019). Results indicated high internal consistency at the general and subscale level supporting previous research (Osman et al., 2012; Shaw et al., 2017; Fox et al., 2018).

Psychometric Properties

The bifactor structure of the DASS-21 supports previous work (Osman et al., 2012; Shaw et al., 2017; Kyriazos et al., 2018), but also integrates Lovibond and Lovibond's (1995) original conceptualisation as it suggests the co-existence of the negative-affect and depression, anxiety and stress components within the same model. Explanations for these findings are housed in the existence of negative-affect, depression, anxiety and stress in the DASS-21. First, the lack of fit in the one-factor model suggests that the individual factors capture variance not associated with a general negative-affect factor. Although, acceptable fit was observed in the three-factor model, the addition of a general-factor in the bifactor model improved fit. Third, the higher loadings on the negative-affect factor compared to their intended factor suggests that the items are not pure measures of each factor. It is possible that although depression, anxiety and stress may manifest uniquely, their shared underlying conceptual core means that overlap is unavoidable (Henry and Crawford, 2005). This is common in many aggregate scales where attempts to increase internal consistency high inter-item correlation is a by-product (Vaughan et al., 2018).

Regarding the structure of the specific factors, although generally acceptable in sample one, some misspecification remained in sample two, suggesting some items may be problematic. Specifically, item-17 of depression cross-loaded onto anxiety (i.e., "I felt I wasn't worth much as a person"), item-7 of anxiety cross-loaded onto stress (i.e., "I experienced trembling e.g., in the hands"), and item-8 of stress cross-loaded onto anxiety (i.e., "I felt that I was using a lot of nervous energy"). Although no common theme appears between the items it is possible that athletes may place specific value on self-worth, nervousness and agitation resulting in misspecification across the factor structure (Grove and Prapavessis, 1992).

Higher factor loadings were generally observed in the general factor except for item-16 (e.g., "I was unable to become enthusiastic about anything") of depression, item-2 (e.g., "I was aware of dryness of my mouth") of anxiety, and item-14 (e.g., "I was intolerant of anything that kept me from getting on with what I was doing") of stress in sample one, and items 16 and 5 (e.g., "I found it difficult to work up the initiative to do things") of depression, items 2 and 9 (e.g., "I was worried about situations

in which I might panic and make a fool of myself") of anxiety, and items 14 and 6 (e.g., "I tended to over-react to situations") of stress in sample two. In both samples' items 16, 2, and 14 loaded higher on their intended factors (depression, anxiety, and stress, respectively) to a good level (Comrey and Lee, 1992). Previous research has suggested that item 2 may be problematic (Norton, 2007), however, this was not the case in the current data. It may be that dryness in the mouth was a common symptom for those who participate in sport. Interestingly, the other target loading items are all themed around motivation which is particularly important for those involved with sport and has links with mental health (Ng et al., 2012).

Moreover, although advantageous in ESEM, the identification of non-target rotations, may indicate redundancy or oversimplification in shortened scales such as the DASS-21 (Morin et al., 2016). For example, according to Lovibond and Lovibond (1995) the DASS-21 captures elements of depression (e.g., low self-esteem, dysphoria, lack of interest, displeasure, sense of hopelessness, devaluation of life, self-deprecation, low positive affect, lack of interest or involvement, anhedonia, and inertia), anxiety (e.g., autonomic arousal, fearfulness, skeletal musculature affects, situational anxiety, and subjective experience of anxiety and panic), and stress (e.g., lack of relaxation, nervous arousal, agitation, ease of becoming upset, irritability, negative-affect and impatience) which will inevitably result in factor overlap (Osman et al., 2012; Shaw et al., 2017).

Measurement Invariance

Overall, the DASS-21 was fully invariant over gender, athletic expertise, sport type and injury status as indicated by acceptable changes between configural, metric and scalar models that demonstrated no significant loss of fit (Chen, 2007). This pattern of results suggests that the DASS-21 items and constructs were operating equivalently across groups and measuring mental health in a consistent manner similar to previous work across other important groupings (e.g., country and gender; Scholten et al., 2017; Lu et al., 2018). This finding is somewhat at odds with suggestions that current measures may be inappropriate for athletes or inapplicable due to the uniqueness of the sport environment (Reardon and Factor, 2010; Chiu et al., 2016). Additionally, and similar to the whole sample, the factor structures of the specific groups (e.g., males and females) provided consistent support for Lovibond and Lovibond's (1995) model with minimal misspecification observed.

Convergent Validity

Support for the scales convergent validity was mixed with a range of small to medium effects. Regarding the POMS-D, depression was the only significant predictor, indicating a medium effect. The non-significant beta coefficients for anxiety and stress further demonstrate the convergence of the DASS-21 as a suitable measure of depression. Akin to research outside of sport, the depression subscale positively correlated with other measures of depression supporting its convergent validity (Gloster et al., 2008; Wang et al., 2016). Although frequently utilized in a sport context the POMS-D can also be considered a general measure of depression (Grove and Prapavessis, 1992). The

general DASS-21 factor also explained a significant portion of the POMS-D variance.

Next, regarding competitive anxiety, depression, anxiety, and stress all significantly predicted SAS-2 scores. Although, the anxiety subscale was the largest predictor across regression models (e.g., somatic, worry, concentration disruption, and total trait anxiety; Gloster et al., 2008; Wang et al., 2016), depression and stress also positively predicted SAS-2 and subscale scores questioning convergent validity. Note, that a similar pattern was observed for the partial correlations which control for the other predictors supporting the notion that DASS-21 anxiety was the largest predictor of the model. All effects of the DASS-21 on the SAS-2 were small. It is possible that being situated within sport, competitive anxiety is conceptually different to anxiety and can be attributed to other factors (Smith et al., 2006). For example, items of somatic anxiety are similar to items of stress (e.g., “My body feels tense”) and items of worry anxiety are similar to items of depression (e.g., “I have self-doubts”). This finding is nonetheless unsurprising as the DASS-21 was originally conceptualized as a measure of the non-diagnostic general depression-anxiety disorder capturing elements of depression, physical arousal, and psychological tension and agitation (Antony et al., 1998) later separated into depression, anxiety and stress therefore each DASS-21 component is likely to have overlap with other related constructs such as worry and concentration disruption. Likewise, the general DASS-21 factor also explained a significant portion of the SAS-2 total and subscales score variance.

Similarly, regarding the ABQ, stress was the largest predictor of total athlete burnout and exhaustion subscale supporting previous work and convergent validity (De Francisco et al., 2016), whereas depression was the largest predictor of the reduced sense of accomplishment and sport devaluation subscales questioning its convergent validity. Note, that whilst all effects were considered small, all three predictors positively predicted ABQ scores. It is possible that burnout, regardless of context, is the chronic manifestation of stress, and as a result will likely be accompanied by other mental health issues (Raedeke and Smith, 2001; Gustafsson et al., 2018). Nonetheless, research suggests that athlete burnout and mental health (e.g., depression and anxiety) are highly related. For example, depression can be a common outcome of athlete burnout (De Francisco et al., 2016). To date, the DASS-21 stress subscale has received less attention in estimates of convergent validity with research focusing on the depression and anxiety subscales (Gloster et al., 2008; Wang et al., 2016). Therefore, it is likely that the DASS-21 subscales will converge with all aspects of athlete burnout. The significant relationship between the DASS-21 subscales and general measures of stress is in line with previous work (Andreou et al., 2011). The general DASS-21 factor also explained a significant portion of the ABQ total and subscales score variance supporting lack of distinctiveness of the stress subscale.

Finally, regarding athlete psychological strain, depression, anxiety and stress all positively predicted APSQ scores. All effects were considered small. Depression was the largest predictor of total athlete psychological strain and self-regulation subscale, anxiety was the largest predictor of the performance subscale, and depression and anxiety both equally predicted the external

coping subscale. The similarity between the DASS-21 and APSQ items may explain these findings. For example, the self-regulation subscale contains items (e.g., “I was less motivated”) which are similar to that of the depression subscale (e.g., “I was unable to become enthusiastic about anything”). Rice et al. (2019) claimed that psychological strain was synonymous with mental health disorders thus supporting the DASS-21’s convergent validity. That is, psychological strain is characterized by emotional exhaustion and difficulty coping which are often linked with depression and anxiety (Rice et al., 2019). The current data is the first study to assess the psychometrics of the APSQ since its development providing evidence of convergent validity and internal consistency. Also, the general DASS-21 factor explained a significant portion of the APSQ total and subscales score variance.

Limitations and Future Research

Despite several strengths (e.g., two-stage psychometric evaluation in two athlete samples) the present study is not without limitation. The cut-offs adopted for the ESEM fit indices were recommended for CFA procedures with no ESEM specific indicators developed. Second, ESEM does not enable researchers to test for modification indices or other forms of guided parameter restraint which may reveal further distortions in the data (Marsh et al., 2011). Third, the cross-sectional design and self-report nature of the DASS-21 may confound the data. For example, the DASS-21 offers only a snapshot of recent mental health symptomology and efforts should be made to examine the scales temporal invariance over a playing season. Also, athletes may not wish to disclose mental health symptoms in an attempt to avoid stigma and biases associated with mental health disorders thus subject to social-desirability (Rice et al., 2016).

It is for researchers to address these limitations in future work. Research may wish to refine items for athletic populations by modifying the number of items (i.e., scale purification). Existing research has successfully shortened the DASS-21 creating twelve and nine-item versions of the scale (Kyriazos et al., 2018). Reducing the number of items would provide practical advantages (e.g., participant time commitment) and we believe the current work provides foundation for future work to begin the purification process of the scale for use with athletes. Future work may also wish to contextualize the DASS-21 items for athletic samples and examine whether a domain-specific operationalisation provides greater explanatory value over a non-specific scale (Reardon and Factor, 2010). Moreover, applied researchers have started to examine the effects of career transition (i.e., professional to non-professional) on mental health. For example, Norouzi et al. (2020) claim that retired athletes may be at risk of mental health problems. Norouzi et al. (2020) also reported that a mindfulness-based stress reduction program was able to reduce stress, anxiety and depression and improve psychology well-being in retired Iranian soccer players. Indeed, O’Connor et al. (2020) note that the impact of COVID-19 may extend to economics and professional athletes may not be immune to this (e.g., reduced income from canceled competitions). Thus, future research should extend the

current findings to these groups and replication of Norouzi et al. (2020) with the DASS-21 may offer a natural starting point.

Our findings have important implications for research using the DASS-21. For example, support of the scales invariance across gender, athletic expertise, type of sport, and injury status mean that researchers can use the scale to explore several important topics around mental health such as the effect of injury, loss of identity, or reduction in participation as a result of the government lockdowns to minimize transition of COVID-19 (Foskett and Longstaff, 2018; O'Connor et al., 2020). Finally, we suggest that future work investigating the implications of COVID-19 for athletes utilize both general and subscale scores of the DASS-21.

CONCLUSION

In conclusion, the psychometrics of the DASS-21 were supported, and researchers can utilize the scale to investigate the implications of COVID-19 in sport. The present findings provide a substantial addition to the athlete mental health literature and support definitive comparisons with the general population, given that the scale operates equivalently across athletes and non-athletes. Moreover, the findings suggest that the DASS-21 relates to other sport-specific measures of mental health such as burnout, psychological strain, anxiety and depression further supports its utility in the sport context. Whilst future research may contextualize or purify the scale for use with athletes, we encourage use of the scale and second recent consensus statements calling for more work exploring athlete's mental health (Moesch et al., 2018; Henriksen et al., 2019). These findings are useful for those examining the implications of COVID-19 by providing evidence of accuracy and stability of the DASS-21 and

thus ensuring rigorous research standards for the field moving forward (O'Connor et al., 2020).

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by York St John University, School of Education, Language, and Psychology Ethics Committee. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RV: conceptualization, methodology, formal analysis, investigation, resources, data curation, and writing – original draft, review, and editing. EE: data curation and writing – original draft, review, and editing. TM: writing – original draft, review, and editing. All authors contributed to the article and approved the submitted version.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.590559/full#supplementary-material>

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Covid-19 Has Turned Home Advantage Into Home Disadvantage in the German Soccer Bundesliga

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The main factors for home advantage (HA), quantified by the number of points won at home expressed as a percentage of all points, are believed to be crowd support, territoriality, familiarity, and travel fatigue. In 2020, the German Soccer Bundesliga interrupted its championship due to the Covid-19 pandemic after 25 rounds and the last nine rounds were played without audience. This unique situation allowed studying the effect of spectators on the team's performance and the referee's decisions. We hypothesized a decrease in HA and a more balanced distribution of fouls and disciplinary cards in the games without audience (GWOA) compared to the games with audience (GWA). We evaluated $n = 223$ GWA and $n = 83$ GWOA of the season 2019/20 and all games of the preceding season 2018/19 to analyze the distribution of game outcomes (wins, losses, and draws) and HA. We analyzed the number of fouls, disciplinary cards, and penalty kicks. We found significant differences in HA between GWA (HA = 54.35%) and GWOA (HA = 44.1%) as well as GWOA and games of 2018/19 (HA = 57.63%). The distribution of game outcomes in GWOA did not differ from GWA but differed significantly from 2018/19 ($p = 0.031$). The distribution of fouls showed a significant difference to equal distribution in GWA [home: 2,595 (48.56%); away: 2,749 (51.44%)] but not in GWOA [home: 1,067 (50.54%); away: 1,044 (49.46%)]. In the GWOA, we counted 178 (51.1%, home) and 170 (48.9%, away) cards, representing a significant difference in the distribution to GWA [home: 405 (44.85%); away: 498 (55.15%)]. The number of red cards differed significantly from an equal distribution for GWA (14 home and 28 away) but not for GWOA (eight home and seven away). In the last nine rounds without audience, we observed more home losses (36) than home wins (27). Hence, the Covid-19 lock-down led to a home disadvantage. One reason for this surprising result could be that the home team is missing an important familiar aspect when playing in their empty stadium without social support from their home audience. Furthermore, both teams know about the HA thus the away team could be more motivated in this unusual situation.

Keywords: team performance, referee home bias, familiarity, travel fatigue, crowd support

INTRODUCTION

Association football (soccer) is one of the most popular team sports in the world. Depending on the country and the league, soccer games attract a large audience. In the German Soccer League (Bundesliga) season 2018/19, the average number of visitors was about 43,000. The largest stadium, the Signal-Iduna Park in Dortmund, has a capacity of more than 80,000 spectators. It is reasonable that the presence of such a big audience supporting the home team affects the players and referees in favor of the home team.

Home advantage (HA), quantified by the number of points won at home expressed as a percentage of all points at home and away (Pollard, 1986; Pollard and Gómez, 2014b, 2015), is a well-studied phenomenon in soccer. Despite a decline in the last decades, probably due to increased professionalism, distancing of players from fans, and globalized marketing strategies that decreased the identification of the local community with clubs (Smith, 2003; Pollard, 2006a), HA is still present in professional soccer (Peeters and van Ours, 2020). A crucial assumption for calculating the HA is a balanced schedule, meaning that all teams play two games against each other, one at home and one away (Pollard and Gómez, 2014b). In the last 50 years, many authors tried to find the main factors explaining why the home teams on the average score better than the away teams (see e.g., Nevill and Holder, 1999; Pollard, 2008 for review). The HA's main factors are believed to be crowd support, territoriality, familiarity with the stadium, and travel fatigue (Ponzo and Scoppa, 2018).

Several aspects of crowd support were investigated in literature: Nevill et al. (1999, 2002) examined the crowd noise and found effects on referee decisions. Pollard and Pollard (2005) investigated the effect of crowd size but found only small effects on HA, similar to previous reports (Dowie, 1982; Pollard, 1986; Clarke and Norman, 1995). Several researchers found evidence for a referees' bias in terms of fouls, disciplinary cards, and awarded penalty kicks during games (Nevill et al., 2002; Garicano et al., 2005; Boyko et al., 2007; Dohmen, 2008; Dawson and Dobson, 2010). Home crowd support seems to put significant social pressure on referees leading to biased decisions. Referees who observed soccer videos awarded less fouls to the home teams when the crowd noise was played than when the clips were played in silence (Nevill et al., 2002). Similarly, Unkelbach and Memmert (2010) observed that referees awarded more yellow cards to the away team when videos with home crowd noise were played with high compared to low volume. Furthermore, Sutter and Kocher (2004) reported that officials grant more injury time after 90 min when the home team is behind one goal compared to matches in which it leads by one goal at the end of a game. This so-called ± 1 bias could be confirmed by other authors (Garicano et al., 2005; Riedl et al., 2015). A similar bias could also be observed for big teams by Lago-Penas and Gómez-López (2016), who reported that referees tended to add more extra time when the higher-level team was behind and less extra time when the team was ahead in close games. Interestingly, Albanese et al. (2020) reported recently that the introduction of additional assistant referees reduced referee bias in favor of home teams. Pollard (2006b) also reported regional differences in HA with

values from 49 to 79% and particularly high values in the Balkans and the Andean countries of South America. They suggested that this is related to high levels of territoriality in these countries, a concept that was first mentioned by Morris (1981). Evidence for this was also found on an individual physiological level when players of the home team had increased testosterone values (Neave and Wolfson, 2003, 2004; Wolfson and Neave, 2004). Home advantage as a social phenomenon (Schwartz and Barsky, 1977) was confirmed by Gelade (2015). He could show that HA is elevated in countries with high levels of collectivism and in-group favoritism as well as in countries with high levels of corruption and where the rule of law is not strictly adhered to. Social support by the audience increases performance of the home team (Salminen, 1993) and even inhibits the performance of the away team as reported from college basketball games by Greer (1983). As to the familiarity to the stadium, there are, on one hand, physical properties as for example the temperature/altitude, the pitch surface, and the pitch size (Pollard, 1986; Barnett and Hilditch, 1993; Clarke and Norman, 1995). On the other hand, there are psychological familiarity and perception (Bray et al., 2000) of the players (see Neave and Wolfson, 2004 for review), the "feeling at home," which is in turn also influenced by the crowd.

Furthermore, travel fatigue may occur when the locations of the different games are far apart (Pollard et al., 2008; Pollard and Gómez, 2014a). During same-stadium derbies, where the effects of travel fatigue or familiarity with the stadium are not present but the level of crowd support still differs, conflicting results have been reported. While Ponzo and Scoppa (2018) still observed a HA, this was not the case in same-stadium derbies analyzed by van de Ven (2011).

Altogether, the different factors are not independent but are related to each other. Statistical calculations of large data sets over many countries and years show some relations (Pollard and Gómez, 2014a). Despite the clear quantitative evidence of HA in soccer, the different factors' proportionate effects are not clear because it is not possible to undertake relevant experiments without audience in professional soccer.

To the best of our knowledge, until 2020 only one study so far included professional soccer games without audience in their analyses of HA (van de Ven, 2011). However, this study only included twenty games of the Italian Series A(7) and B(13) (Season 2006/2007), which only allows limited statistical analyses. Due to the restrictions during the Covid-19 pandemic in 2020, many soccer leagues worldwide had to play without audience. Hence, several working papers have recently been published that analyzed the effects of these so-called "ghost games" on home performance and referee decisions. Fischer and Haucap (2020) analyzed the first three divisions of the German Bundesliga and observed a reduction of the HA only in the first league which was related to occupancy rates, i.e., HA was reduced most in teams with high occupancy in their stadium during regular seasons. McCarrick et al. (2020) analyzed the effect of games without audience collapsed from 15 different European soccer leagues and found that empty stadiums decreased home team performance and affected referees' decisions. When analyzing 23 leagues worldwide, Bryson et al. (2020) discovered large and statistically significant effects on the number of yellow cards

when no audience was present. Referees issued fewer cards to away teams which reduced the home advantage. This reduction in social pressure for referees was also confirmed by (Endrich and Gesche, 2020) who reported that home teams were treated less favorable during the games without audience in the first and second German soccer league.

In 2020, the German Soccer Bundesliga interrupted its championship in March due to the Covid-19 pandemic after 25 of 34 rounds. The championship continued in May, but the last nine rounds had to be played without audience. Hence, this unique situation allowed studying the effect of spectators on the team's performance and referee's decisions in professional soccer.

Based on the well-established effects of crowd support on HA, we hypothesized that the lack of audience would (a) decrease HA and (b) lead to a more balanced distribution of disciplinary cards, penalty kicks, and fouls by the referees in the games without audience (GWOA) compared to the games with audience (GWA) in the 2019/20 season and the 2018/19 season, respectively. Furthermore, we hypothesized (c) differences in the distribution of home wins, home losses, and draws between the games with and without audience.

METHOD

Sample

In total, we evaluated all 306 soccer games of the season 2019/20, 223 with audience (25 rounds with nine games each minus two postponed games from round 22 and 24 without audience) and 83 without audience (nine rounds plus the two postponed games). In addition, we retrieved the results of the preceding season 2018/19 for further comparison of distributions with a balanced playing schedule. For assessing the referees' bias, we evaluated 7,455 fouls, 1,251 yellow cards, 57 red cards, and 72 penalty kicks.

Procedures

For all games, we counted the home wins, the home losses, and draws. We calculated the HA as the ratio between the number of points won by the home teams and the total number of points (Pollard, 2008; Pollard and Gómez, 2014b).

The comparison between the outcomes of games of an unbalanced playing schedule could produce a bias, e.g., if more better teams would have had more away games in one group of games compared to the other. Therefore, to assess the effects of the unbalanced playing schedule, we first calculated the percentage of games without audience, where the home team was ranked higher than the away team according to the final table ranking of the 2019/20 season.

However, the ranking alone does not determine uniquely the probability of the awarded points in a game. Therefore, for a rough estimation of the probability for possible results in each game we applied a Poisson distribution (Maher, 1982; Greenhough et al., 2002) based on the average number of goals per game during the whole season as the expected rate of occurrences. For each game, we first calculated the probability of the number of goals shot in this game for both teams via the Poisson formula:

$$p_s(a) = \frac{a^s}{s!} e^{-a},$$

where a denotes the average number of goals, $p_s(a)$ the probability of shooting s goals.

The probability of getting a result of $s:t$ for two teams with the average number of goals a and b , respectively, is given by multiplying the single probabilities for each team:

$$p_{s,t}(a,b) = \frac{a^s}{s!} e^{-a} \cdot \frac{b^t}{t!} e^{-b}.$$

Then we calculated the probability of each possible result of a game (up to a result of 8:8, which is already very unlikely in soccer). Counting the wins, draws, and losses, we got the expected percentage of home wins, home losses, and draws. We computed the expected number of points for the home team and the away team from this distribution. As an example, we show the procedure for team A (Eintracht Frankfurt) and team B (SC Freiburg). The average number of goals for the two teams were 1.74 and 1.41 according to the results at the end of season 2019/20. **Table 1** shows the probability of each outcome of the game.

This results in the probabilities 0.45–0.31–0.23 for home wins, home losses, and draws, leading to 1.59 points for the home team and 1.18 points for the away team.

We did this for all GWOA and got an expected HA, again dividing the home teams' total points by the sum of the total points of home teams and away teams.

For assessing a possible referee's bias, we investigated three indicators: Firstly, we counted the number of awarded fouls. The distributions for home teams and away teams were compared to a 50:50 relation for GWA as well as for GWOA. Secondly, we counted the number of disciplinary cards (yellow and red) for both teams and calculated the ratio between home cards and all cards. The ratios of home team disciplinary cards for the GWA and GWOA were compared to a 50:50 relation, respectively. Furthermore, we tested for the difference in the number of cards per game and fouls per game. As third indicator of a referee's bias, we analyzed the number of awarded penalty kicks for the home team and the away team.

Statistics

We compared the HA and the distribution of home wins, home losses, and draws for 233 GWA and 83 GWOA to the expected distribution got from the 306 games in the preceding season 2018/19 by applying chi-square goodness of fit tests. Furthermore, we compared the HA and the distributions of home wins, home losses, and draws between the 83 GWOA and the 223 GWA by applying chi-square goodness of fit tests.

We compared the expected HA calculated by Poisson distribution to the observed HA again using a chi-square goodness of fit test.

In addition, the ratio of cards and the ratio of fouls for GWOA were compared to GWA, again by chi-square tests for the

TABLE 1 | Predicted results of an exemplary game between team A (Eintracht Frankfurt) and team B (SC Freiburg): The value in the m^{th} line and the n^{th} column shows the probability for the result $m:n$.

A\B	0	1	2	3	4	5	6	7	8
0	0.043	0.0607	0.0428	0.0202	0.0071	0.002	0.0005	1E-04	2E-05
1	0.0746	0.1053	0.0743	0.035	0.0123	0.0035	0.0008	0.0002	3E-05
2	0.0647	0.0914	0.0645	0.0303	0.0107	0.003	0.0007	0.0001	3E-05
3	0.0374	0.0528	0.0373	0.0176	0.0062	0.0017	0.0004	8E-05	1E-05
4	0.0162	0.0229	0.0162	0.0076	0.0027	0.0008	0.0002	4E-05	6E-06
5	0.0056	0.008	0.0056	0.0026	0.0009	0.0003	6E-05	1E-05	2E-06
6	0.0016	0.0023	0.0016	0.0008	0.0003	8E-05	2E-05	4E-06	6E-07
7	0.0004	0.0006	0.0004	0.0002	7E-05	2E-05	4E-06	9E-07	2E-07
8	9E-05	0.0001	9E-05	4E-05	1E-05	4E-06	1E-06	2E-07	3E-08

goodness of fit. As there were only a few red cards, the difference in the percentage of red cards was assessed by a binomial test. As an unbalanced playing schedule does not affect the referee's decisions, it was not necessary to compare the results of GWOA with previous seasons. However, we tested differences in the average number of fouls per game between GWA and GWOA for home and away teams with t -tests.

We compared the ratio of awarded penalty kicks for the home team and the away team between GWA and GWOA and to a 50:50 distribution applying chi-square tests for the goodness of fit.

In all tests, significance was defined for $p < 0.05$.

RESULTS

Figure 1 shows the distribution of home wins, home losses, and draws in the GWA, GWOA, and the season 2018/19. In the 83 GWOA, we observed 27 home wins, 36 home losses, and 20 draws, which did not differ ($p = 0.137$) from the expected distribution observed in the GWA, but differed significantly from the season 2018/19 ($p = 0.031$). In the 223 GWA, we observed 96 home wins, 78 home losses, and 49 draws, showing no significant difference to the games of the previous season (138 home wins, 95 home losses, 73 draws).

We found significant differences in HA between GWOA (HA = 44.1%) and GWA (HA = 54.35%) as well as between GWOA and games of the season 2018/19 (HA = 57.63%), $p = 0.002$, and $p < 0.001$, respectively. However, the difference between GWOA and an equal distribution was not significant ($p = 0.074$). **Figure 2** shows the time course of the HA for all 34 rounds of the season. No difference in HA was observed between GWA and games from season 2018/19. **Table 2** shows a summary of the observed data.

The analysis of the home teams' playing strength of the GWOA revealed that in 53% of the games the home team was better than the guest team according to the final results at the end of the season. The different ranking according to the average number of goals shot by each team during the whole season lead to 48% of better home teams in GWOA. Based on this average number of goals as the rate of occurrences in the Poisson distribution, we computed the predicted numbers of total points

for GWA and GWOA as 619.22 and 230.11, respectively. The observed total numbers of points were 620 and 229, respectively (see **Table 2**). The detailed results of the expected points for each of the 306 games are listed in the **Supplementary Material**.

From the number of points, we calculated an expected HA of 49.93%. This is not different ($p = 0.982$) to the equal distribution HA = 50% or to the observed HA in GWOA ($p = 0.078$).

A more detailed analysis of the last three rounds of GWOA showed 15 home wins, seven home losses, and five draws, leading to a HA of 65.79%, which differed significantly ($p = 0.015$) from the expected HA = 51.91% calculated via the Poisson distribution. In the last round (34th round of the season, nine games), the observed HA was 73%, again significantly different ($p = 0.023$) from the expected Poisson HA = 51.32%.

In GWA, we counted $n = 5,344$ fouls, 2,595 (48.56%) for the home team and 2,749 (51.45%) for the away team, showing a significant difference to a 50:50 distribution ($p = 0.035$). For the GWOA, we had $n = 2,111$ fouls, 1,067 (50.54%) for the home team and 1,044 (49.46%) for the away team, which was not significantly different ($p = 0.617$) from an equal distribution. The number of average committed fouls per game showed no significant differences between away teams in GWA, home teams in GWOA, and away teams in GWOA (12.327, 12.855, and 12.578, respectively). The average number of committed fouls per game for the home teams in GWA was 11.637, differing significantly ($p = 0.017$) from home teams in GWOA as well as away teams in GWA and GWOA.

The total number of yellow disciplinary cards in the GWA was $n = 903$, 405 (44.85%) for the home and 498 (55.15%) for the away team, respectively. The difference to an expected equal distribution was significant ($p = 0.002$). In the GWOA, we counted $n = 348$, 178 (51.1%) cards for the home and 170 (48.9%) for the away team, respectively, representing no difference to equal distribution ($p = 0.668$), but a significant difference ($p = 0.018$) to the distribution in GWA. The number of red cards differed significantly ($p = 0.031$) from an equal distribution for GWA (14 home and 28 away), but not for GWOA (eight home and seven away). In terms of penalty kicks, we found in GWA as well as in GWOA a home disadvantage (in GWA 22 (43.1%) and in GWOA 8 (38.1 %) penalty kicks for the home team). We did not find any significant differences between GWA and GWOA

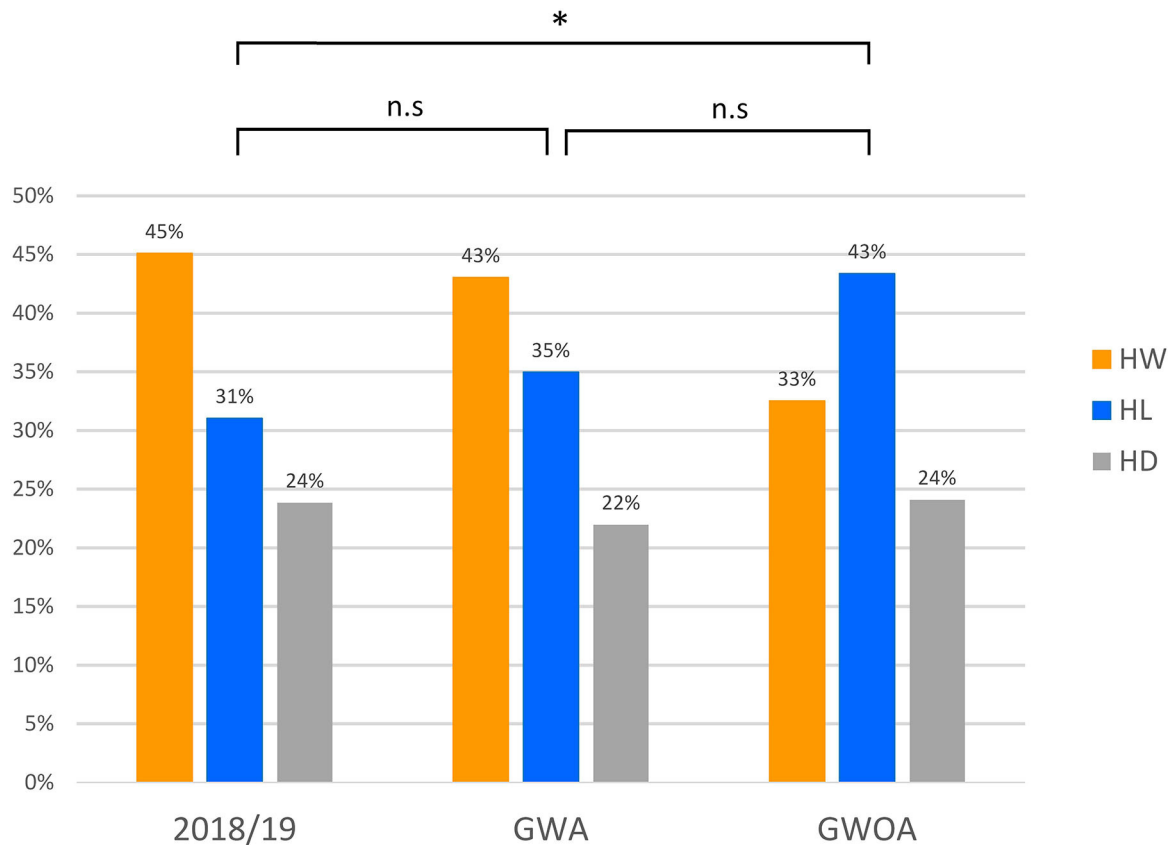


FIGURE 1 | Distributions of home wins (HW), home losses (HL), and draws (HD) for the season 2018/19 (with audience), and games with (GWA) and without (GWOA) audience for the season 2019/20. * indicates significant difference in chi-square goodness of fit ($p < 0.05$). n.s. indicates no significance.

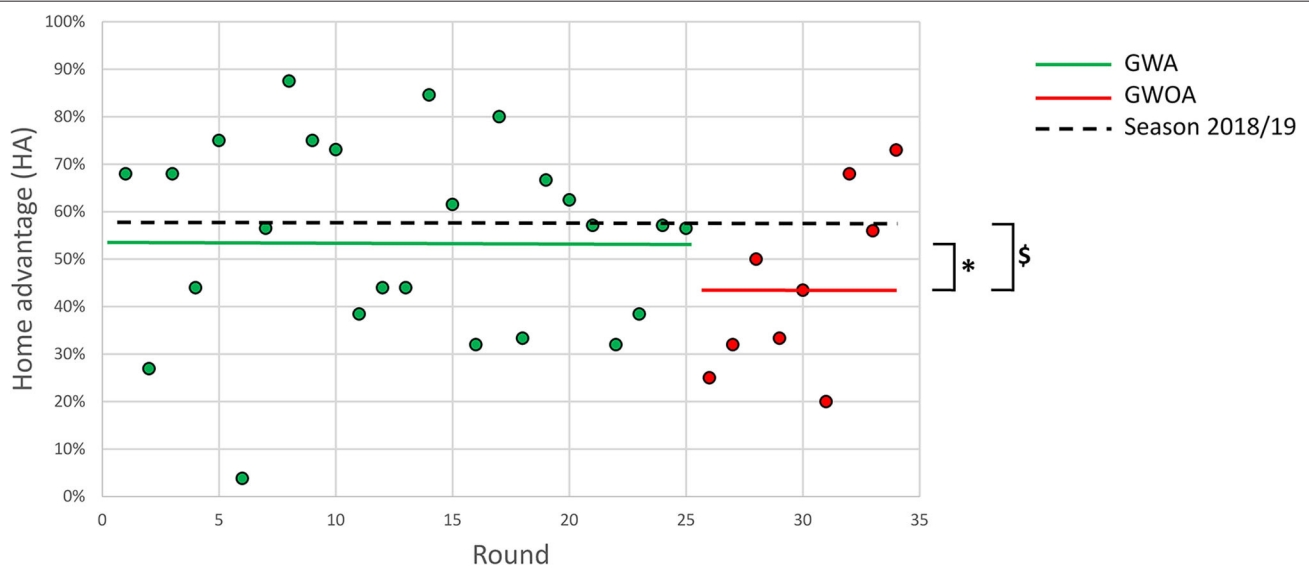


FIGURE 2 | Time course of home advantage (HA) over 34 rounds. Green dots and red dots represent the values for each round in games with (GWA) and without audience (GWOA), respectively. The green and red horizontal lines represent the total HA in GWA and GWOA, respectively. The dashed blacklines represent the total HA over 34 rounds in the season 2018/19. * indicates significant difference to total HA in GWA. \$ indicates significant difference to total HA in the season 2018/19.

TABLE 2 | Summary of the results from the games with (GWA) and without (GWOA) audience of the season 2019/20 and from the full season 2018/19.

	HW	HL	HD	Home points	Away points	Total points	HA
GWA (<i>n</i> = 223)	96	78	49	337	283	620	54%
GWOA (<i>n</i> = 83)	27	36	20	101	128	229	44%
2018/19 (<i>n</i> = 306)	138	95	73	487	358	845	58%

HW, home wins; HL, home losses; HD, draws; HA, home advantage.

or to an equal distribution of penalty kicks for home teams and away teams.

DISCUSSION

The purpose of the study was to analyze the effect of lacking audience on home performance and referee's decisions during the Covid-19 lock-down in the German Bundesliga season 2019/20. In the last nine rounds without audience (GWOA), we did not only observe proportionally fewer home wins than in the previous rounds with audience (GWA), but even more home losses (36) than home wins (27). Hence, the Covid-19 lock-down turned a home advantage of 54.35% into a home disadvantage of 44.10%. Furthermore, the hypothesized omission of a referee's bias during these nine rounds was confirmed by our data with a balanced distribution of penalty cards (home: 51.1%; away: 48.9%), which differed significantly from the previous rounds with audience (home: 55.15%; away: 44.85%). Both during games with and without audience, proportionally fewer penalty kicks were awarded to the home teams (GWA: 43.1%; GWOA: 38.1%).

The lock-down led to an unbalanced schedule for games with and without audience: In the games without audience, each team played either four, five, or six games at home. This had to be considered during the analyses to avoid any false conclusions due to bias. However, the home teams ranked even better in the final season table than the away teams, implying that the chance of winning at home in games without audience was slightly higher just because of the ranking. This makes the finding of a home disadvantage even stronger. However, the final season table results give only an ordinary information about the strength of the teams. To assess the observed HA, we needed another method to calculate an expected HA value for the games after lock-down. Thus, we applied a Poisson distribution for calculating the probability for possible results in each game, taking the average number of goals per game during the whole season as expected rate of occurrences. For a clearly better team, the expected number of points in a game will be close to three, whereas the expected value will be less for an only slightly better team. For equal teams, this value is always larger than one, but depends on the number of average goals/game shot by the two teams. Therefore, this gives more information about the expected points than the ordinary ranking scale obtained by the season's final results. Although the ranking by goals per game showed that in 52% of the games without audience the home team was the better one, the expected HA, calculated via the Poisson distribution, was 49.93% showing no difference to HA = 50% ($p = 0.983$). This implies that the unbalanced partition of all games in games with

and without audience did not influence our results significantly. Applying a Poisson distribution is only a very rough estimation. However, the very good prediction of the total points for the games with audience as well as the games without audience (619.22 for 620 Points and 230.11 for 229, resp.) indicates the suitability of using a Poisson distribution. For the advantages and disadvantages of this method, see, e.g., Maher (1982) and Greenhough et al. (2002).

When investigating the influence of the missing audience on the HA, we had the choice between comparing the lock-down phase to the results of the first 25 rounds (GWA) or former seasons. Comparing the HA in games without audience with the data from games with audience had the advantage that we observed the same set of teams. However, the unbalanced schedule in games with audience could also influence the HA. Therefore, we compared the results of the games without audience not only to those with audience in 2019/20 but also to the previous season 2018/19, again finding significant differences. It is notable that the HA before lock-down in 2019/20 was less than in the season before, and also less than reported in literature (e.g., Pollard and Gómez, 2014a with 58.35% for 2006–2012), but not significantly different. This is in accordance with a reported general decline in HA (Pollard, 2008; Peeters and van Ours, 2020).

To the best of our knowledge, so far, a HA below 50% was only reported once based on a meaningful number of games. Pollard and Gómez (2014a) observed a HA of 49.36% in 336 games from the Cayman Islands soccer league (2006–2012). However, even this number is close to an even distribution of points and is difficult to compare with the present results of a high-professional soccer league. Hence, this is the first time a HA below 50% was observed in one of the world's major soccer leagues. The finding of a HA < 50% shows that the term “home advantage” is misleading: All values below 50% are a disadvantage. Thus, we suggest the term “home performance” which would fit better to this situation.

Before 2020, only two studies (van de Ven, 2011; Ponzo and Scoppa, 2018) so far could analyze the effect of audience in professional soccer experimentally during same-stadium derbies from the Italian Serie A. In such derbies, familiarity with the stadium and travel fatigue does not play a role, and only crowd support should affect the game outcome. Ponzo and Scoppa (2018) reported a HA of 58.32% in such games. van de Ven (2011) reported a lack of HA in such games and indicated that crowd support is not a necessary factor for home advantage. Calculating HA by the provided data from his Table 2 (van de Ven, 2011) would lead to a HA of 44.53%, i.e., a home disadvantage for

the hosting teams in same-stadium derbies. However, this was neither explicitly mentioned nor discussed by the author. Until 2020, van de Ven (2011) was the only author who included games without audience in his home advantage investigations. He reported that home advantage still exists even without audience. However, only 20 games from Italian Serie A and B (season 2007/2008) were included in his study, and a comparison of the data with the present study is difficult because the data analysis is not clearly described.

In 2020, the decrease in HA in soccer games without audience during the Covid-19 pandemic was confirmed by several working papers applying regression models. Home performance, assessed as home wins, point differences between home and away team, or team dominance decreased in the collapsed data from 13 European leagues (McCarrick et al., 2020) and in the first German Bundesliga (Fischer and Haucap, 2020). Interestingly, Fischer and Haucap (2020) did not observe a reduction in home advantage in the second and third German soccer league. They argued that players of the lower leagues might be used to playing in front of smaller crowds. Furthermore, soccer results from individual leagues across the world (Poli et al., 2020) showed a reduction in HA (as % of home wins) in 41 of the 63 leagues studied. The study authors did not observe a decrease of HA in some important leagues like the English Premier League and the Italian Serie A. However, these results must be interpreted with care as team strength was not controlled and the unbalanced playing schedule could have influenced the results. Further analyses of these results are warranted.

Figure 2 shows that the HA increased in the last nine rounds, indicating a recovery of the reduced HA over time. We tested this with a linear regression for the GWOA which showed a significant increase of HA ($R = 0.7$; $p < 0.05$) during this period (see also **Figure 2**). Fischer and Haucap (2020) confirmed this finding in their analyses of the first three German soccer leagues where they could observe a similar tendency. They hypothesized that players got familiarized to the empty stadiums with time. Since the recovery of the reduced HA is highly influenced by the last three rounds, we made an additional analysis of this period. As they also reflect just a subset of all games, we again checked the possible effects of this unbalanced selection. The expected HA of the last three rounds (27 games), calculated via Poisson distribution, was larger than 50%, but significantly ($p = 0.015$) less than the observed value of HA = 65.79%. This shows that we found a clear home advantage in these three rounds that cannot only be explained by the fact that the home teams were slightly better than the away teams. The last round, consisting of only nine games, featured the largest HA of all nine rounds without audience (HA = 73.08%). The home team won six out of the nine games. The unbalanced sample of games led to a far smaller expected HA of 51.32% which also indicates that the observed significant home advantage is not caused by better home teams. Due to the sudden lock-down, we cannot expect that the psychological effects are constant over the following months. There could rather occur some sort of customization. The HA's rising values in the last rounds could be interpreted as a sign of getting used to the situation. However, if this would already be a steady-state, all other factors besides the crowd would have nearly

the same positive effect on the HA. So, we speculate that these peak values would again decrease in time.

The hypothesized omission of a referee's bias was confirmed by our analysis of the fouls and the disciplinary cards. In games with audience, the home teams committed on average fewer fouls than the away teams. This changed in games without audience where we observed an increase in committed fouls for the home team only, which led to a balanced distribution of committed fouls between home and away teams. This was confirmed by Endrich and Gesche (2020), who reported that home teams committed more fouls and were awarded more yellow cards during games without audience in the first two German soccer leagues. These results suggest that the audience makes referees favor the home team rather than discriminate the away team. Contrary, Bryson et al. (2020) reported that during the Covid-19 pandemic fewer cards were given to the away team in their dataset from 23 professional football leagues. Summarized, it appears that the lack of an audience cheering for the home team led to more balanced decisions by the referees. This indicates that the lack of audience reduced the referee's social pressure significantly compared to games with audience (Schwartz and Barsky, 1977; Greer, 1983; Salminen, 1993; Gelade, 2015). These results are somewhat in line with recent reports by Albanese et al. (2020), who found that additional assistance referees helped reduce referee's bias. Interestingly, we could not observe a penalty bias in favor of home teams in games with and without audience in the season 2019/20. This is in contrast to findings by Sutter and Kocher (2004), who reported a clear bias (55 vs. 21 penalties) in favor of home teams in the German Bundesliga in 2000/01. A probable reason for these contrasting results could be the introduction of video assistant systems in 2017/18, which help to re-assess difficult penalty situations with video. The present and previous studies suggest to further support referees on the field by assistant video referees isolated from the home audience. These assistant referees with a wireless connection to the field referees would possibly perceive much less social pressure and therefore make decisions less biased. However, since a more balanced distribution of fouls, disciplinary cards, and penalty kicks can only explain a decrease of HA, but not the observed disadvantage, we can only speculate about the reasons.

Crowd effects are supposed to support the home team, but they also affect the away team (Greer, 1983; Pollard and Gómez, 2014a). On the one hand, the present result with a significant decrease in HA indicates that during the games without audience the lack of cheering and positive gestures, i.e., the social support for the home team (Schwartz and Barsky, 1977), seems to have decreased team performance. On the other hand, also the lack of booing, whistling, and chanting of insults seems to have decreased the distraction for the away team as suggested by Greer (1983). Although these effects for the home and the away team can explain a reduction in HA, these should theoretically not lead to a home disadvantage. Pollard and Gómez (2014a) pointed out that the home advantage is a self-perpetuating phenomenon, meaning that the players' knowledge about the home advantage increases itself. The home team perceives the crowd as "twelfth player" on the field. The sudden absence of the crowd noise and the cheering

TABLE 3 | Detailed round per round data for the games with (GWA) and without audience (GWOA) in season 2019/20.

	Round	HW	HL	HD	Home points	Away points	Total points	HA (%)
Games with audience (GWA)	1	5	2	2	17	8	25	68
	2	2	6	1	7	19	26	27
	3	5	2	2	17	8	25	68
	4	3	4	2	11	14	25	44
	5	5	1	3	18	6	24	75
	6	0	8	1	1	25	26	4
	7	3	2	4	13	10	23	57
	8	6	0	3	21	3	24	88
	9	5	1	3	18	6	24	75
	10	6	2	1	9	7	26	73
	11	3	5	1	10	16	26	38
	12	3	4	2	11	14	25	44
	13	3	4	2	11	14	25	44
	14	7	1	1	22	4	26	85
	15	5	3	1	16	10	16	62
	16	2	5	2	8	17	25	32
	17	6	1	2	20	5	25	80
	18	3	6	0	9	18	27	33
	19	6	3	0	18	9	27	67
	20	4	2	3	15	9	24	63
	21*	3	2	3	12	9	21	57
	22	2	5	2	8	17	25	32
	23	3	5	1	10	16	26	38
	24*	3	2	3	12	9	21	57
	25	3	2	4	13	10	23	57
Games without audience (GWOA)	x**	1	1	0	3	3	6	50
	26	1	5	3	6	18	24	25
	27	2	5	2	8	17	25	32
	28	2	2	5	11	11	22	50
	29	3	6	0	9	18	27	33
	30	2	3	4	10	13	23	43
	31	1	6	2	5	20	25	20
	32	5	2	2	17	8	25	68
	33	4	3	2	14	11	25	56
	34	6	2	1	19	7	26	73

* excluding one postponed game that was played without audience. ** two postponed games from round 21 and round 24, played on 11th March and 16th May without audience. HW, home wins; HL, home losses; HD, draws; HA, home advantage.

fans might further demotivate the home team. An additional mental preparation of the home team players regarding the new situation without crowd support might support the players and reduce these negative effects. On the other hand, the away team is also aware of the usual effects of the audience for the home team and thus might be even more motivated in this unusual situation. While the physical familiarity did not change during the lock-down phase, the psychological familiarity did. Furthermore, travel effects should remain the same; however, as travels during the Covid-19 crisis were rare or even impossible, traveling to another city together with team colleagues could have caused positive and motivating effects on the away team.

The results of the present analysis of the first German league cannot simply be transferred to other leagues or types of sport. Analyses of lower German leagues (Fischer and Haucap, 2020) and results of other major leagues (Poli et al., 2020) revealed that the lack of audience did not affect all teams to the same amount. Another limitation of this study is the unbalanced schedule caused by the sudden lock-down and the consequential small number of games without audience. Thus, it was not possible to assess the behavior of single teams playing only 4–5 home games without audience (only one team had 6 home games). The round by round evaluation (Table 3) shows, that the variation of HA is very large such that conclusions on the HA of single teams are statistically not feasible. In addition,

the comparison between games with and without audience did not only include a different number of games but also dealt with different constellations of teams, thus the team strengths may have affected the results. Considering the team strength, we applied a model using the Poisson distribution with all its shortcomings. However, as mentioned above, the model gave an excellent prediction of points achieved by the teams.

Limitations in the analyses of the referee bias were the small numbers of penalty kicks and disciplinary cards preventing insight into single games.

A further limitation is the small number of variables: we only looked at the results of the games, the numbers of fouls, disciplinary cards, and penalty kicks. The study would have led to more insight if we had had further information, for example, about the perception of the Covid-19 situation by the players and the trainers.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

MT and ST designed the study, analyzed and interpreted the data, wrote the article, and provided a final approval of the version to be published. All authors contributed to the article and approved the submitted version.

SUPPLEMENTARY MATERIAL

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Written Emotional Disclosure Can Promote Athletes' Mental Health and Performance Readiness During the COVID-19 Pandemic

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The widespread effects of the coronavirus disease 2019 (COVID-19) pandemic have negatively impacted upon many athletes' mental health and increased reports of depression as well as symptoms of anxiety. Disruptions to training and competition schedules can induce athletes' emotional distress, while concomitant government-imposed restrictions (e.g., social isolation, quarantines) reduce the availability of athletes' social and emotional support. Written Emotional Disclosure (WED) has been used extensively in a variety of settings with diverse populations as a means to promote emotional processing. The expressive writing protocol has been used to a limited extent in the context of sport and predominantly in support of athletes' emotional processing during injury rehabilitation. We propose that WED offers an evidence-based treatment that can promote athletes' mental health and support their return to competition. Research exploring the efficacy of the expressive writing protocol highlights a number of theoretical models underpinning the positive effects of WED; we outline how each of these potential mechanisms can address the multidimensional complexity of the challenging circumstances arising from the COVID-19 pandemic (e.g., loss of earnings, returning to training and competition). Considerations and strategies for using WED to support athletes during the COVID-19 pandemic are presented.

Keywords: emotion, emotion regulation, elite athletes, sport psychology delivery, performance preparation

INTRODUCTION

The widespread effects of the coronavirus disease 2019 (COVID-19) pandemic have included a range of severe implications for sport competition and athletes. The cancellation of major events and the termination of competitive seasons have impacted athletes from the Olympic level to youth recreational participation (Nicola et al., 2020). It has been noted that the suspension of competition has been experienced by some athletes as a tragic loss (Schinke et al., 2020) inducing significant grief, frustration, and stress (Toresdahl and Asif, 2020). Moreover, as athletes are required to adapt to life in the context of a global pandemic, reports of the detrimental effects on mental health have mounted with increasing accounts of depression and symptoms of anxiety (Cao et al., 2020; Hull et al., 2020).

Imposed social isolation in the form of quarantine or preventative lockdowns is an unfamiliar and unpleasant experience; emotional distress may be amplified by inhibited availability of social support and preclusion of routines that might be acting as coping strategies (Usher et al., 2020; Van Bavel et al., 2020). Athletes in particular are accustomed to operating within extensively planned training and competition schedules that provide routine and structure to both sport-related interpersonal interactions as well as social recovery (Kellmann, 2010; Heidari et al., 2019). The severing of social support incurred as a result of an imposed quarantine or prescribed isolation can dissolve an individual's sense of connectedness and impact negatively on mental health (Hawryluck et al., 2004; Williams et al., 2018). It has been highlighted that during the time of government-imposed restrictions (e.g., lockdown, social distancing) aimed at limiting the effects of the pandemic, individuals would benefit from maintaining social connections to minimize the negative impact on emotional well-being (Courtet et al., 2020).

One of the central functions of social support in sport is to provide athletes with the opportunity for emotional expression and associated emotional processing (Tamminen and Gaudreau, 2014). Restricted emotional processing has been linked with a range of negative health implications including elevations in sympathetic activity (Gross and Levenson, 1993), limiting of positive emotional experiences (Duddu et al., 2003), and a reduction of adaptive physiological responses (Clapp et al., 2015). One common technique to promote emotional processing is the emotional expression protocol of *Written Emotional Disclosure* (WED; Pennebaker, 1989). The expressive writing paradigm has been extensively researched in a wide variety of settings with diverse populations (for reviews, see Frisina et al., 2004; Frattaroli, 2006; Travagin et al., 2015; Riddle et al., 2016). There are, however, very few articles examining its applicability in the domain of sport, and these have predominantly focused on its use with injured athletes (e.g., Mankad et al., 2009a; Duncan et al., 2013; Salim and Wadey, 2018).

WED: HISTORY AND APPLICATION

Presented as a form of writing therapy for over 30 years, WED has been used as a method to reduce the inhibition of emotions through a systematic program of emotional expression (Pennebaker and Beall, 1986). In the vast majority of studies, the typical protocol requests participants to write expressively about an upsetting topic (e.g., previous trauma) for a prescribed duration of time, most often between 15 and 20 min, on three to five occasions over the period of a week (Frattaroli, 2006). A variety of positive psychological outcomes (e.g., reduced stress and anxiety; Lovell et al., 2016; Harvey et al., 2018) and physical benefits (e.g., immunological, lung function; Warner et al., 2006; O'Cleirigh et al., 2008) have been associated with completing the writing protocol.

Psycho-immunological benefits associated with completion of WED have been observed with athletes rehabilitating from long-term injury (Mankad et al., 2009b). In particular, emotionally

expressive writing about the occurrence of the injury was associated with reduced stress levels and mood disturbance (e.g., confusion, depression) as well as enhanced expression of CD4+ immune cells. Taken collectively, Mankad and colleagues suggest that the potential psychophysiological benefits of WED may enhance immune health and mitigate the potential negative effects of emotional distress among rehabilitating athletes.

Clinical populations have also experienced positive outcomes from the protocol (Frisina et al., 2004). For example, patients with cancer (Stanton et al., 2002), post-traumatic stress disorder (PTSD) (Smyth et al., 2008), and asthma (Smith et al., 2015) have shown favorable responses to the treatment. Although, it is worth noting that physical benefits have been noted in a number of studies across a range of conditions (e.g., rheumatoid arthritis, chronic pelvic pain) in the absence of significant psychological improvement (e.g., Norman et al., 2004; Van Middendorp et al., 2009). Beyond medical conditions, expressive writing is highlighted as potentially beneficial for a wide range of populations including caregivers (Riddle et al., 2016), college students (Lumley and Provenzano, 2003), and individuals who are unemployed (Soper and Von Bergen, 2001) or suffering bereavement (Pennebaker et al., 1997; Lichtenthal and Cruess, 2010).

Studies using WED with injured athletes have proposed that the treatment's therapeutic effects may be associated with grief-related responses to injury that can be attenuated when athletes gain greater personal understanding of their injury through emotionally expressive writing (Mankad and Gordon, 2010). Reports from athletes suggest that the COVID-19 cancellation of sport championships (e.g., 2020 Olympics) was experienced like a death (Schinke et al., 2020). The wider implications of discontinued competitive sport seasons were perceived by some athletes to have killed their career (Clarkson et al., 2020) as well as the development of their self-identity as an Olympian (Stephan and Brewer, 2007). WED is noted as an opportunity for individuals to process emotions induced by events occurring within social contexts (e.g., exclusion) that can impact upon self-identity (Cangia, 2014). That said, a number of individual difference factors (e.g., personality; Zakowski et al., 2011) have been highlighted to influence the effectiveness of the expressive writing protocol (Smyth, 1998). Further, research using WED with injured athletes notes that psychological and physical benefits can vary and may be associated with diverse participant characteristics and differing writing protocols (e.g., Duncan et al., 2013; Salim and Wadey, 2018). In consideration of using WED with athletes during the COVID-19 pandemic, examining the underpinning mechanisms of the intervention is warranted to evaluate its potential applicability and to optimize the possible psychophysiological outcomes (Smyth and Pennebaker, 2008).

MECHANISMS UNDERPINNING WED

Research exploring the potential mechanisms underpinning the positive effects of WED has highlighted a number of theoretical models (Sloan and Marx, 2004; Frattaroli, 2006). Specifically, reductions in inhibition (Pennebaker and Beall,

1986; Pennebaker, 1989), positive cognitive adaptation (Margola et al., 2010), repeated exposure/emotional processing (Sloan et al., 2005), and increased social integration (Pennebaker and Graybeal, 2001) are proposed as possible explanations of the efficacy of the emotionally expressive writing protocol. However, despite extensive research, no single theoretical model is able to account fully for the effectiveness of WED (Pennebaker and Chung, 2007). In consideration of the multidimensional complexity of the challenging circumstances arising from the COVID-19 pandemic (e.g., disrupted training and competition schedules, reduced proximity of social support), WED could offer a particularly useful treatment due to its multiple potential mechanisms. Further, the multiple proposed mechanisms underlying the expressive writing protocol may vary in their prominence and influence across the dynamic conditions (e.g., quarantine, return to competition) that athletes are attempting to manage. Within the following sections, we will outline each of the proposed theoretical models underlying WED in relation to how they could address implications of the COVID-19 pandemic on athletes' physical and mental health. We also offer guidance outlining how the potential psychological benefits associated with the proposed theoretical models may be maximized through recommendations for applied practice with athletes.

Reductions in Emotion Inhibition

Emotional inhibition is characterized by an individual's maladaptive interaction with his or her social environment and impacts upon physiological, cognitive, and social-behavioral processes (Traue et al., 2016). The first theoretical model that came to prominence in research attempting to account for the beneficial effects of WED had inhibition at its core (Sloan and Marx, 2004), and initial expressive writing treatment programs were guided by the Freudian concept of (dis)inhibition and its proposed influence on health (cf., Pennebaker and Beall, 1986; Pennebaker, 1989). Following the proposition that inhibiting thoughts, emotions, or behaviors are associated with unconscious physiological effort, the writing exercise provides an outlet to express the inhibited content and thus reduce the internal psychophysiological tension (Pennebaker and Chung, 2007). However, there is no evidence to support the position that decreases in inhibition mediate the relationship between expressive writing and health improvements (Sloan and Marx, 2004). Further, due to measurement difficulties inherent to the attempted examination of individuals' inhibition of thoughts and emotions, little research has focused on this proposed theoretical model (Pennebaker and Chung, 2007).

Repression is a coping strategy that is closely associated with the inhibition of emotions and is operationally defined as the discrepancy between reported emotional experience and physiological indices of activation (Weinberger and Davidson, 1994). Research in sport highlights that self-reported levels of state anxiety do not differ between repressors and athletes low in trait anxiety (Mullen et al., 2009); however, when self-report data are compared with physiological indices of anxiety, athletes categorized as repressors (i.e., low self-report anxiety, high physiological reactivity) are found to suffer performance failures to a greater extent (Woodman and Davis, 2008).

Inhibition of information is an active, energy-consuming process (Schwartz and Kline, 1995). Conversely, *repression* involves no awareness of the concealment of emotions. As such, the repression of grief-related emotions induced by COVID-19 (e.g., cancellation of sport competition) may induce discrepancies between athletes' overtly expressed emotions and their concomitant physiological state; any such perpetual emotional dissonance can promote the development of exhaustion (Kenworthy et al., 2014; Romo, 2017). More broadly, the inhibition of emotions associated with stress has a negative impact on health (Traue et al., 2016).

Another form of emotion inhibition that has been studied in athletes is *suppression* (Uphill et al., 2012; Wagstaff, 2014; Calverley et al., 2020). Whereas repression is unconscious, the emotion regulation strategy of expressive suppression involves conscious attempts to inhibit emotion-expressive behavior once the emotional state has already arisen in the individual (John and Gross, 2004). Suppression can reduce athletes' behavioral expressions even though the psychophysiological symptoms of negative emotions are still experienced (Campbell-Sills et al., 2006). Research in the domain of sport highlights that emotion suppression may heighten awareness of negative emotions (Lane et al., 2012). Suppression also diverts cognitive resources toward attempts at emotion regulation, thereby reducing allocation invested in task-related demands and subsequently worsening performance (Wagstaff et al., 2013).

Research examining associations between the use of emotion regulation strategies and the psychological impacts of the COVID-19 pandemic highlights that reports of post-traumatic stress symptoms are positively related with expressive suppression and negatively associated with cognitive reappraisal (Jiang et al., 2020). These findings outline that inhibiting outward emotional expressions may amplify the experience of stress and negative emotion (Moore et al., 2008). In order to maximize the potential benefits of reductions in inhibition, it may be important to highlight the safety and non-judgmental context offered to athletes in the writing environment. Athletes who feel secure in their ability to authentically express their pandemic-related emotions (e.g., grief) through WED may reduce the negative effects of emotion suppression and in turn facilitate the cognitive reframing of their perceptions of the stressful situation.

Cognitive Adaptation

The second theoretical model posited to explain the mechanisms that underpin WED is *cognitive adaptation* (Sloan and Marx, 2004). Central to cognitive adaptation is the processing of stressful events through the reworking of existing schemas. In particular, individuals must endeavor to redesign a conceptual system wherein the stressful events are assimilated into an established set of assumptions or alter the assumptions to accommodate the stress inducing event (Janoff-Bulman, 2010). Research suggests that translating a traumatic event into language allows an individual to organize, structure, and make sense of disturbing events that may not have been previously possible (Pennebaker and Francis, 1996; Pennebaker et al., 1997). According to this model, the process of gaining insight and cognitively assimilating emotional events into existing

schemas decreases demands on working memory and reduces uncertainty regarding the stressful situation (Klein and Boals, 2001; Graybeal et al., 2002; Schwartz and Drotar, 2004). Making sense of COVID-19 measures (e.g., quarantine, canceled sporting events) is important for athletes' positive stress adaptation and emotional well-being (Davis et al., 2019). Undertaking WED may encourage athletes to consider the implications of restrictions on sport participation in relation to wider global priorities (e.g., mortality rates) and promote their perspective taking, empathy, and mental health (Botterill and Brown, 2002; Meyer and Fletcher, 2007).

Expressive writing can facilitate participants' re-evaluation of their role in the stressful situation and promote perspective taking that increases either the internalization or externalization of the events that transpire (Pennebaker et al., 2003; Moore et al., 2009). In support of this proposal, Campbell and Pennebaker (2003) found that participants who cognitively altered their individual and social perspectives over the course of the WED treatment were more likely to experience health benefits compared with participants with more rigid perspectives. More specifically, increased self-distancing (i.e., shifting from an internal viewpoint to an external observer perspective) has been found to mediate the association between expressive writing and reductions in emotional reactivity (Park et al., 2016).

Expressive writing can also reduce cognitive confusion surrounding an emotional event and provide an opportunity for the integration of antecedents and outcomes into an individual's cognitive representation of themselves (Pennebaker and Francis, 1996; Graybeal et al., 2002). Hudson and Day (2012) note that athletes may re-evaluate and augment their perspective as a result of undertaking an expressive writing intervention when the protocol instructions align with reversal theory. Adapting writing instructions can promote individual growth by reducing avoidance of stressors, facilitating problem solving, and increasing reflection upon competition and training strategies.

The expressive writing protocol offers an avenue for structured self-reflection. Re-evaluating holistic life balance, re-setting of goals, and revisiting competition plans have been noted as being central for maintaining athletes' mental health during the upheaval of COVID-19 restrictions (Schinke et al., 2020). WED presents an opportunity to independently increase self-awareness and integrate disconnected thoughts and feelings with aspects of identity (Brody and Park, 2004). Previous research examining the role of cognitive adaptation has typically analyzed participants' written texts to assess changes in the use of pronouns and words reflecting insight (Fuentes et al., 2018). Computer programs that conduct linguistic analyses have enabled researchers to track changes in participants' writing and link word usage with various health and behavioral outcomes (Pennebaker et al., 1997). Previous investigations of WED with injured athletes have highlighted changes in the semantics of language over repeated sessions of expressive writing, specifically, a significant increase in positive emotions and words related to cognitive mechanisms (e.g., because, therefore), as well as a decrease in negative emotion words (Salim and Wadey, 2018). Athletes attempting to cohere disconnected thoughts and fluctuating emotions during the COVID-19 pandemic may benefit from

increased self-awareness, acceptance, and compassion (Coyne et al., 2020). In an effort to promote cognitive adaptation, we recommend adapting the instructions for each of the sessions across the program of writing to facilitate a process of reflection that develops athletes' self-awareness, perspective taking, and compassion for themselves and others. Repeated sessions of expressive writing could improve athletes' understanding of emotions, thoughts, and behavioral experiences in relation to their evolving identity during the pandemic.

Exposure Hypothesis

Repeated emotional expression underpins WED's third theoretical model of the *exposure hypothesis* (Frattaroli, 2006). Exposure-based therapies guide participants through repeated contact with aversive stimuli that triggers unpleasant emotions, while simultaneously engaging in a behavior that is incongruent with the induced affective state (Ljótsson et al., 2011). Modern forms of exposure have demonstrated high efficacy in many different anxiety disorders, including panic disorder, specific phobias, social anxiety, and obsessive-compulsive disorder (Buchholz et al., 2019). Through repeated exposure to the traumatic stimuli *via* the expressive writing program, participants experience a reduction in emotional arousal that results in the habituation of participants' stress responses and leads to beneficial health outcomes (Kloss and Lisman, 2002; Sloan et al., 2005; Smyth et al., 2008). Sloan and Marx (2004) suggest that WED can serve as a less threatening context for participants to recall traumatic memories that they had previously avoided. Exposure is considered a core method in Cognitive Behavioral Therapy (CBT; Hedman et al., 2014), although it is seldom described in sport settings (Gustafsson and Lundqvist, 2020). Exposure in the form of expressive writing would likely serve as a useful method when exposure cannot be used *in vivo*; for example, in an effort to reduce an athlete's stress associated with recommencing international air travel. It is anticipated that emotional distress may arise due to uncertainty around safety (e.g., risk of infection) or travel disruption (e.g., changes to quarantine requirements), and that undertaking systematic exposure through expressive writing may help to reduce psychophysiological stress reactivity and increase an athlete's preparedness to travel. For example, athletes may be guided to write about effective emotion regulation strategies or tactics to promote positive stress adaptation to be used if a flight is canceled (Gärling et al., 2020). Rehearsed systematic exposure to emotions associated with flight cancellations (e.g., shock, anxiety) can facilitate more efficient emotional processing if/when they arise under pressure filled circumstances (e.g., crowded airports).

It is worth noting that WED incorporates many similar features of acceptance that comprise Acceptance Commitment Therapy (ACT; Hayes, 2004); underpinning both ACT and WED is the guidance for individuals to adopt a position of openness to all thoughts, feelings, and sensations that arise during the course of the treatment (Pennebaker, 1997; Gardner and Moore, 2010). The opposite attitude to acceptance is experiential avoidance; research outlines that experiential avoidance is associated with

multiple negative outcomes, such as anxiety, depression, and lower quality of life (Hayes et al., 2004, 2006). Initial research also confirms related findings using ACT with injured athletes returning to competition (Shortway et al., 2018). Therefore, WED may serve to help athletes “open up” to experiences that are deemed uncomfortable and distressful; subsequent decreases in emotional avoidance could result in increased well-being.

In particular, the thought of returning to sport competition following the easing of COVID-19 restrictions is likely to induce intense emotions for many athletes. Uncertainty in terms of the risk of infection, as well as concerns over performance readiness and injury, may be sources of emotional distress for athletes (Mohr et al., 2020). Athletes completing the expressive writing program can be systematically exposed to the specific stressful stimuli associated with returning to competition and subsequently experience a reduction in emotional arousal that ultimately results in the habituation of participants’ stress responses.

The necessity to adapt the competition environment (e.g., no spectators) may present novel circumstances that result in athletes’ perceptions of reduced challenge and/or motivation; for example, athletes may be required to undertake matches in the absence of a potential audience effect (Wallace et al., 2005). As such, athletes may perceive a “lack of emotional demand” and experience a state of under arousal that is discordant with their individual zone of optimal functioning (Hanin, 1997). In particular, personality, and specifically narcissism, has been found to influence emotional responses to competition and moderate the emotion–performance relationship (Roberts et al., 2018). Narcissists may reduce their effort due to the lack of opportunity for glory in the absence of an audience and experience subsequent performance decrements (Wallace and Baumeister, 2002; Beattie et al., 2017). In an attempt to prepare for the lack of spectators, narcissists may benefit from engaging in external visual imagery as a strategy to vicariously simulate performance-enhancing emotional states (Roberts et al., 2010). Combining WED with imagery training (Lang et al., 1980, 1983) aimed at optimizing athletes’ psychophysiological readiness to return to competition may amplify the positive effects of both the expressive writing treatment and mental rehearsal (Konig et al., 2014).

The benefits of mental rehearsal and imagery in athletes’ preparation and performance are well documented (Martin et al., 1999; Slimani et al., 2016). Imagery is noted to be effective in developing the self-efficacy of athletes during injury rehabilitation and preparation for return to competition (Wesch et al., 2016). Research on imagery has shown that athletes who can imagine themselves performing successfully often experience enhanced performance outcomes (e.g., Callow et al., 2017, 2019). In particular, it is noted that athletes possessing a high task orientation are effective in forming mastery images and experience the emotion of these images (Gregg et al., 2016). On a related note, the benefits of WED have also been observed in studies that have adapted instructions directing participants to write expressively about life goals and best possible selves (King, 2001; Harrist et al., 2007; Layous et al., 2013). Directing athletes to write about their best possible return to sport may help focus

their pursuit of this goal. Combining imagery and expressive writing associated with mastery goals, rather than achievement alone, may better prepare athletes for the emotional experience of returning to competition.

The combined use of constructing mental imagery and verbal representations, in the form of expressive writing, links with Paivio; Paivio’s (1971; 1986) dual-coding theory of information processing. Treatment of clinical anxiety disorders has been developed in consideration of the dual-coding theory (Martin, 1991; Stöber, 1998) with the aim of reducing worry by enhancing the concreteness of imagery and decreasing avoidance (Stöber and Borkovec, 2002). Athletes’ potential emotional distress and worry surrounding the COVID-19 pandemic may be reduced by improving the concreteness of imagery through the development of verbal representations in the language used in the expressive writing protocol. For example, worries about returning to competition may be reduced if athletes are better able to clearly articulate the image of successfully completing tasks associated with recommencing sport (e.g., simultaneously writing about and visualizing their first physical contact with a player on the opposing team).

As athletes engage in a process of identifying process goals directed toward a successful return to sport competition, it is likely that they will seek advice from associated support teams (e.g., coaches; Arthur et al., 2019). As a result of increasing social interactions, they may begin to express their emotions more widely in social contexts. It is noted that emotional expression undertaken in experimental laboratory writing protocols associates with changes in social interactions and language use in the real world (Pennebaker and Graybeal, 2001).

Social Integration

The final proposed explanation for the efficacy of WED outlines that linguistic changes resulting from completion of the expressive writing protocol are more widely integrated into social interactions (Pennebaker and Graybeal, 2001). The theoretical model of social integration posits that WED can facilitate the organization and articulation of emotions that subsequently promotes wider sharing and reciprocal social support (Bryne-Davis et al., 2006). Athletes who undertake expressive writing independently within the WED paradigm may alter the manner in which they interact with their social world as a result of the previously discussed mechanisms underlying WED (i.e., reduced inhibition, cognitive adaptation, exposure). For example, athletes who were planning to attend the Olympics in Japan may have initially struggled with articulating and expressing their feelings of loss about the cancellation of the event. Over the course of repeatedly expressing their emotions systematically during the writing protocol, athletes’ emotional arousal may be reduced, and their thoughts about the setback could be better organized as a result of increased acceptance and self-compassion (Mosewich et al., 2013; Reis et al., 2015). Consequently, they may feel more comfortable speaking with family and more effective in communicating their support needs.

Disclosing thoughts, emotions, and personal experiences *via* written posts on social media has increased during the COVID-19 pandemic (Nabity-Grover et al., 2020). It has been noted

that athletes' presence on social media during the pandemic can serve as positive role models (Leng and Phua, 2020). Examples of athletes' adapted training techniques have served to inspire physical activity during government-prescribed lockdowns (Hayes, 2020). Further, athletes can maintain a sense of connection and fan engagement *via* posts on social media (e.g., Su et al., 2020). Sharing emotional experiences as well as useful information with fans, friends, and family across social media interactions is noted as a potential means to regulate pandemic-related anxiety (Wiederhold, 2020). That said, social media use can contribute to mental health problems; frequent exposure during the COVID-19 pandemic is linked with greater reports of depression and anxiety (Gao et al., 2020). A pressure to present an ideal image of oneself is identified as a contributing factor of psychological distress associated with the use of social media (Casale et al., 2014; Keles et al., 2020). WED undertaken independently provides an opportunity for authentic emotional expression without fear of judgment from others, gaining self-compassion and acceptance through the writing paradigm may reduce anxieties related to idealized self-presentation on social media (Zhang et al., 2020).

Increased social integration and interactions arising as a result of WED have been evidenced in studies outlining that participants assigned to experimental disclosure were more likely than controls to talk about their traumatic experience in the weeks or months following disclosure (e.g., Kovac and Range, 2000). However, it is important to note that expressive writing results in greater health benefits for individuals who perceive that social support is available (Milbury et al., 2017). As such, before athletes initiate WED, it may be prudent to identify and/or establish a supportive social network. The availability of a social support network may promote social integration by offering athletes an outlet when they gauge themselves as being ready to more widely discuss emotional aspects of their experience of the COVID-19 pandemic.

It is possible that the influence of the social integration theory underlying WED is realized over a longer duration than the other proposed mechanisms. Specifically, linguistic changes occurring throughout the completion of the writing are likely to reflect cognitive processes developing across repeated sessions (Pennebaker and Graybeal, 2001). Further, athletes' mental health, and specifically their perceptions of the topic of the expressive writing, will be influenced by ongoing social interactions as well as the feedback gained from significant others. Coming to terms with the implications of a stressful situation, such as a global pandemic, appears to be associated with perceptions and emotions about oneself in relation to others (Swann, 1997; Campbell and Pennebaker, 2003).

The novelty of initiating a program of expressive writing may also instigate athletes' sharing of their experience of WED. Athlete peer-support groups have been established in an attempt to offer peer support during the COVID-19 pandemic; supplementing these online meetings with independent completion of the expressive writing protocol may focus discussion topics among athletes and lead to collective problem-solving as well as emotional support. Sport psychologist, in particular, may act as moderators in online

group discussions to help guide athletes' shared exploration of emotional experiences and promote social support.

SUMMARY AND CONSIDERATIONS FOR USE WITH ATHLETES

In review of the multiple theories advanced in attempts to explain the underpinning mechanisms of WED, it is likely that multiple interacting factors are driving the effectiveness of expressive writing. Considering the wide-ranging implications of the COVID-19 pandemic, it may be particularly useful to implement an intervention to support athletes that can potentially impact upon a variety of aspects of stress (e.g., grieving, isolation, uncertainty). To this end, the writing paradigm appears to affect individuals along multiple dimensions (e.g., emotional, cognitive, physiological, social).

Although it is unclear which underlying mechanisms might be most impactful, the utility of the writing technique is clear given its adaptability across differing situations, participants, conditions, and settings. For example, the writing protocol has been observed to be effective even when the time of the writing session is dramatically reduced (i.e., 2 min; Burton and King, 2008). Shortening the length of the writing sessions (e.g., 5–10 min) may increase athletes' receptivity to undertaking the protocol and minimize concern about time constraints. On a similar note, a single session of expressive writing for a duration of 10–15 min has been highlighted as being effective in the reduction of negative emotions when participants are guided to reframe thoughts and feelings using positive emotion words (Fernández and Páez, 2008). The concept of reframing negative thoughts to more positive alternatives is widely known by athletes who have undertaken mental skills training focusing on self-talk (Van Raalte et al., 2016). In particular, the link between self-talk, affective states, and performance is well established in sport psychology (e.g., Hardy et al., 2001; Latinjak et al., 2017); athletes may be more open to engaging with the expressive writing protocol if it is presented as a systematic organization of self-talk relating to their experience of the pandemic.

In terms of accessibility, the expressive writing protocol is ideally suited for use with athletes in quarantine and observing social distancing; many studies have highlighted WED's effectiveness when undertaken at home or online (e.g., Gillis et al., 2006; Stockton et al., 2014). It is proposed that WED may be particularly helpful for individuals with limited availability of emotional outlets in their social environment (Zakowski et al., 2004). Although online platforms (e.g., Zoom) have been used extensively by coaches and sport organizations in attempts to bridge social distance during periods of lockdown, participants' affective experience and perceptions of emotional expression can vary dramatically with diverse outcomes (Serrano-Puche, 2020).

During government-imposed restrictions, athletes may perceive a loss of autonomy and reduced locus of control. Undertaking WED may facilitate positive stress adaptation in response to socially prescribed behaviors; athletes may gain greater insight into how they can adopt a proactive role in

responding to events rather than perceive themselves to be dictated to through restrictions that curtail usual training methods (Fallby et al., 2006; Holden et al., 2019). For example, WED can assist athletes in the evaluation of their daily routines and promote effective self-regulation in regard to the use of surplus time made available as a result of cancellations and altered schedules. Many athletes are used to maintaining training logs that record a range of factors and activities related to performance development (e.g., diet, sleep, training load); introducing WED as an extension of their training log may increase individual athletes' uptake of the protocol.

It is worth noting that WED is not an ideal treatment for everyone, and that differential outcomes can be observed across varying characteristics of personality (e.g., alexithymia, neuroticism; Baikie, 2008; Zakowski et al., 2011). Sport psychologists would be well advised to ensure that there is adequate support for athletes in case WED initiates an intensity of emotional expression that the athlete feels inadequately prepared to manage. Further, WED can prompt a level of self-reflection that would benefit from the provision of an external perspective to assist with organizing thoughts associated with the uncertainty of the current situation and return to competition in the future. That said, a study by Salim et al. (2015) highlighted that injured athletes reporting low levels of hardiness perceived emotional disclosure as potentially being burdensome on others and could result in negative repercussions (e.g., team selection; Salim et al., 2015). Therefore, it is important for sport psychologists to first evaluate the suitability of WED for use with an athlete, in terms of both personality and quality of surrounding support. Moreover, athletes possessing limited motivation or ability to process their emotions through expression may find WED unappealing or counterproductive (Kraft et al., 2008). For example, athletes who struggle to identify or articulate the stressors they associate with the pandemic are less likely to experience cognitive or affective changes.

Caution is advised prior to commencing a program of WED, as writing about the events surrounding the pandemic (e.g., job loss, death of loved ones) can be an upsetting experience. Sport psychologist must ensure that the risk of potential retraumatization is managed effectively to realize the

potential psychological benefits associated with undertaking the expressive writing program. Athletes may unduly suffer from WED if there is a failure to appropriately support the athlete during the experience of intense emotions associated with the writing or the potential secondary effects that could emerge from the sharing of thoughts and feelings with significant others (e.g., teammates).

To enhance the safety and efficacy of WED with athletes during the COVID-19 pandemic, future research investigating the use of the expressive writing treatment is warranted. In consideration of previous studies exploring WED across diverse populations and contexts, a variety of research designs (e.g., randomized control trials, qualitative interviews) and methods (e.g., measures of immunological functioning and emotional well-being) may help elucidate athletes' experiences of WED. In particular, single-case research may facilitate understanding of the effectiveness of the expressive writing intervention and reflect dynamic aspects of an athlete's emotional processing across multiple phases of the pandemic (e.g., initial cancellation of events, return to competition; Barker et al., 2013; Turner et al., 2020).

In summary, WED has been found to have health benefits across many populations including athletes. In consideration of the restrictions arising during the COVID-19 pandemic, the expressive writing protocol offers a flexible treatment that can be adapted to the individual athlete's circumstances as well as supplement ongoing support. WED is an evidence-based treatment that can help maintain athletes' mental health and support their return to competition. Research evaluating the actual psychological and physical health benefits of WED in athletes and coaches within the context of the COVID-19 pandemic is warranted, and related studies can help refine the expressive writing protocol to align with individual circumstances and optimize treatment outcomes.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Where Did All the Sport Go? Negative Impact of COVID-19 Lockdown on Life-Spheres and Mental Health of Spanish Young Athletes

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During the 2020, the pandemic caused by the massive spread of the SARS-CoV-2 coronavirus (COVID-19) resulted in a global crisis. In Spain, the COVID-19 pandemic caused a lockdown for almost 100 days and forced the sudden stop of sport practices and competitions. This interruption had a negative impact on high-level athletes' mental health. However, its impact on young athletes, who are intrinsically developing a high-demanding dual career, remains unclear. Therefore, this study aimed at (1) describing and characterizing the general impact that COVID-19 lockdown had on Spanish young athletes' life-spheres and mental health, and (2) identifying different profiles of athletes regarding life-conditions and sport-related variables. A sample of 544 young athletes ($M = 15.9$; $SD = 1.51$) participated in this study. Measures included life-conditions and sport-related information along with the Holistic Monitoring Questionnaire (HMQ) and the General Health Questionnaire (GHQ-12). After the screening and description of the data, profiles were defined using a two-level cluster analysis using HMQ and GHQ-12 subscales. We explored differences in demographic and sports information between profiles using MANOVA and subsequent ANOVA. Results suggest a general negative impact of COVID-19 on young athletes' life-spheres and mental health, but with three different clusters regarding the degree of such impact. Cluster 1 grouped the 54.78% of the sample and exhibited a low negative impact of COVID-19 lockdown on life-spheres and few mental health issues. Cluster 2 grouped a 29.96% of the participants who reported a medium negative impact on life-spheres and moderate mental health issues. Cluster 3 represented 15.26% of the sample including participants who showed a high negative impact of the COVID-19 lockdown with high mental health issues. The paradigmatic participant in this third group would be a female student-athlete from a medium or low socioeconomic status with high academic demands and poor or inexistent training conditions during lockdown. Current findings emphasize the need to pay attention to young athletes' mental health and suggest possible influencing contextual variables. We suggest some applied recommendations aimed at helping clubs and sports institutions to mitigate the negative effects of such difficult circumstances on athletes' mental health.

Keywords: SARS-CoV-2, student-athletes, holistic approach, adolescent, cluster analysis, wellbeing

INTRODUCTION

The year 2020 will remain in History as the year of the coronavirus (COVID-19) outbreak. The COVID-19 pandemic¹ caused a global crisis with social, political, and economic consequences. In Spain, one of the countries where the pandemic hit harder,² a state of alarm was declared on March 14, letting the population on lockdown and with most of the regular activities restricted for almost 100 days. Young athletes remained without practices and competitions for months.

According to the experts in the field, mobility restrictions and social isolation policies developed during COVID-19 lockdown could have a negative impact on population mental health (e.g., Brooks et al., 2020; Papaioannou et al., 2020). Early evidence seems to confirm these predictions (Chen et al., 2020). In Spain, González-Sanguino et al. (2020) observed that between 15.8 and 21.6% of the general population showed depressive, anxious, and/or post-traumatic symptoms during the first month of confinement. However, to complement these general results, there is a need to understand better the consequences of the COVID-19 pandemic within the sports context.

Research addressing the impact of this pandemic in sports identified specific challenges for athletes' mental health during the lockdown, such as the difficulty in keeping training conditions (Pillay et al., 2020), the social distancing from teammates (Graupensperger et al., 2020), and the uncertainty regarding the delay or cancelation of future competitions (Samuel et al., 2020). Despite most of these challenges are common for athletes of all ages and levels, research has mainly focused on high performance, professional, and/or Olympic/Paralympic athletes (see also Schinke et al., 2020a,b; Stambulova et al., 2020), letting youth sports' reality underexplored.

Youth sport is characterized by youngsters intrinsically developing a dual career (i.e., academic education and sport combination) that requires an adequate balance of sports, academic, psychological, psychosocial, financial, and legal challenges (Wylleman, 2019). This is considered a high demanding stage that requires both high personal competencies (Miró et al., 2018; Perez-Rivases et al., 2020) and a supportive environment (Morris et al., 2020). Previous research has warned about the negative consequences that a non-successful dual career might have for athletes' mental health (Sallen et al., 2018; Sorkkila et al., 2020), highlighting the need to approach this by taking a holistic approach (e.g., Wylleman and Lavalley, 2004; Wylleman, 2019) that captures both indirect (e.g., impact on life-spheres) and direct (e.g., anxiety/depression and social dysfunction) indicators of athletes' mental health.

Considering the changes that COVID-19 lockdown meant for young athletes' dual career (i.e., new academic reality, practices and competitions canceled, and social distance from peers), and the lack of resources in certain athletic environments for

youngsters developing a dual career in Spain (Mejías et al., 2020), it is needed to understand the complexity of the recent confinement in youth sport. Concretely, the aim of this study was two-fold: (1) to describe and characterize the general impact that COVID-19 lockdown had on Spanish young athletes' life-spheres and mental health and (2) to identify different profiles of athletes regarding these target variables along with their life-conditions and sport-related characteristics.

MATERIALS AND METHODS

Participants

A total of 833 athletes participated in this study. After applying the inclusion (i.e., having between 13 and 18 years) and exclusion (i.e., not completing the full survey or completing it in less than 3 min) criteria, the final sample consisted of 544 athletes ($M_{\text{age}} = 15.9$; $SD = 1.51$; $\% = 48.5\%$). Participants were lower secondary school (63.2%), upper secondary school (27.8%), or tertiary education students (9.0%). The sample was composed of athletes having from 1 to 15 years of sports experience ($M_{\text{experience}} = 7.11$; $SD = 3.11$), competing at regional (38.1%), autonomic (32.5%), national (23.0%), or international level (6.4%). Most athletes reported having an average (58.6%) or good (32.2%) socioeconomic level and living in a home (50.6%) or flat (33.5%) with garden or courtyard. Nearly all participants (98.9%) stayed with their families during the COVID-19 lockdown. When answering the questionnaire, all of them had accumulated between 50 and 100 days of confinement ($M_{\text{days}} = 72.71$; $SD = 12.03$).

Measures

Demographic and Sports Information

An *ad hoc* survey was created to assess relevant information for the objectives of this study. This survey was composed of items evaluating (a) life-conditions during COVID-19 lockdown (i.e., perceived socioeconomic level, academic course, number of co-habitants at home, and physical activity levels) and sport-related characteristics (i.e., years of sporting experience, competitive level, training conditions, and perceived support by the club and/or sports institutions).

Negative Impact of COVID-19 Lockdown on Life-Spheres

Impact of lockdown on athletes' life-domains was assessed using the Holistic Monitoring Questionnaire (HMQ; De Brandt et al., 2019). This questionnaire contains 11 items that evaluate the perceived impact of certain events, in this case the COVID-19 lockdown, on athletes' different life-spheres (e.g., "Please, rate the impact that the COVID-19 situation is having on your different life domains"). The HMQ is divided into four different life-spheres: (1) Dual career (i.e., studies, sport, social life, and the combination of these three areas); (2) Health (i.e., physical health, mental health, mood, and well-being); (3) Rest and recovery (i.e., sleep quality and recovery from training sessions); and (4) Economy (i.e., financial situation). Due to the characteristics

¹Similar to Stambulova et al. (2020), authors differentiate between COVID-19 as a syndrome caused by the SARS-CoV-2, COVID-19 pandemic as the current global crisis triggered due to the spread of COVID-19 worldwide, and the COVID-19 lockdown as the period of confinement of the population that most countries adopted to stop the COVID-19 spread.

²<https://www.worldometers.info/coronavirus/>

of the participants of this study (i.e., economic dependence from their parents), the financial situation item was not included. All items were rated on a 5-point Likert-style scale from 1 (*very positive impact*) to 5 (*very negative impact*). Cronbach's alpha coefficient showed acceptable-to-good reliability indicators for dual career ($\alpha = 0.74$), health ($\alpha = 0.81$), and rest and recovery ($\alpha = 0.85$) subscales. Confirmatory factor analysis showed acceptable model fit indicators, with $\chi^2(32) = 203.55$, $p < 0.001$, RMSEA = 0.098, 90% CI (0.085, 0.111), CFI = 0.973, and TLI = 0.961.

Mental Health Issues

We used the Spanish version of the General Health Questionnaire-12 (GHQ-12; Goldberg et al., 1997; Sánchez-López and Dresch, 2008). This 12-item self-administered questionnaire screens different symptoms that are indicative of a poor mental health. Respondents must select the option that better fits their degree of agreement in a 7-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Following past research with similar samples (e.g., Padrón et al., 2012), items were grouped into (1) anxiety and depression, (2) social dysfunction, and (3) loss of confidence subscales. We reworded the stem of the questionnaire to adapt it to the aims of this study (i.e., "during last few weeks under the situation of confinement..."). Cronbach's alpha coefficient reported acceptable levels of reliability, with values of 0.79, 0.76, and 0.80, respectively. Confirmatory factor analysis presented acceptable model fit indices, with $\chi^2(51) = 309.06$, $p < 0.001$, RMSEA = 0.096, 90% CI (0.086, 0.107), CFI = 0.949, and TLI = 0.933.

Procedure

After obtaining the approval of the University ethics committee (reference 4996), we designed an online tool with the aforementioned questionnaires using LimeSurvey software. A total of 30 sport clubs and sports institutions with different sports characteristics (i.e., number of athletes, competition level, and sport type) were invited to participate in this study using a convenience sampling strategy. Twenty-six of them agreed to participate. We did not detect any common pattern between entities that declined to participate in the study. For those entities that agreed to participate, we asked them to share with their athletes the link to the survey and some relevant information about the research (e.g., invitation letter, survey instructions, and contact information). All participants signed an informed consent and were informed about the confidential and voluntary nature of the study and the absence of any kind of reward to participate. As a gratitude for their help, a global report with the main findings of the study was sent to that all entities that participated in the data collection.

Data Analysis

All analyses were conducted using SPSS 19.0 statistical package. Preliminary data analysis included the examination of the missing data patterns and multivariate outliers. Listwise deletion method was used to deal with missing data. Accordingly, partial responses were not considered in this study. Cases with responses

outside the three interquartile ratio thresholds were also deleted (Hoaglin and Iglewicz, 1987). Afterwards, we calculated the descriptive statistics of the whole dataset, including means, standard deviations, bivariate correlations using Pearson's correlation coefficient, and reliability using Cronbach's alpha coefficient. Such descriptive analyses provided an overall understanding of Spanish young athletes during lockdown.

Next, we used the cluster analysis technique to characterize the different athletes depending on the impact that COVID-19 lockdown had on them. This characterization was conducted following the next steps: (1) we selected subscales of HMQ and GHQ-12 as clustering variables. Then, (2) we transformed the clustering variables into z-scores and (3) we combined both hierarchical and non-hierarchical cluster analysis in order to obtain a more stable solution (see Hair et al., 2010). Hierarchical cluster analysis was calculated using Ward's linkage and squared Euclidean distance. The number of clusters was derived from the visual inspection of the dendrogram and the Bayesian and Akaike Information Criteria (BIC and AIC; Akaike, 1974). The resulting cluster centers were used as starting points for the k-means cluster analysis, which tests the adequacy of a specified cluster solution. Such analyses identified different profiles of young athletes regarding the impact that COVID-19 had on their life.

Last, to approach the second aim of the study, we compared different life-conditions and sport-related variables between the resulting clusters. For categorical data, we used Pearson's Chi-square test and Fisher's exact test (when contingency tables contained at least a cell with less than five cases) with Monte Carlo iteration method. This test was computed considering the need to correct the value of p when conducting multiple comparisons ($p = 0.017$). For numeric data, we first used MANOVA to test whether compared groups differed in the explored dependent variables. Subsequently, we conducted ANOVA with *post-hoc* test comparisons using Games-Howell procedure to evaluate the differences between clusters in life-conditions and sport-related variables.

RESULTS

Descriptive Statistics

Descriptive statistics are presented in **Table 1**. Overall, results indicate that athletes reported that COVID-19 lockdown had a negative impact on their life-spheres and mental health. Regarding the different life-spheres, this impact seems to be more negative on dual career ($M = 3.6$; $SD = 0.7$; Rank = 1–5) and health domains ($M = 3.3$; $SD = 0.7$; Rank = 1–5) than in the rest and recovery domain ($M = 2.9$; $SD = 1.0$; Rank = 1–5). For mental health issues, young athletes reported, on average, higher anxious/depressive ($M = 3.5$; $SD = 1.0$; Rank = 1–7) and social dysfunction ($M = 3.5$; $SD = 1.5$; Rank = 1–7) symptoms in comparison with loss of confidence ($M = 2.6$; $SD = 1.7$; Rank = 1–7). Descriptive results also indicate positive correlations between life-spheres and mental health, with ranging magnitudes from 0.13 to 0.59 among them. Notably, social dysfunction showed

TABLE 1 | Descriptive statistics of negative impact of COVID-19 on life-spheres and mental health issues.

	<i>M</i>	<i>SD</i>	Range	α	1	2	3	4	5	6
Negative impact of COVID-19 lockdown on life-spheres										
1. Dual career	3.59	0.74	1–5	0.74	-					
2. Health	3.27	0.68	1–5	0.81	0.633*	-				
3. Rest and recovery	2.92	0.99	1–5	0.85	0.204*	0.364*	-			
Mental health issues										
4. Anxiety and depression	3.46	1.04	1–7	0.79	0.180*	0.418*	0.273*	-		
5. Social dysfunction	3.53	1.50	1–7	0.76	0.428*	0.580*	0.263*	0.492*	-	
6. Loss of confidence	2.61	1.67	1–7	0.80	0.128*	0.375*	0.209*	0.600*	0.509*	-

Bivariate correlations were computed using Pearson's coefficient. * $p < 0.001$.

to be the most correlated factor with the negative impact on life-spheres subscales (dual career: $r = 0.43$, health: $r = 0.58$, rest and recovery: $r = 0.26$).

Cluster Analysis

Results from the hierarchical cluster analysis suggested the three-cluster solution as the most suitable (see **Figure 1** and **Table 2**). This structure was subsequently confirmed by the non-hierarchical k -means analysis and was considered as theoretically satisfactory. The MANOVA suggested the existence of significant differences between groups in all clustering variables (Pillai's trace = 0.95; $p < 0.001$). The resulting profiles were labeled as *low impact*, *medium impact*, and *high impact* clusters. Overall, these three profiles present differences in the way that COVID-19 lockdown impacted on athletes' life-spheres and mental health. For most of the participants, the impact was low or medium, but there was also a considerable group of athletes that reported important negative consequences. Concretely, the 54.78% of the sample ($n = 298$) belong to the *low impact* cluster, the 29.96% of the sample ($n = 163$) to the *medium impact* cluster, and the 15.26% of the sample ($n = 83$) to the *high-impact* cluster.

The *low impact* cluster included those athletes who reported a small negative impact of COVID-19 on life-spheres (dual career: $Z = -0.47$, health: $Z = -0.54$, rest and recovery: $Z = -0.18$) and few mental health issues (anxiety and depression: $Z = -0.47$, social dysfunction: $Z = -0.55$, loss of confidence: $Z = -0.44$). Second, the *medium impact* cluster contained those athletes who reported a medium negative impact of COVID-19 lockdown on life-spheres (dual career: $Z = 0.61$, health: $Z = 0.48$; rest and recovery: $Z = 0$) and moderate mental health issues (anxiety and depression: $Z = 0.20$, social dysfunction: $Z = 0.47$, loss of confidence: $Z = -0.03$). Finally, the *high impact* cluster included those athletes who reported a considerable negative impact of COVID-19 lockdown on life-spheres (dual career: $Z = 0.48$, health: $Z = 1.01$; rest and recovery: $Z = 0.67$) and high mental health issues (anxiety and depression $Z = 1.31$, social dysfunction $Z = 1.04$, loss of confidence $Z = 1.62$).

Differences Between Clusters

We compared the groups derived from the cluster analysis considering life-conditions and sports-related information to further characterize each observed profile (see **Tables 3A** and **3B**).

The three clusters presented no differences regarding the number of cohabitants during lockdown, physical activity levels before the pandemic, years of sports experience, and competitive level. However, these three groups differed in terms of gender, socioeconomic level, academic course, physical activity and training conditions during lockdown, and perceived support from sport clubs or institutions ($p < 0.05$). *Post-hoc* comparisons between groups showed that, compared to *low impact* and *medium impact* clusters, athletes in the *high impact* cluster were predominantly (72.0%) women ($p_{1-3} < 0.001$, $p_{2-3} = 0.005$) reporting a lower socioeconomic level ($p_{1-3} = 0.001$, $p_{2-3} = 0.006$), a higher academic course ($p_{1-3} < 0.001$, $p_{2-3} = 0.057$), and worse training conditions under lockdown ($p_{1-3} = 0.008$, $p_{2-3} = 0.098$). As illustrated in **Tables 3A** and **3B**, these differences are especially evident between *low impact* and *high impact* groups.

DISCUSSION

This study aimed at better understanding the impact of confinement on young athletes by (1) describing and characterizing the general impact of COVID-19 lockdown on Spanish young athletes' life-spheres and mental health and (2) identifying different profiles of athletes regarding these target variables along with their life-conditions and sport-related characteristics. Globally, results showed a negative impact of COVID-19 lockdown on the sample, but with three different profiles regarding the degree of such impact. Especially, the *high impact* cluster showed a substantial negative effect of confinement on young athletes' life-spheres and mental health. In comparison with the other two groups, this cluster is mostly composed of female athletes, with a lower socioeconomic level, higher academic course, and worse training conditions under lockdown. The present results expand the previous knowledge about the COVID-19 pandemic by providing new insights on the mental health status of young athletes, a frequently underexplored population in mental health research.

Descriptive results show a negative impact of COVID-19 lockdown on athletes' life-spheres and mental health, being the dual career factor the most negatively affected. This finding is in line with the predictions about the negative consequences of confinement (Brooks et al., 2020; Papaioannou et al., 2020), and the importance of an adequate dual career balance for mental health (Schinke et al., 2017). Similar results were found in early evidence exploring

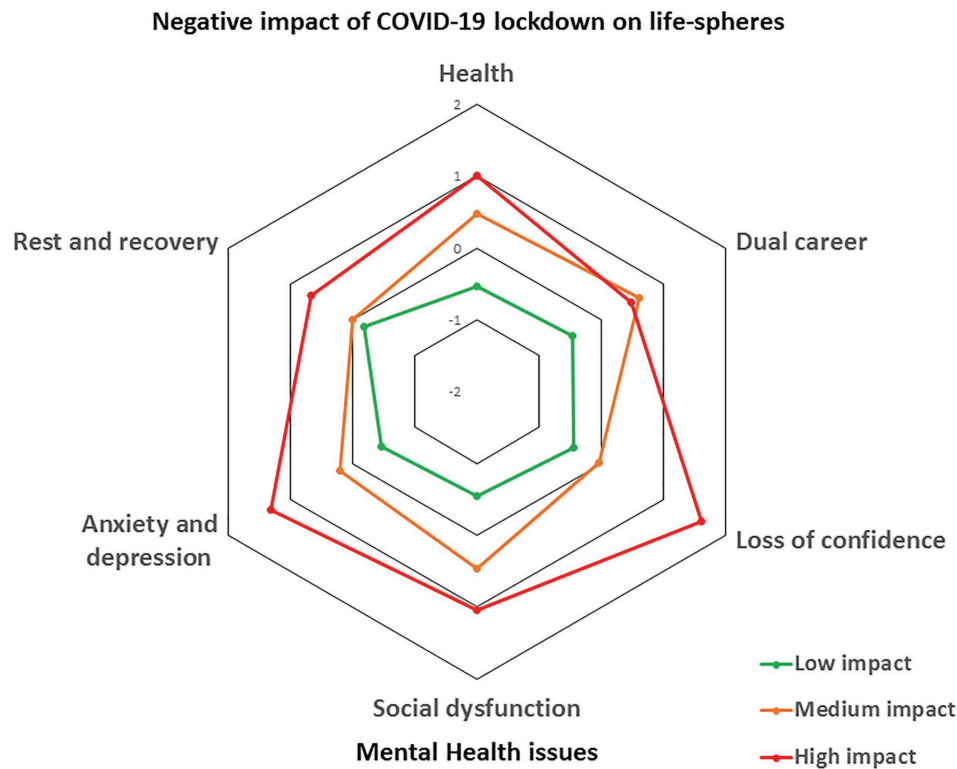


FIGURE 1 | Accepted cluster solution (standardized scores).

TABLE 2 | Standardized and non-standardized scores in the clustering variables of the accepted cluster solution.

	Cluster 1 (n = 298): <i>low impact</i>		Cluster 2 (n = 163): <i>medium impact</i>		Cluster 3 (n = 83): <i>high impact</i>		<i>F</i>	<i>p</i>
	Z-scores	Raw scores	Z-scores	Raw scores	Z-scores	Raw scores		
<i>Negative impact of COVID-19 lockdown on life-spheres</i>								
Dual career	−0.47 (0.06) ^{c2c3}	3.25 (0.04)	0.61 (0.04) ^{c1}	4.04 (0.03)	0.48 (0.08) ^{c1}	3.95 (0.06)	97.93	<0.001
Health	−0.54 (0.05) ^{c2c3}	2.90 (0.04)	0.48 (0.05) ^{c1c3}	3.60 (0.03)	1.01 (0.07) ^{c1c2}	3.96 (0.05)	171.00	<0.001
Rest and recovery	−0.18 (0.05) ^{c3}	2.74 (0.05)	0.00 (0.09) ^{c3}	2.92 (0.08)	0.67 (0.11) ^{c1c2}	3.58 (0.11)	25.66	<0.001
<i>Mental health issues</i>								
Anxiety and depression	−0.47 (0.05) ^{c2c3}	2.82 (0.08)	0.20 (0.05) ^{c1c3}	3.83 (0.08)	1.31 (0.06) ^{c1c2}	5.50 (0.09)	179.55	<0.001
Social dysfunction	−0.55 (0.04) ^{c2c3}	2.89 (0.04)	0.47 (0.06) ^{c1c3}	3.95 (0.07)	1.04 (0.10) ^{c1c2}	4.55 (0.10)	176.08	<0.001
Loss of confidence	−0.44 (0.04) ^{c2c3}	1.88 (0.07)	−0.03 (0.06) ^{c1c3}	2.56 (0.09)	1.62 (0.07) ^{c1c2}	5.31 (0.12)	276.79	<0.001

C1, Cluster 1; C2, Cluster 2; C3, Cluster 3. Boldface indicates inter-group significant differences. Superscripts indicate intra-group significant differences using Games-Howell post-hoc test.

the impact of COVID-19 lockdown in similar samples (di Fronso et al., 2020; Pillay et al., 2020). However, Clemente-Suárez et al. (2020) reported no effects on Spanish Olympic athletes' mental health during the first month of confinement. The differences between studies are probably due to the diverse characteristics of the samples (i.e., as pointed by the authors, Olympic athletes are more used to cope with challenging situations) and to the number of days of confinement when participating in each study.

Results from cluster analysis indicate differences regarding how young athletes experienced the COVID-19 lockdown, suggesting different impact realities. In line with the results found in non-sportive samples (e.g., Chen et al., 2020), most youngsters showed a low-to-medium impact of confinement. However, a substantial percentage (i.e., 15.26%) of young athletes reported a high impact of COVID-19 lockdown on their life-spheres and mental health. According to previous

TABLE 3A | Differences in demographic and sports information between clusters (ordinal variables).

	Cluster 1: low impact (n = 298)	Cluster 2: medium impact (n = 163)	Cluster 3: high impact (n = 83)	χ^2 (gl) ^f	p
Gender	C3	C3	C1 C2	26.70 (2)	<0.001
Male	59.6%	47.9%	28.0%		
Female	40.4%	52.1%	72.0%		
Socioeconomic level	C3	C3	C1 C2	21.02 (8)	0.003
Very bad	0%	0%	2.4%		
Bad	4.0%	4.3%	14.5%		
Medium	60.1%	57.7%	55.4%		
Good	31.9%	35.0%	27.7%		
Very Good	4.0%	3.1%	0%		
Academic course ^a	C2 C3	C1	C1	48.02 (10)	<0.001
1° ESO (year 8)	7.1%	5.0%	0%		
2° ESO (year 9)	23.8%	13.6%	6.8%		
3° ESO (year 10)	23.5%	20.0%	13.5%		
4° ESO (year 11)	22.8%	25.7%	29.7%		
1° BACHILLER (year 12)	10.0%	25.7%	31.1%		
2° BACHILLER (year 13)	12.8%	10.0%	18.9%		
Competitive level				4.37 (6)	0.634
Regional	35.2%	39.3%	45.8%		
Autonomic	35.2%	29.4%	28.9%		
National	22.5%	25.2%	20.5%		
International	7.1%	6.1%	4.8%		
Lockdown training conditions	C3		C1	12.63 (6)	0.045
Not training	10.6%	12.5%	24.7%		
Training with important changes	55.0%	57.5%	54.3%		
Training with minor changes	27.6%	25.0%	18.5%		
Training as always	6.8%	5.0%	2.5%		
Satisfaction with club/institution	C2	C1		22.87 (8)	0.003
Very unsatisfied	4.7%	3.1%	8.4%		
Unsatisfied	3.7%	9.3%	4.8%		
Indifferent	19.5%	22.2%	24.1%		
Satisfied	32.7%	40.1%	42.2%		
Very satisfied	39.4%	25.3%	20.5%		

C1, Cluster 1; C2, Cluster 2; C3, Cluster 3. Boldface indicates inter-group significant differences ($p < 0.05$). Superscripts indicate intra-group significant differences (corrected $p < 0.017$) using Chi-square test.

^aAcademic course was computed removing those participants pursuing tertiary education programs (participants excluded = 49).

^fAll inter-group comparisons that included a group with $n < 5$, were computed using Fishers' exact test.

TABLE 3B | Differences in demographic and sports information between clusters (numerical variables).

	Cluster 1 (n = 298): low impact		Cluster 2 (n = 163): medium impact		Cluster 3 (n = 83): high impact		F	p
	M	SD	M	SD	M	SD		
Number of co-habitants	4.02	0.89	3.94	0.81	4.01	1.09	0.38	0.682
PA time before lockdown	9.45	6.02	9.31	5.22	8.08	3.91	2.05	0.130
PA time during lockdown	5.81	4.29	4.94	3.58	4.83	3.94	3.42	0.034
Sports experience	7.16	0.18	7.33	0.24	6.49	0.35	2.09	0.125

PA, physical activity. Boldface indicates inter-group significant differences.

research, this group could be at risk for suffering from psychological problems. Considering that, adolescent athletes are a population with a low tendency for help-seeking behaviors (Tomalski et al., 2019), present results emphasize the need to pay attention to young athletes' mental health to prevent potential psychosocial problems.

A second aim of this study was to explore the differences between clusters regarding general demographic and life-conditions and sports-related characteristics. Group comparisons showed that, compared to the other two groups, the *high impact* cluster

had a greater percentage of female athletes exhibiting a lower socioeconomic level, who reported pursuing higher academic courses and having poorer training conditions during confinement. Although these differences cannot be interpreted in a causal way, present findings suggest some research lines to be explored in the future. Regarding gender, research addressing differences in how the pandemic hit male and female athletes has revealed a more negative impact of COVID-19 lockdown in female athletes (di Fronso et al., 2020). In this line, Bowes et al. (2020) identified some factors that might help to explain these differences

in elite sport, such as a later resumption of the sport activity, greater difficulties for training at home, and a lesser financial support. As suggested in this study, future research in the field of youth sport should explore in more detail the sociological factors causing these gender differences beyond the impact of COVID-19 lockdown.

Group differences regarding academic course showed that participants in the *high impact* cluster were pursuing higher academic courses than the *low impact* one. Research in this line suggested that individuals with higher academic level usually report lower levels of well-being (Wanberg et al., 2020). Within the sports field, previous evidence relates mental health issues with higher difficulties to undertake a dual career pathway (Sallen et al., 2018; Sorkkila et al., 2020). As highlighted by other authors (e.g., Samuel et al., 2020; Stambulova et al., 2020), COVID-19 lockdown can be understood as a change-event with unexpected demands for the athletes that combine academic and sports career. Therefore, it would be interesting that future research addresses the impact of this adaptation process on young athletes' mental health.

Regarding the socioeconomic level, group comparisons showed that the *high impact* cluster had a worse socioeconomic level than *medium* and *low impact* ones. While lower socioeconomic level has been identified as a risk factor associated with mental health issues (e.g., Jones et al., 2016), recent research specifically addressing the impact of the pandemic suggests that people with higher incomes experienced a greater relative decrease in well-being during lockdown (Wanberg et al., 2020). In line with this relative perception of loss, our results also showed group differences regarding training conditions during confinement, with the *high impact* cluster showing worse training conditions than the *low impact* cluster. Faulkner et al. (2020) had suggested that regular and structured physical activity would act as a coping strategy for mitigating COVID-19 lockdown negative consequences. However, further research should address whether the socioeconomic conditions of the athletic population might be interrelated with training conditions. In this line, we hypothesize that athletes with more resources would be more likely to keep similar training conditions during COVID-19 lockdown and perhaps is this perception of preservation of conditions despite the general conditions what would have a positive effect.

Practical Implications

Current findings entail some appealing applied considerations. By presenting the way that COVID-19 impacted young athletes, this research contributes to the visibility of potential mental health issues in the youth sport population. In this sense, and in view of the observed contextual differences between profiles partly related with the backing of sport institutions, we recommend clubs and sport organizations to promote youngsters' physical activity and to facilitate the access to supportive network during challenging circumstances even when the competitions are canceled (e.g., lockdown, high-demanding academic courses, and career transitions).

Special attention should be given to women's sport, as female athletes seem to be the least-favored group. By developing these supportive resources (e.g., dual career support services and communication networks with athletes and families) that serve as backup system for young athletes, sports clubs and institutions will become protective agents against mental health issues in this population.

Limitations and Future Directions

Some considerations are needed when evaluating the reported results. First, it is important to bear in mind that this is a descriptive study, therefore, while group comparisons may indicate a possible role of certain life-conditions and sport-related variables in the health of young athletes, these relations cannot be interpreted in a causal way. Future studies should continue developing this approach using designs that allow making predictive or causal attributions. Second, this work is a first attempt to study the psychometric properties of the Holistic Monitoring Questionnaire (HMQ; De Brandt et al., 2019). However, more evidence is needed in different athletic samples to confirm the satisfactory properties regarding internal consistency and factorial structure obtained in this study.

As a complement of the descriptive nature of these findings, further studies should deepen some other research questions regarding the effects of the COVID-19 pandemic in this population. Specifically, focusing on reporting complementary mental health indicators (e.g., performance, well-being, and basic psychological needs satisfaction; Schinke et al., 2017) in this sample, evaluating the long-term impact of lockdown on mental health, and/or implementing intervention programs aimed at improving the mental health status of highly affected athletes could be of great interest.

Conclusion

The COVID-19 lockdown had a general negative impact on Spanish young athletes. However, significant differences were found when comparing different individual realities. While most of the sample reported a low-to-moderate impact, an important group of participants reported high negative issues in relation to this COVID-19 lockdown. Group comparisons showed that the *high impact* cluster was composed mostly of female athletes with lower socioeconomic level, pursuing a more demanding academic course and reporting worse training conditions than their counterparts. This study reinforces the need to focus on young (specially women's) athletes' mental health and highlights the role of contextual variables with potential issues. Sport clubs and institutions, by supporting young athletes during difficult moments, could and should help mitigating the negative impact of such challenging circumstances on their athletes' mental health.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by *Comissió d'Ètica en l'Experimentació Animal i Humana*, Universitat Autònoma de Barcelona. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

JP, YR, SA, and MT participated in the design of the research project. JP, AJ, and MB participated in the survey design and data collection. JP, YR, and SA participated in the data analysis. All authors participated in the preparation

of the manuscript. All authors contributed to the article and approved the submitted version.

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The 4Ds of Dealing With Distress – Distract, Dilute, Develop, and Discover: An Ultra-Brief Intervention for Occupational and Academic Stress

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The Covid-19 crisis has clarified the demand for an ultra-brief single-session, online, theory-led, empirically supported, psychological intervention for managing stress and improving well-being, especially for people within organizational settings. We designed and delivered “4Ds for Dealing with Distress” during the crisis to address this need. 4Ds unifies a spectrum of familiar emotion regulation strategies, resilience exercises, and problem-solving approaches using perceptual control theory and distills them into a simple four-component rubric (Distract–Dilute–Develop–Discover). In essence, the aim is to reduce distress and restore wellbeing, both in the present moment through current actions (distract or dilute), and through expressing longer-term goal conflicts (e.g., through talking, writing, and drawing) to discover new perspectives that arise spontaneously after sufficient time and consideration. The intervention is user-led in that it draws on users’ own idiosyncratic and pre-existing experiences, knowledge, skills and resources to help them apply an approach, or combination of approaches, that are proportionate and timed to the nature and context of the stress they are experiencing. In this article we review the empirical basis of the approach within experimental, social, biological and clinical psychology, illustrate the novel and time-efficient delivery format, describe its relevance to sports and exercise, summarise feedback from the recipients of the intervention to date, and describe the directions for future evaluation.

Keywords: resilience, stress management, online interventions, problem-solving, single session therapy, brief therapy, emotion regulation, expressive writing

SCIENTIFIC BACKGROUND

The Covid-19 crisis has brought the mental health needs of the population into greater awareness. In particular, the effects of lockdown on employment, interpersonal relationships, access to nature, and the provision of leisure activities and exercise has reminded those in government, academia and professional practice of the important role that these factors play in mental health and well-being (Kumar and Nayar, 2020). When they are unavailable, compromised or less accessible, wellbeing and mental health are also compromised (Molarius et al., 2009). This has prompted

active discussion of how to replace their buffering effects on stress within the general population, and within organizational settings such as schools, universities, sports organizations and businesses (Maben and Bridges, 2020).

There are a wide variety of programs provided in workplaces that are aimed at helping people deal with distress. The effectiveness of these interventions is well established, but mainly in the short term (Lamontagne et al., 2007). To promote access and scalability, many stress management interventions are delivered online or via computer, and vary in length from 2 to 12 weeks of modules (Heber et al., 2017). They may include training sessions grounded in cognitive behavioral therapy, mindfulness training, career planning, or personal resilience training, and even brief (under 4 weeks) interventions show small-but-significant reductions in stress (Heber et al., 2017). However, most interventions are atheoretical or eclectic in nature, and delivered over at least 3 weeks (Ryan et al., 2017). The scientific and professional background has largely recommended intensive training of specific techniques for specific issues (Yusufov et al., 2019).

Even the interventions proposed to be theory-driven appear to be more eclectic in nature and involve intensive training. For example, the role of control in dealing with stress formed the basis of an online intervention in college students (Hintz et al., 2014). This intervention was found to be superior to a stress-information-only comparison group in its effects on depression, anxiety and stress at post-intervention and at 3-week follow-up. The intervention was fairly intensive, involving four modules over 2 weeks, and including between-session homework exercises and stress logs. It amalgamated the theory of present control (Frazier et al., 2001) with self-efficacy theory (Bandura, 1986) and questioning drawn from motivational interviewing (Rubak et al., 2005).

From the above brief synthesis of the literature, we conclude that there is distinct niche for an approach that is guided by a single theory, and is ultra-brief yet focused on facilitating long-term change. We have devised an approach of this kind, termed “The 4Ds of Dealing with Distress.” In order to do so, we reviewed the research evidence regarding the components of existing interventions to identify which classes of strategies appear to be effective in reducing distress both in the short and long term. We then produced an integrative framework for these components united by a single theoretical framework – perceptual control theory (PCT) – although the theory is not explicitly “taught” in the session. In the current article we draw out the particular relevance for our intervention to the psychology of human performance, exercise, sports and the wellbeing of clients and staff within sports organizations.

WHY PERCEPTUAL CONTROL THEORY?

There are several reasons for utilizing PCT. First, PCT is grounded within physiology, physics and engineering, which can make it directly applicable to a number of professions, including sports professions. For example, PCT has been applied to movement science, including hand-eye coordination (Powers,

1999), catching flyballs (Marken, 2005), intercepting objects such as frisbees (Shaffer et al., 2004), and dual agent pursuit (Sandhu et al., 2020). Second, PCT is interdisciplinary, and applied widely throughout the fields of mental health interventions (Alsawy et al., 2014), organizational psychology (Vancouver, 2020), human-computer interaction (Farrell et al., 1999), and education (Zhao and Cziko, 2001). Thus, it provides a direct link between psychology, technology, business, and education – the domains traversed by an online wellbeing intervention for occupational and educational organizations.

According to PCT, control is at the heart of adaptive functioning, and so control is the essence of health, wellbeing and mental health (Powers et al., 1960; Carey et al., 2014; Carey, 2016). Within PCT, distress is the loss of control that emerges when a person cannot achieve and maintain the experiences that are most important to them. There is substantial evidence from experimental research to support such a claim (see **Table 1**, Control). In relation to this core tenet of PCT, the third reason for utilizing PCT is that several sources of evidence point to the benefits of acknowledging and embracing client control, choice and user-tailored interventions. It is well established that individuals vary widely in their readiness and pace of change (Hayes et al., 2007). There is also evidence that having control over stressful experiences, such as facing a fear, is beneficial (Healey et al., 2017). When users are interviewed about how they utilized existing interventions, they commonly report selecting and personalizing the strategies and insights that they find relevant to their own specific situation (Amos et al., 2019; Warwick et al., 2019). Building on these features, when clients are given the control to book their own timing and duration of appointments, the benefits include a reduced waiting list (Carey and Spratt, 2009) and a greater efficiency of the intervention relative to benchmarked studies (Carey et al., 2013). A previously developed group intervention based on PCT – known as the Take Control Course (TCC) – has an emerging evidence base (Morris et al., 2016). This supports the principles of a psychological intervention based on PCT; however, unlike 4Ds, the TCC is six weekly sessions, provides more in-depth explanation of theoretical principles, and was initially designed for people within mental health services to access in person rather than online.

A fourth reason for utilizing PCT lies in its focus on core principles, rather than specific techniques, tools or strategies. This allows PCT to be applied from a “meta” perspective to an array of pre-existing methods available to each individual. So, as will be described later, an array of expressive methods – such as expressive writing (Kelly et al., 2012) and artistic expression (Stevenson-Taylor and Mansell, 2012) – can facilitate the mechanism of change described by PCT.

Table 1 summarizes the components of 4Ds with examples and evidence.

THEORETICAL RATIONALE FOR 4Ds

In everyday life, loss of control manifests itself as uncertainty, worry, low mood, intrusive memories, poor motivation, and various other “stress symptoms.” Therefore, any opportunity

TABLE 1 | The components of 4Ds, their definition, examples, and evidence.

Component	4D definition	Examples	Selected evidence from experimental research	Selected evidence regarding neural pathways
Control (an underpinning theoretical construct of 4Ds)	The user chooses, achieves and maintains their desired experiences.	Draw on users' knowledge, skills, and experiences. Encourage users to consider, select, and test each strategy for themselves.	Loss of control is associated with distress and control is associated with wellbeing (Cheng et al., 2013; Tabibnia, 2020).	Chronic loss of control through dorsal raphe nucleus of the brain, reversal via medial prefrontal cortex (Maier and Seligman, 2016).
Distract	Everyday activities that shift attention away from distress for a period of time and improve mood.	Sport, exercise, social activities, nature engagement, music, daydreaming, and humor.	Distraction improves short-term mood (Webb et al., 2012); rewarding, and social, activities reduce distress (Tabibnia, 2020).	Multiple combined pathways including reward pathways (e.g., ventral striatum) (Tabibnia, 2020).
Dilute	Trained techniques that reduce current distress.	Applied relaxation, slow breathing, grounding, brief mindfulness, and thought challenging.	Applied relaxation is effective for anxiety (Kim and Kim, 2018); mindfulness training reduces stress (Khouri et al., 2015).	Reduced activation of autonomic nervous system and release of cortisol (Pascoe et al., 2017).
Develop	Plans to engage in discovery in a safe and constructive way.	Worry time, self-scheduling, drawing upon times they have previously coped and generating compassionate imagery.	Control over worry linked to reduced distress (LaFreniere and Newman, 2019); self-compassion interventions reduce distress (Ferrari et al., 2019).	Compassion recruits midbrain periaqueductal gray (PAG) (Simon-Thomas et al., 2012).
Discover	Shifting to and sustaining engagement with, and expressing the experience of distress to explore the source of conflicts to generate new perspectives.	Emotional disclosure, discovery talk (active listening), and expressive writing or drawing.	Active listening reduces distress (Jones and Cutcliffe, 2009); expressive writing improves wellbeing (Travagin et al., 2015); effects of expressive writing mediated by conflict awareness (Kelly et al., 2012); higher level construals enhance personal growth (Wang et al., 2016).	Medial prefrontal cortex, amygdala, and autonomic nervous system (Saunders et al., 2017; Tabibnia, 2020).

to act in a way that restores control over these experiences will relieve distress in the short term – we have termed these “distraction” and “dilution.” Examples of distraction are hobbies and other pleasurable activities, as well as internal processes such as daydreaming. Distraction is a commonly used term to describe common, everyday activities that intentionally shift attention away from one’s problematic thoughts and feelings for a period of time and may even improve mood (see **Table 1**). Some of these activities, such as sport, exercise, and nature engagement, whilst being “distracting,” may tap into other more significant pathways to well-being that overlap with the later components of 4Ds, such as providing opportunities to safely reflect on problems, or to become aware of higher level values, such as health during exercise and connectedness with others during team sports (Hoye et al., 2012). We save the term “dilution” for those novel, specialist-trained activities that aim to reduce heightened states of distress in the moment, and they include mindfulness training, slow breathing techniques, grounding methods, and applied relaxation.

Both distraction and dilution may restore control very effectively in the short term but at the same time not resolve long-term issues, or even have the potential for generating other problems. For example, distracting oneself with taking on extra work can help a person feel that they are meeting their standards for productivity, but failing to meet their standards for spending time with the family. There is even evidence that

inflexible engagement with sports or exercise have “addictive” properties (Bamber et al., 2000; Nogueira et al., 2018). Engaging in mindfulness meditation for 45 min every day may provide a sense of control over negative thoughts as one decenters from them, but take one’s attention away from thoughts about pressing issues (paying fines, housing repairs, and dealing with threats to employment) that need to be addressed as soon as possible. Thus, the PCT approach encourages each individual to work out the most adaptive and flexible use of any approach rather than providing any blanket advice about specific strategies. There is considerable evidence from systematic reviews that psychological flexibility is closely associated with mental health and wellbeing (Kashdan and Rottenberg, 2010; Morris and Mansell, 2018), and a PCT approach to the use of behavioral or cognitive strategies proposes that clients are provided with the opportunity to weigh up the pros and cons of these as applied to their own life context (Alsawy et al., 2014).

From a PCT perspective, the long-lasting source of distress is not a lack of resource, strategy or skill, but an underlying conflict between high-level goals (e.g., ideals, standards, and principles) of similarly high importance. There are a variety of examples of goal conflict occurring in the context of sports and exercise (Graham and Dixon, 2017). For example, an experimental study of students who had the goal of exercising found that priming the conflicting goal of performing well academically led to evidence of reduced motivation to engage in physical exercise

(Bailis et al., 2011). The range of potential goal conflicts are highly idiosyncratic. For example, a manager of a gym may want to maintain their sense as a trustworthy person by re-employing all of her staff after lockdown, but at the same time want to keep her family financially secure through streamlining staffing at the organization. Taking another example, an employee experiencing bullying from a colleague may be in conflict between seeking help to stop the bullying, and keeping the experience private for fear of being ridiculed or experiencing further retaliation.

According to PCT, goal conflict is commonplace and it is normally resolved when a conflict is brought into awareness through speech, or through other forms, such as writing or drawing. Therefore, distress reduction is ultimately a process of “discovery” through expression, feedback of one’s expressed ideas, and the curiosity that helps guide awareness to the source of the conflict. Because the process of change is spontaneous – sometimes getting worse before it gets better – it can feel destabilizing in itself. The individual therefore needs to be in control of the discovery process, even if it requires the help of another person such as a curious listener. It is this further user-led element of the 4Ds that is termed “develop” and prompts the user to plan and prepare the most suitable conditions to set forth into, the sometimes open-ended, discovery process.

The role of the four components can be described with an example. The staff member experiencing bullying may:

- (a) Regain short-term control outside the workplace by effectively *distracting* themselves from their feelings of failure through focusing on their productive work from home, sporting activities, and their rewarding family life.
- (b) Regain short-term control in the work place by *diluting* their feelings of panic when at work through breaking the cycle of escalating arousal with slow breathing and applied relaxation.
- (c) Regain long-term control by *developing* opportunities to express their experiences of bullying. This begins by starting a private expressive writing journal, and shifts to open conversations with their partner, during which childhood experiences of bullying are also described and similar conflicts explored. Among other insights, this staff member *discovers* that their overall goal of being respected and valued could be achieved by describing the details of the bullying incidents privately to a manager who has the same qualities as a considerate teacher who helped them as a child.

In summary, distress is the loss of control over valued life experiences. The loss of control may persist or resolve to various degrees at various timescales, depending on the individuals and the nature of the problem. In some instances, activities that distract from, or dilute, the distress can be enough to regain enough short-term control whilst the source of distress resides, or whilst it is resolved naturally through pre-learned attempts at discovery that shift and sustain awareness to the source of the conflict (e.g., talking through one’s mixed feelings with an untrained friend). In many instances, however, the individual will need to plan and prepare (develop) a more regular

format to engage in extended discovery, such as doing regular expressive writing, or booking a time to talk to a person who is trained to help them shift and sustain their awareness on the source of the problem.

DELIVERY

4Ds integrates four components that are organized as levels of a pyramid (see **Figure 1**). The idea is to work up the pyramid during the one 60–90 min session that explains the approach. The session points out that all four Ds (Distract, Dilute, Develop, and Discover) can be helpful, but that only the person experiencing distress can work out which balance of the 4Ds will address the problems at the root of their current distress. Depending on the source and intensity of stress, some problems may resolve with simple approaches at the bottom of the pyramid, whereas others may require working upward, entailing full use of the “higher” levels of the intervention.

Clients are encouraged to draw on their own strengths, activities, preferences and resources, throughout the session right from the beginning. What works for one person with one problem may not work for a different problem, or for a different person. Given the theoretical emphasis on control, diversity, flexibility and self-determination are encouraged over and above intensive training in a specific method. In fact, the aim of 4Ds is to enable each user to integrate the methods they have already encountered and started to use, rather than to train intensively in any new techniques. For many users who have experienced training in all kinds of well-being techniques to date, this user-led emphasis can be refreshing, or even pivotal in their appreciation of the 4Ds approach. 4Ds is focused on explaining *how* and *why* wellbeing approaches may work so that the individual can find their own, unique combination of solutions.

Prior to the session, clients are informed of the experiential aspect of trying the techniques during the session and are encouraged to think about current stressors that they would like to explore throughout the session. Furthermore, clients are provided with a worksheet to complete during the session, detailing which strategies work for them, in each of the four components. The worksheet also serves as a reminder that they have choice over how to deal with the stress and therefore they have control (worksheets available from authors).

The session describes explicit parallels between the 4Ds and the range of approaches one takes to any kind of problem – this is typically grounded in the expertise of the individual clients within the session. For example, clients with a health or exercise background are reminded of how they might deal with the physical pain from an injury. In the very short term – distraction may help – for example for a football player to get through a match by focusing on the game if they can manage it. Typically though, some form of dilution is also necessary – an analgesic to reduce the pain, for example. Yet, we are all aware that a significant injury will require more active exploration. The person with the injury will plan to consult a physiotherapist, or a doctor, who will do various tests and potentially scans, to attempt to discover which parts of the body are injured, as this will inform



FIGURE 1 | The 4D pyramid.

the appropriate intervention. Thus, there is a stage that involves development of a plan to make the appointment and preparing what to say to the health professional, and there is a stage that involves the actual exploration to discover the nature of the problem. The “catch” for problems with emotional distress is that only the person experiencing the distress can fully explore what is behind it. Only the symptoms, but not the source, can be identified by an expert on the outside with a test or a scan. A person experiencing distress is like a car looking under its own bonnet to work out what part is not working right.

The session then proceeds to describe the base of the pyramid – the client-led coping activities that act as a temporary distraction from distress. Their aim is to temporarily remove the experience of distress and clients often share forms of exercise and sporting activities as sources of distraction. Many of these activities also potentially serve important personal goals for the individual, thereby indirectly improving mood. For some people with some problems, distraction can be sufficient to redirect them away from their distress, so that they can find a way round the problems without extensively and intentionally exploring them. For example, during lockdown, one personal trainer lost her job at an indoor gym. She felt undervalued, sad and angry with her employer. One day she chose to distract herself from their feelings by running regularly with a local running club. At the club she met the manager of a personal trainer agency who offered her a well-paid role, which resolved her job stress in the short term. However, under different circumstances, distraction may purely allow the individual to mentally disengage from the stress for a

brief period, offering only short-term relief and not tapping into the source of distress. In this case, users are encouraged to move up the pyramid to the second component.

At the next step up is a collection of very simple techniques (Dilute) that enable the client to circumvent some of the processes that temporarily exacerbate distress. Their aim is not to remove the experience of distress, but to reduce its intensity whilst still experiencing some, manageable, degree of distress. These techniques overlap with various techniques used in a variety of other approaches, but in 4Ds they are aligned under one principle; they provide the client with greater control at that moment. This may be control over physiological experiences (slow breathing and muscle tension), or thinking (mindful awareness and grounding techniques). Thus, the client gets a sense of control in the moment, and these techniques interfere with the actions that can perpetuate their current, most distressing states of mind.

In the third step of the session, the clients are introduced to the opposite side of the coin – the need to actually think about and talk about the problems they are having, even though this can feel distressing. The “Develop” aspect of 4Ds prompts them to be in control of this decision such that the pace, depth, timing and setting feels right for them, maximizing their ability to face the source of distress. Therefore, the concept of “worry time” is introduced – a specific time of the day or evening to think about their problems. They are also reminded to think of a time in their life that they were able to cope, to draw upon some of the same strengths and resources. They are also helped to form a

compassionate image if they choose to – a template for the kind of person they would want to share their problems with, to hold in mind when expressing them.

The fourth step – “Discovery” proceeds from this point, now that the clients are aware of the means to control their engagement and exploration of their difficulties. The facilitators illustrate the benefits of speaking one’s problems out loud to hear them in one’s own voice. This begins in private, simply by muting the audio – “It’s OK to talk out loud to yourself – it doesn’t mean you are losing your mind!” In addition to wide accessibility and scalability, privacy of verbal expression is an additional advantage of the online format over and above a face-to-face group intervention. The clients are then encouraged to do the “upward arrow” approach, adopted from the Take Control Course (Morris et al., 2018). This is a succession of “What makes that important?” questions help them to become aware of the higher level goals, values, ideals, and principles that are challenged by their difficulties. They are also provided with an opportunity to use expressive writing and reflect on the experience of doing so (Pennebaker and Chung, 2011), and they are introduced to Discovery Talk (@DiscoveryTalk), a way of adapting Method of Levels therapy (Carey, 2006) for people who are not mental health professionals to use in their everyday settings. In doing so, they are directed toward simple ways of actively listening to one another to help explore a problem, without giving advice, interpretations, or solutions, and helped to notice the new perspectives that they gain from the experience (Churchman et al., 2019).

The session rounds off with a reminder that it is entirely up to each person whether, and how, they use the approaches that are covered – they are in control. A different combination will work for different people at different times, and that is as it should be. Worksheets for 4Ds and further guidance on its implementation are available from contacting the authors.

IMPLEMENTATION AND FEEDBACK

To date, the 4D sessions have been delivered by qualified and trainee clinical psychologists via online platforms, namely Zoom and Microsoft Teams, to a variety of client groups. To date, sessions have been accessed by the general adult public, by teachers at Primary and Secondary schools, tutors at colleges, mental health professionals, and teenagers (aged 13–16); encompassing around 200 individuals of varying ages and backgrounds.

User feedback has been gathered verbally and via voluntary online surveys. Feedback suggests a reduction in immediate stress symptoms, increased awareness around the cause of stress, improved confidence in managing stress and a preference for the “develop” and “discover” components. The finding that clients tend to see the additional value in the “develop” and “discover” components is consistent with PCT, which specifies that awareness needs to shift and sustain toward higher level goals in order to facilitate longer term alleviation of distress. Additionally, the clients seem to appreciate that the approach is *universal*, in keeping with the universal principles of PCT,

with clients expressing a keenness to try these with others too. For example, teachers spoke of the strategies being useful for their own stress but were also enthused to try them with pupils; indicative of the model being applicable to most ages and sources of stress. To date, suggestions for improvement typically involve the request for more opportunities to learn ways to engage in discovery, such as extended opportunities for expressive writing, or more training in the kinds of questions to ask to help another person explore their problems in more depth and detail. In response to this, we have included a follow-up session for some groups to extend the practice and to receive feedback on this last section of the course as well as referring them to wider resources such as online journaling and expressive writing resources, @DiscoveryTalk and videos of Method of Levels in action.

CONCLUSION

We have summarized the scientific and pragmatic rationale for a novel, ultra-brief intervention for stress management that lends itself particularly well to the Covid-19 crisis, given the challenges to occupational, academic and family life, and the necessity for an easily accessed, one-session, remote format. Unlike alternative interventions, it entrusts clients with their own selection, use and testing of various strategies to meet the idiosyncratic and varying stressors in their own life. It builds upon techniques and principles that the clients will be familiar with but integrates them within one simple rubric and puts them in charge of how and when to use each approach. Whilst the science of the intervention is empirically supported, it requires systematic evaluation of its impact within this format, and of its putative mechanisms of action. Nonetheless, quantitative and qualitative audits have indicated that many clients grasp the key messages and report benefits. Given the challenging times we are in, it is imperative that practitioners and researchers work on the most efficient means to address stress and improve wellbeing, but in ways that enable expression and collective action rather than minimize and isolate suffering. The 4Ds is designed in such a way within its focus on fostering the agency of the individual to construct their own solutions, which may ultimately manifest at the individual, organizational, and societal levels.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

WM and LM conceived of the clinical approach. WM led on the writing of the article and drawing upon the clinical experience of LM, WM, and RU in delivering the approach. All authors were involved in editing for the final manuscript.

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Conflict of Interest: The 4Ds is delivered by Beyond Psychology at a charge to users. LM is a director of Beyond Psychology, which is a not-for-profit social enterprise.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Anxiety and Motivation to Return to Sport During the French COVID-19 Lockdown

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Feeling anxious and presenting self-determined motivations about returning to sport after a break may impair sport performance and increase the risk of sustaining an injury. Hence, the aim of this study is to explore differences in anxiety and motivation to return to sport according to gender, expertise, training status before and during the lockdown, and athletes' availability (i.e., injury status) at the time of the lockdown. A total of 759 competitive athletes (49% female; mean age: 27 ± 10 years old) completed the cross-sectional study. Participants were invited to state their expertise, training status before and during the lockdown (did they have a training program), and whether they were injured at the start of the lockdown. Additionally, participants filled out psychometric self-report measures of anxiety (TFAI-return) and motivation (SMS-return) to return to sport. Due to non-normal distributions in the TFAI and SMS scores, non-parametric group comparisons were performed to compare participants for each categorical variable: non-parametric correlation tests were also performed to test the associations between continuous variables. Group comparisons showed higher scores of anxiety for females, younger athletes, athletes practicing and competing at the highest level, and athletes without a training program during the lockdown. Moreover, results suggested lower motivation scores (i.e., autonomous and controlled) for older athletes, experts (practicing for more than 10 years), athletes practicing and competing at a lower level, and athletes without a training program during the lockdown. Additionally, participants who were injured at the start of the lockdown reported higher scores of cognitive anxiety to return to sport than non-injured participants. The results of this study suggest that elite athletes may have suffered from external pressures to return to sport during the lockdown. Additionally, participants with a training program during the lockdown seemed to be less anxious and more self-determined to return to sport after the lockdown. Future studies may focus on the impact of cognitive behavioral interventions on anxiety and motivation to return to sport.

Keywords: anxiety, motivation, lockdown, return to sport, sport injury

INTRODUCTION

In France, in reaction to the COVID-19 crisis, the government decided to lock the population down for more than 2 months starting in mid-March 2020. However, quarantine increases the risk of psychological distress (Brooks et al., 2020). A systematic review of the literature shows that the COVID-19 pandemic increased the prevalence of anxiety and mood disorders in the general population—33 and 28%, respectively (Luo et al., 2020). Additionally, quarantine prevents athletes from training in their habitual settings, and most national and international competitions were canceled or postponed until further notice. Hence, the lockdown created uncertainty and stress related to sport practice and future return to competitions may have increased athletes' anxiety (Grupe and Nitschke, 2013) and impaired motivation to return to sport (McGregor et al., 2010). On the other hand, Lades et al. (2020) showed that daily activity (e.g., exercising) during the COVID-19 lockdown increased positive affects and decreased negative affects in 604 individuals from the general population in Ireland. Additionally, in Italy, Chirico et al. (2020) showed that higher anxiety scores during the COVID-19 lockdown negatively influenced intentions to adopt physical activity behaviors. This protective role of exercise as demonstrated in the general population may have also applied to athletes who maintained sport practice or physical training during the lockdown.

Anxiety and motivation are two psychological variables that are associated with the risk of injury and lower performance when returning to sport (Wiese-Bjornstal, 2019). The literature on return to sport following an injury posits that athletes may be anxious because they think they will not meet the level of their pre-injury performances, or because they may not meet their coaches' expectations, among other reasons (Podlog and Eklund, 2007; Podlog et al., 2011). Moreover, motivational states from Self-Determination Theory (SDT; Ryan and Deci, 2017) are also psychological determinants of return to sport. A study of Podlog and Eklund (2010) with professional Australian Football players revealed that greater self-determination in the return to sport results in more positive appraisals and affect. Even if the literature on return to sport lies in the context of an injury and rehabilitation, the context of lockdown displays similar aspects: athletes could not train as they used to and were not competing. In fact, long periods of rest and the absence of competitions represent a significant risk for athletes' health and performances (Paoli and Musumeci, 2020). Hence, examining the impact of a confinement period on self-determination and anxiety could be of great interest.

A study on perceived stress in Italian athletes showed that male athletes and elite athletes (i.e., competing at the national and/or international level) displayed lower perceived stress during the COVID-19 lockdown than female and non-elite athletes, respectively (di Fronso et al., 2020). Additionally, Clemente-Suárez et al. (2020) found lower rates of anxiety in Olympic and Paralympic athletes than in the general population, suggesting that athletes may have more cognitive and emotional resources to face the confinement situation (Costa et al., 2020). Furthermore,

in a qualitative study investigating psychological correlates of return to competition in basketball players, participants stated that participation in training programs prior to returning to sport increased their confidence in having better performance and lower fear of reinjury, and that reaching their pre-injury levels of performance was the main motivation to give "100% effort" in training programs before returning to competition (Conti et al., 2019). These results show the importance of considering both anxiety and motivation when studying the psychological aspects of return to sport after a break.

The literature on psychological states of athletes during the COVID-19 crisis focused on perceived stress, anxiety, and coping resources, but not on motivation to return to sport. It is also not clear whether the level of competition or the training habits (before and during lockdown) differentiate between athletes' psychological predictors of return to sport. Hence, the aim of this study is to explore differences in anxiety and self-determined motivation to return to sport according to gender, expertise, training status before and during the lockdown, and athletes' availability (i.e., injury status) at the time of the lockdown.

MATERIALS AND METHODS

This study was performed in April and May 2020 using an online software for conducting surveys (Limesurvey GmbH, 2003). A correlational design with convenience sampling was used, advertising the survey on social media (Facebook, Twitter, and LinkedIn). During lockdown, this methodology was deemed appropriate for obtaining information in order to respect social distancing rules.

Participants

In the present study, a total of 1302 individuals read the online informed consent disclosure, from which 1206 were screened for inclusion. Eligibility criteria were as follows: practicing sport in competition (1147 "yes"), being 18 years old or over (1123 "yes"), not being under the protection of social services (1144 "no"), and providing informed consent to participate (972 "yes"). Exclusion criterion was participants with missing data. A total of 759 completed the full survey (49% female; mean age: 27 ± 10 years old). More than 40 sports were represented: 270 participants practiced track and field, 43 triathlon, 38 basketball, 36 judo, 33 shooting, 31 soccer, 27 gymnastics, 24 handball, 24 cycling, 17 tennis, 17 skiing, 16 fencing, 16 swimming, 16 boxing, 15 badminton, 13 rowing, 12 table tennis, 11 ice-skating, 10 rugby, and 90 other sports.

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Before participation, experimental procedures were explained online to all the participants who gave their voluntary online informed consent in accordance with the Declaration of Helsinki.

A total of 37 participants stated that they were injured at the start of the lockdown. The estimated duration of time loss after injury ($M = 222 \pm 196.3$ days, including 169.9 ± 171.3 days before lockdown and 52.1 ± 58.0 days during lockdown) did

not show any significant correlation with neither anxiety nor motivation to return to sport.

Measurements

Personal and Sport-Related Information

In addition to their age and gender, participants were first asked a set of general information regarding their sport practice. We estimated participants' expertise level by asking them if they practiced their sport for less than 10 years or 10 years or more. Participants were considered "elite athletes" if they present such an official national status (listed in the Sport Ministry repository) and "competitive athletes" if they practiced their sport in competition without the official elite status. Participants were asked for their number of training sessions per week (2 or less, 3 or 4, and more than 4) and their highest level of competition (regional, national, and international) before the lockdown. Additionally, the training status during the lockdown was estimated: participants had to state whether they had a training program during the lockdown or not.

Regarding injury, participants were asked whether they were injured at the start of the lockdown (not injured; injured). For injured participants, additional information was recorded: (1) estimated time loss duration (in days) and (2) adoption (no; yes) of a rehabilitation program during the lockdown.

Psychometric Questionnaires

Anxiety to return to sport was assessed using an adapted version of the Three-Factor Anxiety Inventory 2 (TFAI-2; Jones et al., 2019). The original version of the TFAI-2 is used to assess pre-competitive anxiety with three factors and six subscales: cognitive anxiety (worry, private self-focus, and public self-focus), physiological anxiety (somatic tension and autonomic hyperactivity), and perceived control. The general instructions were modified to assess anxiety to return to sport at the moment of study completion: "A sport break may have a strong impact. People can experience it very differently. Below is a list of athletes' affirmations describing their psychological states when they return to sport after a break. This questionnaire measures how you feel at the moment." Items measuring worry, private self-focus, and perceived control were modified to match concerns regarding "return to sport" instead of "performance." Participants were asked to rate 25 items on a five-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree).

Motivation to return to sport was assessed using an adapted version of the Sport Motivation Scale 2 (SMS-2; Pelletier et al., 2019). The original version of the SMS-2 assesses motivation to practice sport with six motivation subtypes from the SDT (intrinsic motivation, integrated, identified, introjected, and external regulation of extrinsic motivation, and amotivation). In the general instructions and in each item, elements such as "practicing sport" were replaced with "returning to sport" in order to contextualize motivations toward an upcoming "return to competition and/or training" instead of "sport participation." Participants were asked to rate 18 items on a seven-point Likert scale ranging from 1 (do not agree) to 7 (completely agree).

Confirmatory factor analysis (CFA) was conducted using lavaan (Rosseel, 2012) in order to check whether the French

versions of the TFAI-return and SMS-return were close to their original validated versions. The model fit of the TFAI-return and the SMS-return was assessed using the comparative fit index (CFI), the Tucker–Lewis index (TLI), and the root-mean-square error of approximation (RMSEA) as goodness-of-fit statistics. CFI and TLI values close to or above 0.90 and 0.95 were considered acceptable (Hu and Bentler, 1998); RMSEA values close to or below 0.08 were considered acceptable (Browne and Cudeck, 1992). The results of the CFA showed an acceptable fit of the factor structure of both psychometric questionnaires to our data. For the TFAI-return, fit indices were as follows: CFI = 0.84, TLI = 0.82, RMSEA = 0.07 ($p < 0.001$). For the SMS-return, fit indices were as follows: CFI = 0.88, TLI = 0.85, RMSEA = 0.08 ($p < 0.001$).

Statistical Analysis

Based on the results of Shapiro–Wilk tests, non-parametric tests were used. To investigate between-group differences in anxiety and motivation, Wilcoxon tests with continuity correction were performed for categorical variables with two groups;

TABLE 1 | Descriptive statistics of the study variables.

	Not injured (<i>N</i> = 722)		Injured (<i>N</i> = 37)	
	<i>N</i> (%)	<i>M</i> (<i>SD</i>)	<i>N</i> (%)	<i>M</i> (<i>SD</i>)
Age (years)		27.23 (10.25)		24.08 (6.3)
Gender: Female	358 (49.6%)		16 (43.2%)	
Gender: Male	364 (50.4%)		21 (56.8%)	
Expertise: > 10 years	431 (59.7%)		21 (56.8%)	
Expertise: < 10 years	291 (40.3%)		16 (43.2%)	
Elite: Yes	128 (17.7%)		6 (16.2%)	
Elite: No	594 (82.3%)		31 (83.8%)	
Weekly training: > 4	394 (54.6%)		21 (56.8%)	
Weekly training: 3 or 4	197 (27.3%)		11 (29.7%)	
Weekly training: 2 or less	131 (18.1%)		5 (13.5%)	
Competition level: International	127 (17.6%)		6 (16.2%)	
Competition level: National	255 (35.3%)		10 (27.0%)	
Competition level: Regional	340 (47.1%)		21 (56.8%)	
Training program during lockdown: yes	586 (81.2%)			
Training program during lockdown: no	136 (18.8%)			
Rehabilitation program during lockdown: yes			21 (56.8%)	
Rehabilitation program during lockdown: no			16 (43.2%)	

Kruskal–Wallis tests were conducted for categorical variables with more than two groups. Kendall's Tau correlation tests were used to explore the correlation between anxiety, motivation, and other continuous variables.

All analyses were performed using R (R: A Language and Environment for Statistical Computing, 2013). Participants with injured status during the time of the survey were analyzed separately.

RESULTS

Table 1 shows the number of participants (N) and percentage (%) for each categorical variable, and the mean (M) and standard deviation (SD) for continuous variables. Participants who were injured by the start of the lockdown are displayed separately from others.

The comparison between injured ($N_{inj} = 37$) and non-injured ($N_{non-inj} = 722$) participants at the start of the lockdown suggested significantly higher scores of worry ($M_{inj} = 3.64 \pm 0.93$; $M_{non-inj} = 3.04 \pm 0.98$; $p < 0.001$), private self-focus ($M_{inj} = 3.57 \pm 0.68$; $M_{non-inj} = 3.28 \pm 0.69$; $p < 0.05$), cognitive anxiety ($M_{inj} = 3.36 \pm 0.64$; $M_{non-inj} = 3.04 \pm 0.66$; $p < 0.01$), introjected regulation of external motivation ($M_{inj} = 5.45 \pm 1.10$; $M_{non-inj} = 4.96 \pm 1.21$; $p < 0.05$), and intrinsic motivation ($M_{inj} = 5.80 \pm 1.13$; $M_{non-inj} = 5.45 \pm 1.15$; $p < 0.05$) for injured participants when compared to non-injured participants.

For non-injured participants, results showed significant negative correlations between age and: worry ($\tau = -0.14$; $p < 0.001$), public self-focus ($\tau = -0.14$; $p < 0.001$), cognitive anxiety ($\tau = -0.13$; $p < 0.001$), external regulation of extrinsic motivation ($\tau = -0.07$; $p < 0.01$), and identified regulation of extrinsic motivation ($\tau = -0.07$; $p < 0.01$). Female participants reported significantly higher scores of cognitive and physiological anxiety, as well as significantly lower scores

of perceived control than male participants (see **Table 2**). These results suggest that older participants had lower cognitive anxiety and extrinsic motivation to return to sport and that female participants were more anxious (both cognitively and physiologically) while perceiving less control over return to sport than male participants.

Elite participants from the Sport Ministry list showed significantly higher scores of public self-focus and external regulation of extrinsic motivation to return to sport than non-elite participants (see **Table 2**). Additionally, participants with a higher level of competition (international and national) reported significantly higher scores of cognitive anxiety (including public self-focus), as well as significantly higher scores of both autonomous and controlled motivations (excepted for amotivation) to return to sport than regional competitors (see **Table 3**). These results suggest that participants competing at the highest level of competition were mainly concerned by the perception of the public when they return to sport, and more motivated for external (e.g., rewards they will receive when returning to sport) and internal (e.g., desire to improve or master their sport) reasons, or pleasure.

Participants who had been practicing their sport for more than 10 years (experts) showed significantly lower scores of private self-focus and lower scores of intrinsic motivation than those who had been practicing for less than 10 years (see **Table 3**). Conversely, participants who had practiced more during the season before lockdown reported significantly higher scores of cognitive anxiety (worry and public self-focus), perceived control, as well as external and integrated regulations of extrinsic motivation to return to sport than participants who had practiced two training sessions or less per week before lockdown (see **Table 4**). These results suggest that expertise (measured by the number of years of practice) seems to be associated with less self-focus when considering return to sport and that practicing more

TABLE 2 | Differences in anxiety and motivation between groups for gender and athlete official status.

	Gender			Athlete official status		
	Female ($N = 358$)	Male ($N = 364$)	p	Elite ($N = 128$)	Non-elite ($N = 594$)	p
Worry	3.25 ± 0.96	2.83 ± 0.96	<0.001	3.08 ± 1.01	3.03 ± 0.98	
Private self-focus	3.30 ± 0.70	3.27 ± 0.68		3.26 ± 0.70	3.29 ± 0.68	
Public self-focus	2.96 ± 0.94	2.67 ± 0.83	<0.001	3.08 ± 0.85	2.76 ± 0.90	<0.001
Total cognitive anxiety	3.17 ± 0.65	2.92 ± 0.65	<0.001	3.14 ± 0.63	3.02 ± 0.66	
Somatic tension	2.30 ± 0.84	2.15 ± 0.84	0.005	2.07 ± 0.72	2.26 ± 0.86	
Autonomic hyperactivity	1.89 ± 0.74	1.74 ± 0.72	0.003	1.75 ± 0.64	1.83 ± 0.75	
Total physiological anxiety	2.09 ± 0.73	1.94 ± 0.72	0.002	1.91 ± 0.62	2.04 ± 0.75	
Perceived control	4.04 ± 0.67	4.27 ± 0.58	<0.001	4.15 ± 0.71	4.16 ± 0.62	
Amotivation	1.54 ± 0.87	1.47 ± 0.79		1.58 ± 0.89	1.48 ± 0.82	
External regulation	3.09 ± 1.54	3.12 ± 1.51		3.55 ± 1.55	3.01 ± 1.50	<0.001
Introjected regulation	5.01 ± 1.15	4.92 ± 1.28		4.90 ± 1.23	4.98 ± 1.21	
Identified regulation	5.47 ± 1.09	5.47 ± 1.08		5.53 ± 1.01	5.45 ± 1.10	
Integrated regulation	5.83 ± 0.97	5.79 ± 0.96		5.90 ± 0.95	5.79 ± 0.97	
Intrinsic motivation	5.38 ± 1.20	5.51 ± 1.10		5.51 ± 1.13	5.43 ± 1.15	

Values are represented as mean $\pm$ standard deviation.

TABLE 3 | Differences in anxiety and motivation between groups for expertise and competition level.

	Expertise			Competition level			
	>10 years (<i>N</i> = 431)	<10 years (<i>N</i> = 291)	<i>p</i>	International (<i>N</i> = 127)	National (<i>N</i> = 255)	Regional (<i>N</i> = 340)	<i>p</i>
Worry	3.00 ± 1.00	3.10 ± 0.96	0.034	2.99 ± 0.96	3.14 ± 0.97	2.98 ± 1.00	<0.001
Private self-focus	3.24 ± 0.72	3.35 ± 0.62		3.18 ± 0.71	3.32 ± 0.67	3.29 ± 0.69	
Public self-focus	2.82 ± 0.91	2.80 ± 0.89		3.01 ± 0.87	2.91 ± 0.88	2.67 ± 0.90	
Total cognitive anxiety	3.02 ± 0.67	3.08 ± 0.64		3.06 ± 0.63	3.12 ± 0.65	2.98 ± 0.67	0.027
Somatic tension	2.21 ± 0.83	2.25 ± 0.86	0.018	2.18 ± 0.82	2.27 ± 0.85	2.20 ± 0.84	<0.001
Autonomic hyperactivity	1.81 ± 0.73	1.83 ± 0.74		1.78 ± 0.63	1.88 ± 0.77	1.78 ± 0.74	
Total physiological anxiety	2.01 ± 0.72	2.04 ± 0.74		1.98 ± 0.67	2.08 ± 0.74	1.99 ± 0.74	
Perceived control	4.15 ± 0.63	4.16 ± 0.65		4.21 ± 0.65	4.17 ± 0.63	4.12 ± 0.63	
Amotivation	1.52 ± 0.85	1.48 ± 0.80	0.018	1.58 ± 0.88	1.52 ± 0.88	1.46 ± 0.77	0.003
External regulation	3.09 ± 1.55	3.13 ± 1.49		3.43 ± 1.58	3.26 ± 1.51	2.87 ± 1.47	
Introjected regulation	4.97 ± 1.20	4.95 ± 1.23		4.85 ± 1.33	5.17 ± 1.14	4.85 ± 1.20	
Identified regulation	5.41 ± 1.08	5.56 ± 1.08	0.018	5.38 ± 1.07	5.63 ± 1.03	5.37 ± 1.12	0.009
Integrated regulation	5.87 ± 0.92	5.73 ± 1.02		5.88 ± 0.95	5.95 ± 0.94	5.68 ± 0.97	
Intrinsic motivation	5.37 ± 1.15	5.55 ± 1.15		5.38 ± 1.16	5.61 ± 1.15	5.35 ± 1.14	0.004

Values are represented as mean ± standard deviation.

TABLE 4 | Differences in anxiety and motivation between groups for weekly training sessions and training program during lockdown.

	Weekly training sessions				Training program during lockdown		
	>4 (<i>N</i> = 394)	3 or 4 (<i>N</i> = 197)	2 or less (<i>N</i> = 131)	<i>p</i>	Yes (<i>N</i> = 586)	No (<i>N</i> = 136)	<i>p</i>
Worry	3.12 ± 0.97	3.02 ± 1.01	2.83 ± 0.95	0.015	3.04 ± 0.98	3.01 ± 1.00	0.033
Private self-focus	3.31 ± 0.69	3.24 ± 0.68	3.25 ± 0.67	0.025	3.28 ± 0.69	3.30 ± 0.67	
Public self-focus	2.89 ± 0.89	2.77 ± 0.89	2.65 ± 0.93		2.80 ± 0.89	2.88 ± 0.93	
Total cognitive anxiety	3.11 ± 0.64	3.01 ± 0.66	2.91 ± 0.68	0.027	3.04 ± 0.65	3.07 ± 0.70	0.012
Somatic tension	2.23 ± 0.85	2.22 ± 0.81	2.21 ± 0.86	0.016	2.18 ± 0.81	2.40 ± 0.95	
Autonomic hyperactivity	1.80 ± 0.72	1.84 ± 0.79	1.80 ± 0.71		1.77 ± 0.69	2.00 ± 0.87	
Total physiological anxiety	2.02 ± 0.73	2.03 ± 0.74	2.01 ± 0.72	0.018	1.98 ± 0.69	2.20 ± 0.85	0.018
Perceived control	4.20 ± 0.64	4.06 ± 0.67	4.16 ± 0.54		4.18 ± 0.64	4.03 ± 0.58	
Amotivation	1.49 ± 0.83	1.56 ± 0.88	1.45 ± 0.75	0.018	1.49 ± 0.81	1.55 ± 0.91	0.001
External regulation	3.23 ± 1.52	3.05 ± 1.53	2.83 ± 1.47		3.10 ± 1.53	3.14 ± 1.50	
Introjected regulation	5.03 ± 1.20	4.94 ± 1.26	4.79 ± 1.17		4.97 ± 1.23	4.95 ± 1.14	0.022
Identified regulation	5.53 ± 1.03	5.44 ± 1.16	5.31 ± 1.13	< 0.001	5.50 ± 1.08	5.30 ± 1.07	
Integrated regulation	5.98 ± 0.87	5.68 ± 1.06	5.51 ± 0.99		5.85 ± 0.95	5.63 ± 1.00	
Intrinsic motivation	5.46 ± 1.15	5.50 ± 1.11	5.31 ± 1.20		5.51 ± 1.13	5.17 ± 1.18	0.002

Values are represented as mean ± standard deviation.

times per week seems to be associated with higher concerns while still perceiving having control on return to sport.

Additionally, participants who had training programs during lockdown showed significantly lower scores of physiological anxiety (somatic tension and autonomic hyperactivity), significantly higher scores of perceived control over return to sport, as well as higher scores of autonomous motivational regulations to return to sport (i.e., identified and integrated regulations of extrinsic motivation and intrinsic motivation) than those who did not follow any training program (see **Table 4**). These results suggest that continuing sport practice at home during lockdown is associated with perceived control when considering return to sport and autonomous motivations (e.g., in line with individual's objectives and needs) to return to sport.

Among injured participants, those who had a rehabilitation program to perform at home during lockdown (*N* = 21) showed higher scores of autonomous motivational regulations [identified ($M_{\text{rehab}} = 5.71 \pm 1.12$; $M_{\text{non-rehab}} = 5.02 \pm 1.23$; $W = 130.5$; $p < 0.05$) and integrated ($M_{\text{rehab}} = 6.00 \pm 0.88$; $M_{\text{non-rehab}} = 5.50 \pm 0.93$; $W = 126.5$; $p < 0.05$) regulations of external motivation] than those who did not (*N* = 16).

DISCUSSION

The aim of the present study is to investigate the differences in anxiety and motivation to return to sport across groups of competitive athletes with different levels and training habits

during the COVID-19 confinement period in France. The results showed higher scores of anxiety for females, younger athletes, athletes practicing and competing at the highest level, and athletes without a training program during the lockdown. Additionally, participants who were injured at the start of the lockdown reported higher scores of cognitive anxiety to return to sport than non-injured participants.

Moreover, results suggest lower motivation scores for older athletes, experts (practicing for more than 10 years), and athletes without training programs during the lockdown. International athletes' motivations are more controlled than national and regional athletes, and national athletes presented the best self-determined profile during the lockdown. In comparison with other levels (national and regional), international athletes show a complex motivation profile, with both high controlled and autonomous regulations. This is in line with a recent analysis of motivational processes of Olympic medalists (Jordalen et al., 2020) that recalls how much international athletes are subject to external forces. The controlling environment linked with the COVID-19 context could have catalyzed this perception of external control (e.g., financial support, athletes' playing contract for next season).

Our results seem to be contradictory with previous studies that show lower anxiety and perceived stress among elite athletes during the COVID-19 crisis compared to either the general population or non-elite competitive athletes (Clemente-Suárez et al., 2020; Costa et al., 2020; di Fronso et al., 2020). However, in the present study, the measure of anxiety was contextualized to return to sport. The use of the TFAI-return aimed at measuring signs of anxiety regarding return to sport while athletes had no information on the future training setting and competitions' dates. Hence, athletes competing at the highest level of competition were not sure whether they will be prepared enough for the forthcoming competition.

In previous studies, anxiety has been shown to be associated with more external regulations of extrinsic motivation to return to sport after an injury (Podlog et al., 2011). In our study, the results showed that participants displaying higher levels of anxiety also recorded higher scores of controlled motivations. This is in line with SDT (Ryan and Deci, 2017): returning to sport to avoid threats or to get external rewards is associated with anticipatory thoughts generating cognitive anxiety.

Athletes who had training programs (either from their staff or from other sources) were less anxious, perceived more control, and were more intrinsically motivated to return to sport after the confinement period (see **Table 4**). This is in line with theoretical models of return to sport in the context of sport injury (Wiese-Bjornstal, 2019). In fact, continuing to train, keeping in contact with the staff or other athletes, having goals and activities on a daily basis, as well as having time to train and limited extra-sport activities are ideal conditions for being confident with the capacity to return to sport with a lower loss in performance and for the pleasure of practicing sport and competing again. Furthermore, it would be of interest to record whether athletes were compliant in performing their training programs. However, it was not possible to record compliance to

training programs in this study (athletes were at home on their own, so no investigators could have investigated their behaviors on a daily basis).

This study is not free of limitations. First, both psychometric questionnaires were adapted to return to sport and have not yet been validated with those adaptations. The CFA allowed the estimation of the construct validity of the TFAI-return and the SMS-return; however, external validity will need to be checked. Second, assessing coping strategies would have been of interest to estimate the usual capacity to cope with stressful events and may have been associated with lower anxiety. Likewise, the level of general stress perceived during the confinement period would have been of interest for running a more complete model of stress related to return to sport. However, we decided to target the two main variables that are known to predict return to sport (Podlog and Eklund, 2007). These variables could be the target of interventions and have been widely studied in the literature. Third, this study only investigated identified predictors of the risk of injury and impaired performance when returning to sport. Recording injuries and performances several weeks after completion of the psychometric questionnaires would have been a worthwhile addition to this study to verify if being anxious or externally motivated to return to sport after lockdown leads to increased risks of injury and impaired performance. Unfortunately, it was not possible to request the athletes to respond to a follow-up questionnaire.

The results of this study may lead to practical implications when considering the confinement period or training periods that are held at home for long periods of time (e.g., 2 weeks of self-isolation in case of COVID-19 contraction). To help athletes cope with the uncertainty of future competitions, coaches could encourage setting goals during training periods (e.g., succeeding x times over y a technical move). Goal setting has proved to be effective in reducing anxiety and increasing motivation in sport (Hogue, 2019). Additionally, anxiety reduction techniques such as breathing exercises for physiological anxiety or mental exposure using imagery for cognitive anxiety may be taught to athletes with high anxiety (van Dis et al., 2020).

Finally, we can highlight the little attention given to how coaches could be supported by federations or clubs during this lockdown. While most concerns have centered on how training programs may successfully transit from face to face to remote delivery, little attention has been given to how educators could be supported in this new uncharted territory. In this way, Orsini and Rodrigues (2020) recently gave some practical recommendations for teams working remotely for cultivating autonomous motivation in coaches as well as others in their institution, including the staff and athletes.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AR and NH conceived the study. AR, JF, MB, and NH designed the questionnaires and wrote and edited the

manuscript. AR collected and analyzed the data and designed the tables. AR, MB, and NH interpreted the results of the research and the formal analysis on the successive drafts. All authors approved the manuscript in its final form.

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“Time for Recovery” or “Utter Uncertainty”? The Postponement of the Tokyo 2020 Olympic Games Through the Eyes of Olympic Athletes and Coaches. A Qualitative Study

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The current COVID-19 pandemic has affected the entire globe, including the world of high-performance sports. Accordingly, it has been widely assumed that the thereby caused postponement of the Tokyo 2020 Olympic Games could have negative psychological impacts for aspirants, since they were halted abruptly in the pursuit of their Olympic endeavors and their daily lives drastically altered. Considering the sudden nature of the pandemic, few researchers, if any, have yet scrutinized the individual experience of Olympic aspirants. This qualitative study examines the subjective perceptions of the Tokyo 2020 Olympic Games postponement among Austrian Olympic athletes and coaches. To this end, 21 Austrian athletes (13 male, 8 female; mean age = 26.67 ± 4.93 years) and six male coaches were recruited through a criterion-based purposive sampling strategy. Five athletes had already qualified for the Olympic Games in Tokyo 2020 and 15 athletes were still in an ongoing qualification process. Data was collected by means of short written statements, elicited via open-format questions on an anonymous online survey platform. In order to infer meaning from the text, a qualitative content analysis with an interpretative focus was conducted inductively, which allowed for deriving alternative explanations of findings. The results support the notion that the Olympic postponement was experienced in myriad ways by affected participants. Three general themes comprised of several meaning units of different levels of abstraction were created from the text data. Many respondents experienced an immediate emotional reaction to the postponement characterized by confusion, disappointment and/or relief. Participants associated multiple consequences with the postponement, such as the prolongation of physical and psychological pressure, a lack of motivation, concerns about future performance, living and their occupational career, but also the opportunity for performance improvement and recovery. Respondents displayed various coping strategies, such as distancing themselves from sports, cognitive reframing, appealing for acceptance, and planning behavior. This study

gleans first insights into the idiosyncratic experience of the Olympic Games 2020 postponement among Austrian aspirants. The findings could serve to assist sport psychologists in their applied practice by informing them about athletes' and coaches' needs in their Olympic preparation during the ongoing pandemic.

Keywords: Olympic Games Tokyo 2020, postponement, content analysis, COVID-19 pandemic, coping, athletes, coaches

INTRODUCTION

When the Coronavirus forced the World Health Organization to declare a public health emergency of international concern and categorize the disease as a global pandemic on 11th March 2020 (WHO, 2020), the world of sport began to wait for a decision on behalf of the International Olympic Committee (IOC) about the Olympic Games' commencement in Tokyo in July 2020. The IOC became increasingly criticized for reacting hesitantly to the dramatically evolving pandemic by the international sport community and health experts alike. With complaints growing louder and several national Olympic committees taking a clear stand by withdrawing from the Games, the unthinkable eventually happened. On 24th March the IOC and Japan's Prime Minister, Shinzo Abe announced that the Tokyo 2020 Olympic Games would be postponed until 2021 (Rich et al., 2020). It was the first time since the opening of the modern Olympic Games in 1896 that the world's most prominent sport event would be delayed in peace time, a fact that highlights the magnitude of the unprecedented health crisis caused by the coronavirus outbreak for the world of sport (Taku and Arai, 2020).

The COVID-19 pandemic and the subsequent postponement of the Tokyo 2020 Olympic Games raised broad discussions within the world of sport about the challenges Olympic athletes and coaches are encountering. The issues ranged from handling social distancing, social isolation, and loss of social support to dealing with career disruption, uncertainties about the Olympic qualification status and process, limitations and bans of training possibilities as well as insecurities about future funding, sponsorship contracts and individuals' health status (Schinke et al., 2020a,b; Toresdahl and Asif, 2020). From a holistic developmental perspective (Wylleman, 2019), the COVID-19 pandemic can be regarded as a significant career development barrier for athletes, bringing about changes in their athletic, psychological, academic-vocational, financial and legal development (Stambulova et al., 2020). On top of these unique demands produced by the current pandemic, the Olympic Games are considered a career change-event (Samuel et al., 2016), comprised of a multi-phase transition process (Stambulova et al., 2012; Wylleman et al., 2012), and entailing as such very specific challenges for athletes. Against this backdrop, the authors of this study were curious how Olympic aspirants would experience the unprecedented postponement.

In numerous research projects world-wide, increased levels of stress, anxiety, and depressive symptoms as well as feelings of anger, grief, fear, confusion, and emotional exhaustion among the general population were documented as negative psychological effects of the COVID-19 pandemic and national governments'

actions to restrict the spread of the virus and limit its detrimental impacts (Ahmed et al., 2020; Brooks et al., 2020; Chakraborty, 2020; Mazza et al., 2020; Qiu et al., 2020; Rajkumar, 2020; Wang et al., 2020). Moreover, studies carried out among elite athletes also reported a rise in stress levels, depression and anxiety symptoms due to the current pandemic (di Fronso et al., 2020; FIFPRO, 2020). It could be assumed that in Olympic sport particularly, people's mental health and well-being could be negatively affected. In their pursuits toward excellence, the challenge of facing a global health crisis combined with seeing the Olympic Games delayed (presumably a symbol of their visions, lifelong dreams, or for the culmination of their professional strivings and ambitions), could put Olympic aspirants at greater risk of experiencing adverse psychological effects. Concerns were voiced that repercussions of the pandemic would threaten the mental health of Olympic participants whose daily routines were disrupted from one moment to the next as competitive seasons had come to an abrupt halt and training facilities around the world were closed (Schinke et al., 2020a; Toresdahl and Asif, 2020).

The announcement of the official IOC decision sparked an abundance of interviews and global media coverage of future participants' reactions to the postponement. Personal social media feeds of Olympic aspirants testified to the emotional turmoil that the events had triggered within the world of Olympic sports. In addition, elevated demands for psychological online support through sport psychologists were reported following the outbreak of COVID-19 and the implemented confinement measures (Hossien Mehrsafari et al., 2020). Taken together, the question was raised whether Olympic candidates possess sufficient and adequate coping resources to deal adaptively with the unprecedented situation (Hossien Mehrsafari et al., 2020). Elite athletes have been shown to employ different coping strategies to meet the demands imposed on them in the pressurized environment of high-performance sport (Nicholls and Polman, 2007; Nicholls, 2010a). Considering the societal consequences of the COVID-19 pandemic and the postponement of the Olympic Games in Tokyo 2020, it seems open if and how athletes and coaches employ different coping strategies. Extant literature differentiates between problem-focused coping (e.g., actions of problem solving, planning, or information seeking), emotion-focused coping (e.g., seeking social support, relaxation techniques, or acceptance), meaning-focused coping (e.g., searching for meaning in adversity, drawing on values, beliefs and goals, or making causal attributions), and avoidance coping, comprising behavioral (e.g., removing oneself from the stress-inducing situation) as well as cognitive (e.g., blocking thoughts or cognitive distancing) efforts to withdraw from a

stressful situation (Krohne, 1993; Lazarus, 1999; Folkman and Moskowitz, 2004; Nicholls and Polman, 2007; Polman, 2011; Guo et al., 2013). It seemed likely to find Olympic aspirants resort to various coping strategies in response to the postponement of the Olympic Games.

However, due to the dynamic progression of the health crisis, there is a lack of empirical work within the field of sport psychology on how this unique population actually experience the Olympic postponement. Assumptions about which feelings, concerns, frustrations, fears or reliefs accompany the IOC's decision on the part of affected aspirants, and which coping strategies they might resort to in order to overcome encompassed difficulties, are thus far of hypothetical nature only. Currently, few studies examining individual perceptions of the ongoing COVID-19 crisis among Olympic athletes and coaches have been published (e.g., Clemente-Suárez et al., 2020; Taku and Arai, 2020). With the world scrambling up to cope with the implications of the current health crisis, a detailed exploration of perceived challenges and associated coping responses as well as additional idiosyncrasies through participants' lived experience of the delay of the Olympic Games is still missing. Designed to address this gap in knowledge, the purpose of the present paper is to provide subjective interpretations of this unprecedented situation through the eyes of Olympic aspirants. Hence, a qualitative approach to inquiry was used to afford a deeper insight into this novel area of interest (Patton, 2002), centralizing two research questions: (1) How do Olympic athletes and coaches experience the postponement of the 2020 Tokyo Olympic Games? (2) What consequences do they expect?

MATERIALS AND METHODS

Philosophical Positioning

The authors of this study endorse the idea that people's realities are shaped through their individual and subjective perceptions and thereby commit to epistemological constructionism (i.e., knowledge is constructed and subjective) and ontological relativism (i.e., multiple created, mind-dependent realities exist; Ponterotto, 2005; Smith and McGannon, 2017). Accordingly, the goal of the study was to acknowledge and show that the situation of seeing the Olympics Games delayed due to an unforeseen global health crisis can be experienced in myriad ways by different individuals and that it impossible to know what this unique situation means and entails for them.

Participants

Participants were recruited through a criterion-based purposive sampling strategy (Sparkes and Smith, 2014) to ensure that they shared predefined inclusion criteria characteristics. Accordingly, 78 Austrian athletes and 16 Austrian coaches in total were invited via email or private message on Facebook to participate in the study. These athletes were selected due to: (a) successfully completed qualification for the Olympic Games in Tokyo 2020 or (b) high probability of qualification for the Olympic Games in Tokyo 2020. The coaches were corresponding coaches of the aforementioned athletes whose German language skills were

deemed sufficient to provide a detailed written description of their lived experience. Twenty-one athletes (13 male, 8 female; mean age = 26.67 ± 4.93 years) and six male coaches (mean age = 46.67 ± 9.73 years) followed the invitation and participated in the study. Five of these athletes stated that they were already qualified for the Olympic Games in Tokyo 2020, 15 athletes stated that they were in an ongoing qualification process and one athlete did not answer this question. Eight athletes had participated in previous Olympic Games, whereas 13 athletes stated trying out for their Olympic debut. Concerning their sports: Eighteen athletes and five coaches categorized their sport as individual sports, while three athletes and one coach categorized their sport as team sports. The study took place from 21st April to 19th July 2020. Data collection was halted on the grounds that the lockdown phase of the COVID-19 pandemic in Austria was over and the contextual circumstances had vastly changed for additional potential participants. Out of the 27 respondents, 24 took part in the study within the first 9 weeks. Three participants responded within the last 3 weeks of the study.

Procedure and Data Collection

Potential study participants were contacted via social media and email and provided with an online link to a survey platform, which could be accessed in a computer or mobile version. The research was introduced as a study to explore how Austrian Olympic athletes and coaches personally experience the postponement of the Olympic Games caused by the Coronavirus pandemic. In the introductory text, special care was attributed not to influence participants in order to capture their idiosyncratic views. Before directing participants to the question, the procedure was described and the athlete or coach was informed of his or her right to withdraw from the study at any time. After this, participants were asked for their explicit consent. It was made clear that the researchers would not be able to infer personal identities from the data and that the study intended to provide an anonymous setting for participants to share their subjective experience in a written statement. The open-format questions that participants were asked to answer read as follows: "Please describe what the postponement of the summer Olympic Games of Tokyo 2020 means from your perspective. What does this decision entail for you personally?"

The method of prompting written statements from participants stems from research conducted by Hunger and Böhlke (2017). These authors developed the method of a "short written narration" (p.5) further by asking study participants to elicit a statement about a specific situation that was subjectively perceived as boundary overstepping in the context of physical education. The method of prompting written statements in an online format has so far received little attention in methodological reflections in the context of qualitative research (Schiek, 2014). Despite some drawbacks of this method (e.g., participants' varying ability to express internal experiences in writing and the invisibility of participants' omissions and corrections of content for the study authors; cf. Bampton and Cowton, 2002; Schiek, 2014), the rationale behind applying this method of data collection in the current study rests on several grounds. Firstly, the online link was available around the

clock from anywhere so that study participants could access the survey at their convenience, meaning whenever they felt ready to self-disclose. In this sense, the authors intended to offer an anonymous setting for participants, in which they could reflect freely on their private experiences, at an autonomously chosen point in time, and what is more, without being influenced by the study authors. This aspect was vital for the study design, which intended to allow participants to express personal opinions and views that they might be hesitant to disclose in a public media interview or in an online interview conducted face-to-face with the study authors. Since both authors are currently providing sport psychological services to athletes and coaches in Austria, they were potentially personally known by participants. Furthermore, the authors chose the data collection method in order to help participants process their experiences and feelings. Since writing involves arranging, revising and structuring content, it allows experiences to be processed directly (cf. Schiek, 2014).

Following the writing prompt, participants were asked to provide information regarding their age, gender, actual qualification status, previous participation in Olympic Games, the nature of their sport, and whether they were athlete or coach. No additional biographical or sport-related details were obtained from participants due to the aforementioned concerns about ensuring their anonymity. The statements, which respondents produced, were on average comprised of seven lines, ranging from two to 37 lines between individuals.

Reflexivity

In order to increase the credibility of their claims, the authors acknowledge their own standpoints and feel the responsibility to clarify their positionality in regard to the topic and the population under investigation (Levitt et al., 2018). The first author recognizes her complex positioning as a former and long-term member of the Austrian Olympic Team, for which she competed in three Olympic Games and won one individual medal. After retiring from her athletic career, she started to work as a certified mental performance consultant in Austria. As such, she is currently supporting clients in their preparation for the next Olympic Games. The second author has been in charge of the Austrian Team at Olympic Games as sport and exercise psychologist for several Olympic cycles. He has extensive experience in providing support for athletes and coaches in high performance settings and additionally holds a post doc position at the University of Vienna in the field of sport psychology. Against this backdrop, the authors are aware that they were able to make use of privileged communication pathways to establish contact with potential study participants. Furthermore, it is worth noting that anonymity and the impossibility to link data to individual replies seemed to be questioned as some participants emailed the authors asking them if further information was needed from them. Since the high-performance sport community in Austria is rather small, athletes, coaches, stakeholders and sport psychological support staff know each other personally in most cases, which added to the challenge of establishing confidence and trust among the study participants that their anonymity would be safeguarded at all times.

Data Analyses

The first and second author individually performed a qualitative content analysis with the goal of gathering knowledge and enhancing understanding of the phenomenon under study (Downe-Wamboldt, 1992). In line with preliminary reflections about the research design, this analysis method was conducted with an interpretative focus while systematically classifying and identifying patterns of meaning. Following the differentiation of Hsieh and Shannon (2005), the authors employed a conventional approach to content analysis. This type of content analysis was aligned with the study's purpose to develop a deeper understanding of a recent phenomenon, for which research literature is lacking. Without imposing preconceived categories or theoretical considerations, a conventional content analysis is data-driven, and thereby derives knowledge from participants idiosyncratic perspectives (Hsieh and Shannon, 2005).

In a first step, the authors familiarized themselves with the data by reading the entirety of the texts repeatedly to get a sense of the whole (Tesch, 1990). Next, the authors analyzed the text inductively to allow themes and categories to appear from the data (Patton, 2002; Mayring, 2015). Meaning units, defined as "a segment of text that is comprehensible by itself and contains one idea, episode, or piece of information" (Tesch, 1990, p. 116), were identified and labeled as codes. In this article, codes are understood as condensed meaning units and as such employed as "tools to think with" (Coffey and Atkinson, 1996, p. 32), intended to look at the data in new ways. The labels were mostly based on the wording of the text and contained key words (Hsieh and Shannon, 2005). In a next step, the codes were grouped into subcategories and categories representing higher levels of abstraction. A category can be considered as a thread throughout the codes (Graneheim and Lundman, 2004). As a final step in the independently performed analysis, recurring meanings across categories were inferred and labeled as themes (Polit and Hungler, 1999). A theme can also be thought of as a thread of an underlying meaning, but on an even higher level of abstraction, since it encompasses latent content of the text, obtained through interpretative analysis. The interpretative nature of themes makes it possible for codes and categories to be sorted into more than one theme, as themes are not necessarily mutually exclusive (Graneheim and Lundman, 2004).

Once the analysis was conducted by the two authors individually, the researchers met on several occasions to present their thematic framework to each other and to discuss their interpretations of the underlying meaning (i.e., the latent content) of the text. Despite the content analysis being depicted as a linear process, it is important to note that the derivation of meaning from a text is performed in a rather circular manner by moving back and forth between the text as a whole and its segments. As described earlier, the research design was underpinned by constructivist epistemological beliefs and a commitment to a relativist ontology. In line with these beliefs, the authors assume that it is impossible to produce theory-free knowledge as reality can be interpreted in a variety of ways. This in turn, implies the idea that understanding depends on subjective interpretation. Consequently, the authors decided against the use of the popular method of member checking as

a form of quality control and with the aim to ensure rigor (cf. Smith and McGannon, 2017). Likewise, interrater reliability was regarded as irrelevant to this study, since a quest for consensus among researchers as Kvale (1996) put it can “lead to a tyranny by the lowest denominator: That an interpretation is only reliable when it can be followed by everyone, a criterion that could lead to a trivialization of the interpretations” (p. 181; Smith and McGannon, 2017). Instead, the authors chose to first perform the content analysis independently and discuss their results afterward without aiming for interpretative agreement. In this regard, they factually acted as critical friends to each other, promoting reflexivity by challenging each other’s views and their respective construction of knowledge (Cowan and Taylor, 2016; Smith and McGannon, 2017). In the methodological debate about strategies to achieve rigor in qualitative research within sport and exercise psychology, the critical friend procedure is gaining momentum (e.g., Gustafsson et al., 2008; Hill and Hemmings, 2015) and was chosen by the authors in order to increase the quality and trustworthiness of this interpretivist study.

RESULTS AND DISCUSSION

Since description and interpretation of the underlying meaning are closely related in this qualitative approach, the “Results and Discussion” sections are combined in order to avoid redundancy. Three central themes related to the perception of the postponement of the Tokyo 2020 Olympic Games were inferred from the data: (1) Immediate emotional reactions, (2) Perceived consequences of the postponement, and (3) Coping with the situation. The detailed structure and composition of the derived categories, subcategories and codes are presented in **Tables 1–3**.

Immediate Emotional Reactions

Table 1 illustrates the codes, subcategories, and categories, which were created from participants’ texts relating to their immediate

emotional reactions. The categories and main emotional states ascribed were confusion, disappointment, and relief.

Confusion

In many cases, participants described the way they reacted to the announcement of the postponement in distinguishable phases. Thus, they often recalled their initial reaction as a sense of shock and confusion. As this respondent put it: “Of course I was shocked at first and for a short time I didn’t know what to think about it or how to deal with the situation at all” (id13). Another participant asserted: “For me personally, it was the only right decision, even if it was a small shock at first” (id23). Several participants associated this shock moment with a feeling of uncertainty. Often, the underlying factors of having no exact dates and schedules to structure their yearly training accordingly, in combination with being left in the dark about possible changes to the ongoing Olympic selection process and rules, were described as challenging. One athlete stated: “As a consequence, all athletes find themselves in utter uncertainty. I would describe that as the most difficult issue” (id4). This finding was somehow expected as it reflects the general assumption within the field of sport and exercise psychology that elite athletes, in terms of being high-performance career professionals, evolve based on structured short- and long-term plans, which logically permit outcomes such as improved and consistent performance and viability into the future (Schinke et al., 2020b).

Disappointment

Feelings of disappointment and regret were frequently reported as a first emotional reaction: “Immediately after the announcement of the decision, it was a challenge for me to process everything, because I had invested a lot in the upcoming selection and had already completed a big part of it successfully!” (id12). One coach explained how the Games’ postponement was experienced as tragic, because it stopped the team’s ongoing Olympic selection at its final stage: “Also, we were really close to qualifying, there were only 2 competitions left. Now everything is “up in the air” again and there is a certain insecurity” (id14). There is a growing awareness within the field of sport psychology that even in a “normative” Olympic cycle, athletes are prone to disappointment in their Olympic endeavor, which might impact their well-being and ultimately their mental health negatively (Henriksen et al., 2020). With this in mind, the extended preparation phase caused by the postponement understandably represents an important challenge for Olympic aspirants.

Relief

Since the phase proceeding the IOC’s announcement was characterized by an agonizing uncertainty about scheduled events and plans in general, the official call served to reduce this uncertainty and was consequently experienced as relief at first. Some participants felt relieved that difficult recent training conditions were now judged as less unfavorable: “It is a relief, because we were not able to train in the last month” (id5). Another athlete added: “Following a stage of uncertainty, the postponement of the Olympic Games to 2021 felt like a big relief to me. Moreover, training conditions were very different from

TABLE 1 | Hierarchical structure of the theme “Immediate emotional reactions”.

Code	Subcategory	Category
Shock	Loss of (lifelong) target/daily structure/clear schedules	Confusion
Loss of target	Disappointment	Disappointment
Expectation to successfully qualify for the Olympic Games	Feeling of losing an already achieved status/position	
Concerns about cancellation of qualification events	Pessimism about one’s successful Olympic Games qualification/performance	Relief
Doubts about a successful execution of the OG		
Disadvantages in comparison to other athletes due to training restrictions		
Waiting for the call of postponement	Reduction of uncertainty	

country to country, the postponement of the Games allows for a fair preparation” (id17). Numerous respondents had pessimistic views about the continuation of their qualification process and feared negative changes to their selection mode before the delay of the Olympic Games was formally announced. Therefore, they felt relieved about the formal decision of the IOC, as it ended speculation about the cancellation of upcoming qualification events. This athlete stated: “Personally, I have to say that the postponement was a relief. I wasn’t qualified 100% yet and was scared that because of the corona crisis there would be no more competitions, so that there would be no more chances to meet the selection criteria for me. My big goal was always the Olympics, and not being able to participate because of something like this, made me think a lot” (id27).

These comments exemplify that Olympic athletes and coaches lived through diverse concerns that COVID-19 will affect their actual situation, and even more importantly, their future perspective negatively. As already shown in other population groups besides elite athletes and coaches, increased levels of stress, anxiety and depression were documented as a psychological consequence of COVID-19 (Ahmed et al., 2020; Brooks et al., 2020; Chakraborty, 2020; Mazza et al., 2020; Qiu et al., 2020; Rajkumar, 2020; Wang et al., 2020). The data of this study might be in line with these quantitative findings. As such, the reported mixture of feelings of shock, confusion, disappointment and relief might represent a typical progression. Accordingly, the decision of the postponement sparks a moment of shock at first, as the major target of athletes and coaches is propelled into the future. As this shift of time perspective has a major impact on short-term as well as on long-term plans of Olympic aspirants, a phase of confusion might follow, in which they have to factually process the novel situation and re-orientate themselves in order to adapt. By realizing the situation and assessing its individual, multidimensional consequences, feelings of disappointment, but also relief might ensue depending on individually rated positive and negative implications of the postponement and on one’s perceived ability to manage stress. The depicted progression bears resemblance to Kübler-Ross (1969) model of grief, which comprises five (non-linear) stages as reactions to loss i.e., denial, anger, bargaining, depression, and acceptance.

Perceived Consequences of the Postponement

Table 2 shows the hierarchical structure of the codes, subcategories and categories that were identified from the participants’ answers relating to the perceived consequences of the postponement of the Tokyo 2020 Olympic Games. The identified topics were grouped into six categories.

Prolonged Physical and Psychological Pressure

Numerous participants expected the Olympic postponement to bring about negative consequences. A recurring issue in the data was the notion of an extended period of mental and physical pressure due to the delayed Games. Multiple athletes and coaches mentioned chronic pain, injuries, and physical and emotional stress resulting in exhaustion as characteristics of the

TABLE 2 | Hierarchical structure of the theme “Perceived consequences of the postponement”.

Code	Subcategory	Category
Chronic pain, injuries as part of athlete’s daily life	Prolonged physical and psychological pressure	Prolonged physical and psychological pressure (leading to chronic exhaustion)
Retirement considered due to exceeding demands	Accumulating exhaustion	
Break after the Games delayed	Continuation of physical and mental pressure	
Goals lost, difficulties to set new intermediate goals	Loss of (immediate) goals	Lack of motivation
Difficulty of staying focused without competitions	Loss of targets to focus on	
Loss of detailed training and competition schedules	Concerns about training progress	Concerns about future performance
Lacking opportunities to compare themselves to other competitors	Concerns about staying competitive	
Uncertain progress of qualification mode	Concerns about successful Olympic Games qualification	
Being confronted with more severe training restrictions than other athletes/nations	Concerns about disadvantageous training possibilities	
Changes in private plans, later life put on hold	Reflections about occupational career and future perspectives	Concerns about living and occupational career
Uncertain funding, sponsorship	Concerns about making a living from sport	
Use additional year to work on personal weaknesses, identify gaps	Improving performance	Opportunity of performance enhancement
Superior preparation for Olympic Games	Improving Olympic preparation	
Recovery from injuries and physical strains	Physical recovery	Opportunity of recovery
Reduction of pressure and stress	Mental recovery	

daily life of professional athletes: “During the entire selection phase (selection had been going on for 2 years already), I had, among other things, to constantly deal with injuries. As a high-performance athlete, among other things, you are forced to permanently exceed your limits and often you don’t give your body the time it would actually need” (id4). In some cases, this even led to the contemplation of an early career termination, since the demands of prolonged physical and emotional hardship (by at least another year) seemed too overwhelming: “For me personally, this postponement represents a challenge. I am often injured and have been in chronic pain for years already. The plan was to try as good as possible to give it 100% until the Games and then to slowly end the career. To train a whole year longer

for the Olympics is going to be a challenge for me, mentally and physically. After the announcement that the Games will be postponed, I was wondering for a long time if I should continue at all" (id12). The topic of career ending was also mentioned by one coach, who confessed that he had very different plans for his life since he was planning to retire after the Games, but now has to "add another year" (id14). The toll that the long-lasting and draining Olympic qualification phase takes on athletes was paramount. As such, it was noticeable in the words of this coach, describing how much effort had been put into the preparation since 2016 and concluding that "the athletes were quite worn out already" (id14). In one athlete's statement the unwanted interruption and stretch of time was especially pronounced: "One more year until the event that we have been preparing for 10 years will finally take place" (id19).

These depictions indicate a high level of mental and physical exhaustion, which might represent a core dimension of burnout (Maslach et al., 2001; Schaufeli and Buunk, 2003; Gustafsson et al., 2016) comprising both physical and emotional aspects (Gould et al., 1996; Cresswell and Eklund, 2006). Informed by this knowledge, the statements could be interpreted as (early) signs of bodily and psychological fatigue due to demands of the pressurized environment of elite sport. It is known today that the specific demands of elite sport such as high training loads, abundance of calendared competitions, inflexible training schedules and mental pressure can act as potential stressors to athletes and even threaten their mental health (Rice et al., 2016; Küttel and Larsen, 2019). Consequently, it is plausible to assume that athletes and coaches who expressed their fatigue in this study are even more at risk of poor mental health now as stress and negative emotions caused by the pandemic are added to the mix.

Lack of Motivation

The feeling of an accumulating exhaustion was directly linked to a motivational low by some participants, who attributed this to the fact that the outlook on a break after the Olympic Games was deferred for one more year: "As I was expecting at least a longer break after the Olympic Games, the postponement turned a lot of things upside down. Because I was really looking forward to this break, it is actually very difficult to maintain the motivation at the moment" (id24). Another aspect affecting athletes and coaches' motivation negatively, became apparent in previous statements already: The loss of calendared competitions and thereby clear targets to peak for. As one athlete stated "in a year without any major event, it seems challenging to keep the focus, as the main target is far away and there are no conducive intermediate goals" (id33). One participant reflected: "In the first moment after the final decision of the postponement for me personally, it was not as easy as expected. The questions of how to set new goals and what I might have to adjust in my private life turned out difficult for me at the beginning" (id37). Another athlete talked about how the postponement was a shock "because you train hard all winter long to qualify and suddenly this goal is snatched away from you" (id54). These statements elucidate the impact that the postponement of the Olympic Games has on athletes and coaches' goal setting, an aspect previously emphasized by Schinke et al. (2020a,b). According to the vast psychological literature and

pertinent studies, goal setting is relevant for effective goal striving and can ultimately lead to enhanced performance (Locke and Latham, 2002), which is why it is one of the most widely used interventions by practitioners (Weinberg and Butt, 2011; Healy et al., 2018). By setting oneself goals that are aligned with one's personal values and pursuing these autonomously, athletes see purpose and meaning in sport and life in general. In this sense, setting oneself meaningful and personally significant goals was identified as a protective factor against mental illness and can in turn serve to increase mental health in the high-performance sport context (Mousavi et al., 2017; Küttel and Larsen, 2019). Thus, effective goal setting might help athletes and coaches in a healthy pursuit of excellence. However, the data collected in this study testify to the experienced difficulty of Olympic aspirants in determining foreseeable goals due to the reigning uncertainties associated with the pandemic.

Concerns About Future Performance

The novel situation of not being able to plan ahead, to have a set competition schedule to follow, to prepare for selected main events, and to aim for specific performance goals along the way seemed to increase concerns about building up one's performance until the Olympic Games. This athlete summed it up: "High performance athletes are used to working toward their goals and to have a detailed schedule in mind. This one doesn't exist in the current situation" (id4). As a consequence, "there is also an uncertainty, as I do not know how and where to train next year" (id5). The difficulty of staying competitive without opportunities to compare themselves to others, was described as a pressing issue by several respondents. Some participants experienced concerns about sustaining their form until the Olympics: "The already relatively high level has to be sustained for a year!?" (id19), one participant seemed to ask in disbelief.

The uncertainty surrounding the ongoing Olympic qualification and impending cancelation of future qualification events was a recurring aspect in the data: "I was afraid that there would be no more competitions due to the corona crisis, which would destroy any possibility for me to reach the limits for a successful qualification" (id27). With the entire world in flux, Olympic athletes and coaches were faced with an unknown unpredictability of events.

Most notably, the concern of being subjected to more severe restrictions than their fellow competitors was noticeable across participants' texts. "Many athletes do not have the possibility to train and they have to sit at home. Other nations, like Sweden, do not have such harsh restrictions for their population, and therefore don't affect everyday life of athletes" (id23). When the pandemic caused a global standstill, athletes were stopped dead in their tracks to prepare for Olympic glory. Restrictions and mandates calling for physical distancing put in place made it impossible for them to continue their regular training as most facilities were closed. Still, many athletes tried to uphold their training routines in order to stay in shape and sustain their athletic capacity. Through social media, athletes and coaches in Austria found out that competitors in other parts of the world were still able to train in nearly normal formats. The feeling of being disadvantaged in comparison

to fellow competitors could have acted as additional stressor, especially in the lock down phase. Overall, the impression was gained that various participants experienced the task of preparing for a peak in performance at the Olympic Games in the times of a global health crisis as a major challenge (cf. Schinke et al., 2020a).

Concerns About Living and Occupational Career

Several athletes and coaches expressed concerns about their future occupational career, and feared negative consequences for their daily living, most notably on a financial level due to the Olympic postponement. For example, one athlete stated: “Personally, the postponement implies a very high effort in organizational terms as well as in financial terms” (id25). These financial concerns were also emphasized by coaches: “Additionally it causes uncertainty: Will the athletes and myself receive the same funding? How will the sponsors react?” (id16). It became obvious that the postponement affected respondents’ scheduled plans for the time after the Olympic Games: “The decision what will happen after the Games will be postponed for another year. The plans which already existed for the time after the Games will also be postponed for a year” (id19).

As already shown in the last category, Olympic athletes’ and coaches’ statements revealed numerous concerns extending to multiple domains of their life. The statements might emphasize the assumption of increased stress levels in athletes and coaches as a consequence of diverse concerns and worries not only about the actual situation, but also their future perspective (Rajkumar, 2020; Schinke et al., 2020a,b). Since elevated stress levels have already been found in other subpopulations (Chakraborty, 2020; Mazza et al., 2020) as well as in elite athletes (di Fronso et al., 2020) as a psychological effect of COVID-19, the text data might hint at increased stress levels among these Olympic athletes and coaches, thereby supporting previous results. According to the transactional theory of stress by Lazarus and Folkman (1984), individuals can experience stress when the demands they are faced with exceed their perceived resources, endanger their well-being, and when making appraisals of threat, harm or challenge. As the participants in this study were confronted with an unprecedented situation, which was associated by many with negative effects in multiple domains of their life (e.g., sport, social life), the challenges naturally seemed difficult to meet. Consequently, higher levels of stress might be a negative psychological impact of the Olympic postponement among Olympic aspirants. Extant literature shows that performers in sport commonly experience organizational stress such as poor financial support structures, harsh selection criteria, or prolonged traveling time (Fletcher et al., 2012). In light of the knowledge that organizational stress can be associated with various problems for athletes (e.g., negative emotions, dissatisfaction, overtraining, poor psychological health, low well-being, burnout, and underperformance; Gould et al., 1999; Noblet et al., 2003; Meehan et al., 2004; Fletcher et al., 2012; Tabei et al., 2012), future research is needed to gain a more thorough understanding of the multiple stressors at play throughout the COVID-19 pandemic across elite athletes and coaches’ samples.

Opportunity of Performance Enhancement

The feature of having extra time at one’s disposal was a reoccurring topic in the data and can be interpreted in various ways. Multiple participants regarded the additional year as an opportunity to heighten their chances to compete at their best at the Olympics: “We are able to use this year to work on weaknesses and invest without pressure in things for which there would probably not be enough time under normal circumstances. You always have to see the positive I think” (id32). As this quote illustrates, many respondents intended to use the COVID-19 induced extra year to systematically work on personal weaknesses and described it as a chance for performance enhancement. Likewise, this athlete stated enthusiastically: “Would I have liked the Games to happen this year? Yes, of course, but on the other hand I am almost happier that I will be able to show even more what I am capable of next year. I can use the extra year to continue to train and to work on my weaknesses. All in all, I think that I would have made the Olympics this year and then I would have taken part in Tokyo. But next year, I will not only take part in Tokyo, but also show what I want to show!” (id27). Other participants shared this view by explaining how the structural changes made to their training environment in the previous year could now be parlayed into improved training conditions. Some athletes and coaches reasoned that the young age of the athletes turned the prolonged preparation phase until the Olympics into a relative advantage for them, since the additional time allowed them to close the gap to the leaders in their respective sport, and to develop their potential even further. Interestingly, helping athletes search for gaps and by this adopting a constructive problem-solving attitude, was recently suggested as an effective way of providing psychological support for athletes at the current stage of the pandemic by an international expert group of mental performance consultants (Schinke et al., 2020a).

Opportunity of Recovery

In high-performance sports, physical and psychological demands are experienced as a regular, yet challenging part of daily life. An important result of this study was therefore to see several athletes experience the postponement as an opportunity to recover from daily strains. One athlete asserted: “In my case the postponement of the Olympics reduced the pressure massively. For the first time in years, I have the time to process the events and emotions of the past time. . . . Now, for me personally, it is important to use the time wisely. Above all, to recover well, not only mentally but also physically” (id4). Another athlete also seemed glad to be afforded extra time to recover and additionally intended to use it to improve his/her performance in light of the ongoing selection: “Since I had to deal with injuries lately, the postponement of Tokyo 2020 gives me the time to prepare myself physically so far that I can qualify in the tournaments next spring” (id8). This view was shared by a participant who even predicted to be able to extend his/her athletic career by “another year or so” (id55) thanks to the possibility to heal the body in the gained off-season time.

All in all, the reflection that an extra year meant a personal advantage in comparison to others, was a common feature that was found in the data. Reading through the entirety

TABLE 3 | Hierarchical structure of the theme “Coping with the situation”.

Code	Subcategory	Category
Experiencing nature/leisure time/family/university studies	Exploring other aspects of life, beyond athletic identity	Distancing from sport
Time without traveling	Experiencing less demands	
Personal benefits due to the postponement (e.g., performance improvement, opportunity of recovery)	Focusing on (relative) benefits of the postponement	Cognitive Reframing
Postponement better than cancellation		
Necessary for a level playing field, fair preparation for the Olympic Games for all athletes	Social comparison, putting things in perspective	
Health as most important		
Personal maxims, e.g., try to make the best of the situation	Appealing for acceptance of the situation, adopting a mindful attitude	Appeal for acceptance
Claim to stay positive, e.g., accept the necessity of the situation as it is	Appealing for acceptance of the situation	
Societal duty of athletes to act as leading examples in staying optimistic	Appealing to act as role model	
Planning how to benefit from the postponement	Devising plans in order to adapt to the situation	Planning behavior

of statements, the impression was gained that thanks to the unexpected pause and changed conditions, many participants finally had “time to breathe” in the fast-paced world of Olympic sport. A finding that emphasizes once more the amount of pressure that high-performance protagonists experience under normal circumstances.

Coping With the Situation

Table 3 presents the codes, subcategories, and categories that were identified in participants’ texts relating to the theme of “Coping with the situation”. The dimensions were combined in the categories “Distancing from sport,” “Cognitive Reframing,” “Appealing for acceptance,” and “Planning behavior.” Since the distinguished dimensions are interconnected and overlap to some extent, the topics discussed as positive consequences of the Olympic postponement could also be interpreted as coping strategies that participants reverted to in order to adaptively respond to the situation imposed on them. Additionally, a single coping strategy could be sorted into more than one dimension (Compas et al., 1996).

Distancing From Sport

The differentiation between an initial, somewhat genuine emotional reaction and a later, more reflected and controlled response to the news of the delayed Olympic Games was noticeable in some of the quotes presented above. In fact, many respondents seemed happy, relieved and even thankful that they were afforded time to pursue other interests beyond sport and enjoy different aspects of life as a consequence of the Olympic postponement. This athlete expressed feeling closer to nature

and enjoying training outside, a welcome change for an indoor athlete. “At this time of year, I have never before felt sunrays on my face this often as at the moment” (id4). Another athlete enjoyed having more time to spend with his/her children, a wonderful side-effect of the sudden changes in season planning. While competing and training abroad may represent an attractive way of life for many, ceased travel obligations were mentioned as a positive impact of the Games’ postponement in this study. As this athlete suggested: “Personally, I find it enjoyable as a whole, for the first time, a time without travel, stress and pressure” (id30). This athlete concludes by asserting that this extra time allowed them to finish off other tasks such as completing their master thesis and to thereby free their head.

All these comments show that athletes also reflected on topics beyond training and performance. As diverse uncertainties were mentioned by athletes and coaches relating to the postponement of the Games, exploring interests other than sport might serve as a coping strategy to deal with these potential stressors (Nicholls and Polman, 2007). Athletes and coaches distanced themselves from sport and turned their attention away from the incisive decision and its ramifications to more positive and/or controllable aspects of their daily lives. Being able to open up to other life domains and personal interests beyond sport such as focusing on nature experience, leisure time and hobbies, family, friends and/or university studies, might serve as distraction for these Olympic aspirants. Following this interpretation, the attempt to distract oneself can be seen as an avoidance coping strategy (Folkman and Moskowitz, 2004; Polman, 2011). Individuals use avoidance coping primarily in situations in which they perceive themselves to have little control over the outcome (Carver et al., 1989; Nicholls and Polman, 2007), such as when goals are unreachable irrespective of the effort made. In such situations, the strategy of avoidance seems to be an effective way of coping with acute stressors (e.g., not thinking about a faulty referee decision), whereas in the long-term negative consequences such as increased negative affectivity (Ingledeu et al., 1997), more pronounced symptoms of burnout (Polman et al., 2010), and higher levels of stress (Polman, 2011) were reported. While providing short-term relief of negative emotional states and inner experiences, avoidance coping in principle indicates that an individual is turning away from a problem, thereby deciding not to confront it. Yet, if an individual cannot physically or mentally disengage from a situation that he/she does not want to be exposed to, such as the current global health crisis encompassing every life domain, it is likely that he/she will experience increased stress as a consequence of trying to escape the situation in vain (Carver and Scheier, 1998; Folkman and Moskowitz, 2004).

An alternative way of interpreting the statements made by the study participants is the idea of broadening their athletic identity. By allowing themselves to explore a breadth of interests, athletes and coaches could use this historical time to grow in a holistic sense by developing their personal multifaceted identity. As a unidimensional athletic identity has been identified as a risk factor for developing symptoms of burnout (Coakley, 1992; Gustafsson et al., 2008, 2018), promoting a broader identity development in their clients and following a

whole person approach could be an important intervention for practitioners working with Olympic athletes and coaches in these challenging times (Wylleman et al., 2013; Schinke et al., 2020b; Stambulova et al., 2020).

Cognitive Reframing

Several of the consequences of the Olympic postponement perceived as personally advantageous by participants, such as a relative age advantage over other competitors, using the additional time to optimize training and improve performance, regarding the situation as a unique opportunity to recover physically and mentally, and to explore other interests, can all be classified as positive reframing of the situation. Likewise, the statement, “but a postponement is still better than a complete cancelation, which would have meant having wasted years of training and fighting” (id25), can be understood as reframing of the situation, which consequently fosters acceptance of the postponement, an event that cannot be changed or controlled itself. This cognitive strategy is a psychological technique that helps a person to view things differently by putting them in a different context, thereby allowing new perspectives to arise (Robson and Troutman-Jordan, 2014). As such, it refers to a general shift in a person’s mindset. In this regard, athletes and coaches might apply meaning-focused coping strategies, as they re-evaluate the positive meaning and outcomes of the postponement, thereby engaging in benefit-finding (Tennen and Affleck, 2002). Past research already emphasized successful adaptations, especially in less controllable situations, through meaning-focused coping attempts (Folkman and Moskowitz, 2004; Guo et al., 2013).

Additionally, different lines of arguments were presented why the postponement was the only viable option under the exceptional and unique circumstances, such as difficult and scarce training conditions for athletes world-wide in the preceding weeks. As mentioned earlier, the training restrictions varying to a great extent locally and internationally received a lot of interest, as visible in this athlete’s quote: “Moreover, training conditions were very different from country to country, the postponement of the Games allows for a fair preparation” (id17). The idea of fairness was expressed by many participants, as it represents one of the core Olympic values and is translated in the notion of a level playing field for all competitors. One athlete said: “I definitely think the postponement is the right solution to ensure equality of opportunity for all athletes around the world” (id27). Another prominent feature along the lines of having the bigger picture in mind when judging the IOC’s decision, was the plea for regarding health in general as the most important asset and therefore treating it as foremost priority: “From a health perspective, it was certainly the right decision to postpone the Games. The risk would have simply been to big internationally” (id12). One participant added a personal experience: “Health is the most important issue. This became increasingly clear to me as an athlete during the course of my career and was confirmed one more time now” (id13).

In these statements, it seems that athletes and coaches attempted to view their actual situation and its personally experienced implications from a broader perspective. In fact,

in many cases they tried to legitimize their worries and doubts by opposing their situation to others. The comparison to fellow athletes and coaches, who potentially face more severe restrictions and consequences, could help to judge the actual situation as less dramatic and thus, to feel less disadvantaged. In case the depicted attitude reflects their genuine beliefs, these participants seemed to have found effective ways of coping already, which might display these athletes’ and coaches’ high level of expertise (cf. Nicholls et al., 2007).

Appeal for Acceptance

Participants also presented personal maxims that seemed to help them respond with poise to the unprecedented challenges imposed on them. As this athlete explained: “Anyway, I accept this decision and it can always be positive for one person and negative for another. For me, the most important is the realization that everything shall happen as it may (that is my personal way of handling the situation) and to try and make the best of the situation” (id4). Another participant declared living the situation by the principle of “One has to accept the situation as it is” (id38). The last two quotes suggest that participants employed these philosophies or mottos with a motivational and emotional purpose. As such, they can be interpreted as an attempt to adopt a mindful attitude of non-judgmental awareness to what really is instead of ruminating about what was and what could be. Several mindfulness approaches specifically targeted at high-performance athletes and coaches demonstrate that such a poised attitude based on the (trained) ability to make room for uncomfortable internal and external experiences (e.g., thoughts, feelings, or a sudden pandemic ruining all plans for the next future), while still engaging in personally valued activities, could allow athletes and coaches to navigate the broader challenges of a high-performance environment in a mentally and physically healthy way (Baltzell and Summers, 2017; Kaufman et al., 2018). Such a feeling of acceptance also represents an essential requirement for meaning-focused coping to enable personal growth in personally demanding or rather overburdened situations (Folkman and Moskowitz, 2004; Guo et al., 2013).

Yet, in some statements, a very strong appeal for acceptance and an almost forced optimism in handling the situation positively, became apparent. In particular, one coach wrote: “The postponement is necessary and because of that you have to accept it” (id41). Another coach stated: “In no way can this allow the motivation to drop. . . You always have to see the positive things, I think” (id16). Consciousness about an athlete’s societal duties and thus assuming this responsibility by acting as a good example in taking an optimistic stance and behaving accordingly, was another feature that became apparent in this athlete’s text: “I am firmly convinced that we (as) athletes have a duty toward society – namely as role models to approach the future positively” (id22). These statements suggest that athletes and coaches made conscious efforts to accept the postponement, evoking the image of an inner dialog, in which a statement is continuously repeated like an incantation in order to convince oneself at the end by sheer force of repetition.

However, the interpretative nature of the conducted content analysis in this study makes it possible for the derived features to be viewed in differing ways. Hence, the fact that participants when being invited to express their subjective views and describe their very personal experiences, responded by presenting ethical arguments and life mottos, could also be regarded as serving different functions. First, it could be an attempt to portray oneself in a socially desired way, and by expressing sympathy for the necessary restrictions and ramifications of the COVID-19 pandemic for the entire world, participants took a moral stance as general members of society. Second, being bound by commitments toward various institutions, stakeholders and sponsors in the world of sport, participants felt obliged to act as athletic role models for society, implying self-presentation in favorable ways, and the display of outstanding character strengths in the face of adversity. Adding to this interpretation, participants mentioned Olympic values such as fairness in order to demonstrate how they were worthy members of the Olympic family, well aware of non-debatable principles. Third, study participants did not trust the anonymous setting that was explained extensively to them in the lead-up to the open-format questions. As mentioned earlier, high-performance sport in Austria is a small universe in which protagonists know each other personally in most cases. It is therefore possible that participants wanted to ensure that their answers contained moral arguments in case their identities would be revealed. It can also be hypothesized that the disbelief in anonymity is based on a general ignorance of (or even mistrust in) scientific standards. In this sense, the setting would have been perceived not much different to that of a media interview in which self-presentation is of utmost importance.

Planning Behavior

Another possibility to cope with the situation seemed to be achieved through planning behavior. Several athletes and coaches discussed scenarios of how to benefit from the postponement of the Olympic Games. It seemed that generating options for a more beneficial progress of athletic performance was a common strategy to handle the postponement of the Olympic Games. For example, one athlete stated: “Above all, the focus is on a long build-up training cycle, which hopefully prepares us well for the upcoming competition season” (id4) or rather “concerning training I am already in a basic preparation phase again. Besides endurance and torso training I try to evaluate my technique and bring it to perfection point by point” (id22). Also, from the coaches’ perspective, planning behavior as a strategy to cope with the situation was applied: “From this time on, we had already worked on different scenarios to enable corresponding adaptations in athletes training” (id41). By making detailed plans, coming up with concrete training programs to follow and performance goals to strive for, athletes and coaches were able to take ownership of their (athletic) life again, thereby regaining more control over their daily structure. The prospect of a more predictable future might help participants live the time of the Olympic standstill in an adaptive way. Thus, planning behavior could be interpreted as a problem-focused coping strategy, as it consists of taking actions to change the person-environment relationship (Lazarus, 1999).

Collectively, the data demonstrated that study participants employed different psychological strategies to deal with the situational demands they were facing as a consequence of the Olympic postponement. Despite a longstanding tradition of coping research, there is lack of agreement regarding adaptive forms of coping in sport until this day (for a systematic review see Nicholls and Polman, 2007; Polman, 2011). According to Nicholls (2010b), coping effectiveness is the “degree in which a coping strategy or combination of strategies is or are successful in alleviating stress” (p. 264). Following this understanding, only few studies have looked into the issue of coping effectiveness of strategies used by elite athletes and coaches in high-performance sport, producing inconsistent evidence in addition (Polman, 2011). The findings of this study underline the importance for future research to delve into this area of interest in order to advance a more thorough understanding of effective coping in elite sport. In particular, sport psychologists and mental consultants need to gain scientifically derived knowledge to be able to design and implement advisable coping strategies for their clients (Folkman and Moskowitz, 2004), especially in challenging times like the current pandemic.

Limitations

The dimension of extra time was not conceptualized as a theme on its own in this study. Nevertheless, throughout the analyses the impression was gained that the issue of time itself translated into having to wait for another year, represented a major challenge. An athlete wrote about a lengthy Olympic preparation phase of over 10 years, and his/her statement evolved from a seemingly objective description of the current situation to an increasingly reflexive monolog. This transition is only discernable when analyzing this participant’s statement as a whole. It can be addressed as limitation of this study that data analysis was done by sequence through the examination of meaning units, so that the evolvement of participants’ statements could not be detected. In order to allow for more in-depth analysis and with the goal to glean an even deeper understanding of the psychological experience, the authors suggest choosing entire accounts as unit of analysis for future studies. Another important limitation was the fact that original quotes had to be translated from German to English by the authors. Since the study was of interpretative nature, changing text data might interfere with the derivation of meaning. Yet another limitation, which can be considered an ethical dilemma, is related to the disbelief of study participants in the anonymity of the setting. If this is due to the presumed interconnectedness within Austrian high-performance sport or based on lacking knowledge regarding scientific principles, can only be hypothesized.

CONCLUSION

This qualitative study was aimed at exploring participants’ subjective perceptions in order to glean insights into how Olympic athletes and coaches experience the postponement of the Olympic Games in Tokyo 2020. The findings derived from an exclusive sample of aspiring Olympic athletes and coaches

from Austria, and data collection was conducted at the beginning of the COVID-19 lockdown, when predictions for its duration were vague. The scope of transferability of the reported findings might therefore be limited. However, qualitative research in general is aimed at obtaining rich and contextually sensitive data, thereby producing local knowledge (Marecek, 2003), so that the contextual embeddedness is not a limitation but the main characteristic of this study.

The use of short written statements in a web-based format as a data collection strategy can be considered as a contribution to qualitative research methods within sport and exercise psychology. When planning the research design, the authors expected participants to be inundated by the constant influx of digital information, and thus be unwilling to spend additional time online to support the study's scientific interest. It seemed, however, that study participants used the opportunity to process their emotions and thoughts through verbalizing their experiences. Effects of expressive writing on well-being have been studied since Pennebaker's and Beall's seminal study (Pennebaker and Beall, 1986) in psychological research. In this line, putting personal experiences in words in a web-based format allows participants to perpetuate, test, delete, reorganize and reformulate and thereby process their experiences directly (Schiek, 2014).

The variety of topics that were identified in the data analyses was an important result and supports the authors' constructivist beliefs that each participant is unique in his/her engagement with the Olympic postponement and its implications. The findings are also in line with the assumptions made from a holistic development perspective (Wylleman, 2019), namely the idea that athletes face changes on multiple levels, such as in their athletic but also academic-vocational development due to the postponement. While some topics (e.g., concerns about general health and fairness) were consistent with arguments found in media interviews and social media comments of athletes and coaches, others came as a surprise and showed how the situation was experienced like an emotional rollercoaster by some participants. As such, the finding that athletes even considered a premature retirement to escape the overwhelming physical and mental requirements associated with the undue year of preparation was quite significant. The feeling of exceeding demands in the pressurized high-performance environment of Olympic sports was clearly discernable in the data.

On the other hand, the finding that many athletes and coaches alike viewed the postponement as a chance for pursuing complementary interests beyond sport, improvement and recovery was a promising result, demonstrating their ability to cope with adversity. It also hints at the fact that the involuntary pause yields holistic opportunities for growth (Schinke et al., 2020b). As a consequence, in providing mental services to athletes and coaches during the ongoing pandemic, mental performance consultants should take a reflexive stance and go about this task in a mindful (i.e., non-judgmental and curious) way in order to appreciate each individual's perspective and idiosyncrasy in this historical time. For example, the finding that some athletes benefited from the pause by taking care of physical issues (such as long-term injuries) and mental aspects (such as emotional exhaustion) could inform the direct work

of high-performance coaches as well as sport psychologists by educating them about the fact that not every athlete needs new goals to strive for or severe training regimes to follow in this unprecedented situation. On the contrary, drawing on the authors' direct experience in working with Olympic aspirant coaches and athletes in recent months, some athletes might seize the opportunity to breathe and enjoy living in a pressure-free space in the lead-up to the Olympic Games. Assisting athletes in self-reflecting and thereby allowing them to accept their very personal interpretation of the current situation can be an important task for mental consultants as well as coaches, which can be derived through this study.

The interpretative focus of the data analyses holds that there may be more than one valid and useful set of findings from a given data set (Levitt et al., 2018). Hence, the first author emphasizes the understanding that the mentioning of rational arguments to support the postponement along with motivational mottos is due to the constraints, which the roles of Olympic athletes and coaches entail. As discussed earlier, their answers reflect how they expect people would want to see them (i.e., their perceived public image), are employed quasi strategically, and can be interpreted as side-effects of being socialized in a high-performance environment. This understanding of findings is done from the position of being a retired Olympic elite athlete who experienced the aforementioned constraints and expectations herself over the course of nearly two decades. By acknowledging this personal perspective, the first author assumes a reflexive stance and exemplifies that the production of theory-free knowledge is impossible.

This article intends to inform the development of evidence-based interventions that can be utilized to alleviate associated negative effects and promote Olympic aspirants' well-being during insecure times like the ongoing COVID-19 pandemic. One possible implication for future practice of mental performance consultants is to employ strategies that foster openness in terms of the broad array of feelings and thoughts that Olympic aspirants are experiencing and support them in developing an agile mindset (Schinke et al., 2020a). Adopting an attitude characterized by psychological flexibility allows for such a mindset and could be best suited to help these top performers cope with the looming cancellation of the Tokyo 2020 Games and potential negative consequences thereof. Mindfulness approaches for performance sport contexts aim at promoting psychological flexibility (e.g., Gardner and Moore, 2007) and could be one specific method to assist athletes and coaches in these challenging times. For the near future, additional data on how other international groups of aspiring Olympic athletes and coaches experience the historical postponement and its implications is desirable. For example, through longitudinal monitoring of how this population continue to respond to the postponement and rescheduling of the 2020 Olympic Games, case studies of athletes and coaches who aim to compete at the rescheduled Games, and tracking athletes' progress through specific phases and/or over long-term periods until the conclusion of this major competition. Derived insights could ultimately facilitate the development of effective psychological approaches to support Olympic athletes and coaches in their personal endeavor in sport and life in general.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

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Both authors conceived and designed the study, collected the data, conducted the data analyses and contributed to writing the manuscript.

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The Impact of COVID-19-Related Shutdown Measures on the Training Habits and Perceptions of Athletes in the United States: A Brief Research Report

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The purpose of the current study was to examine the impact of COVID-19 government-enforced shutdown measures on the training habits and perceptions of athletes. A web-based electronic survey was developed and distributed online to athletes. The survey contained questions regarding currently available resources, changes in weekly training habits, and perceptions of training such as intensity, motivation, and enjoyment. A total of 105 (males: $n = 31$; females: $n = 74$) athletes completed the survey (mean $\pm$ SD age = 19.86 ± 2.13 years). Ninety-nine (94.3%) athletes continued to receive guidance from their primary sport coach or strength training staff. There was a significant ($p < 0.001$) decrease (mean $\pm$ SD) in self-reported participation time for strength training (-1.65 ± 4.32 h. week⁻¹), endurance (-1.47 ± 3.93 h. week⁻¹), and mobility (-1.09 ± 2.24 h. week⁻¹), with the largest reduction coming from participation time in sport-specific activities (-6.44 ± 6.28 h. week⁻¹) pre- to post-shutdown. When asked to rate their current state of emotional well-being using a visual analog scale of 0–100, with 100 being exceptional, the mean score was 51.6 ± 19.6 AU. Athletes experienced notable reductions in training frequency and time spent completing various training related activities. In the future, practitioners should have preparations in place in the event of another lockdown period or future pandemic to avoid or minimize significant disruptions in training. Special considerations may be needed when athletes are allowed to return to sport in the event of significant levels of detraining that may have occurred.

Keywords: coronavirus, strength and conditioning, sports, deconditioning, deconditioned

INTRODUCTION

In 2020, the sports world was halted by a global pandemic that resulted in a stoppage of most athletic competitions. The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) responsible for the respiratory condition known more commonly as COVID-19 can result in pneumonia-like symptoms and may elicit an inflammatory cascade impacting the bronchioles, alveoli,

cardiovascular system, and myocardial tissue (Buscarini et al., 2020; Cipollaro et al., 2020; Ding et al., 2020; Lovato and De Filippis, 2020). In March of 2020, the World Health Organization (WHO) classified COVID-19 as a global pandemic (World Health Organization, 2020). In an effort to prevent community transmission and to “flatten the curve” (in reference to reducing large spikes in positive cases and potential for high in-patient volumes), national- and state-level officials within the United States (US) implemented several restrictions and safeguards. These precautionary measures included social distancing, restrictions on public gatherings, and stay-at-home orders for several states within the US, which resulted in the closure of most non-essential businesses. Included in this closure were most athletic training facilities and community fitness centers which prevented athletes from accessing strength and conditioning equipment. As a result, athletes had to significantly modify their training habits and environment without adequate time to secure appropriate training equipment.

Until June of 2020, the majority of athletes across all levels of competition within the US were still not able to compete in organized sporting events or in-person training activities due to the continued health concerns of COVID-19 and incumbent precautionary measures. Over the summer of 2020, some professional sports organizations such as the National Basketball Association, Professional Golf Association, and eventually Major League Baseball were able to return to competition albeit using extreme precautionary measures such as complete isolation of athletes and staff members in a “bubble” environment or the sport naturally lent itself to easy isolation of athletes resulting in a seemingly safer sport environment with a higher chance of success. However, this was not a financially viable option for smaller leagues or those competing at the college and high school level. Therefore, smaller leagues continued to prohibit in-person sport-related activities through most of the summer of 2020 and some have even differed competition through the end of the year in some cases.

The COVID-19 pandemic response resulted in an unprecedented situation within the sporting community. Resultantly, athletes were forced to abruptly modify training habits without adequate time for coaches, strength, and conditioning professionals and athletes to develop a structured strategy moving forward. While previous commentaries (Sarto et al., 2020) and consensus statements have been recently published regarding concerns for athletes returning to sport after a disruption in regular training or recommendations for in-home training (Hammami et al., 2020; Jukic et al., 2020), there are currently a lack of data available that has examined the specific changes of athletes’ training habits. Therefore, the purpose of this brief research report was to examine the effect that COVID-19 government mandated shutdown measures had on the training habits and perceptions of athletes within the US.

METHODS

Design

This cross-sectional study design distributed an electronic survey to a mixed-sex cohort of athletes. The survey was designed

to examine how the COVID-19 pandemic during the spring of 2020 and the ensuing response from sporting organizations and government-mandated shutdown measures impacted the training habits, perceptions of effort, and motivation of athletes within the United States. The survey was distributed between April 2020 and June 2020.

Participants

A total of 136 athletes initially responded to the survey with 105 (males: $n = 31$; females: $n = 74$) of these individuals (mean $\pm$ SD age = 19.9 ± 2.1 years; weight = 76.1 ± 23.7 kg.; height = 170.6 ± 11.6 cm) completing the survey. Of those who completed the survey, 92 (87.6%), 10 (9.5%), and 3 (2.9%) of the athletes competed at the collegiate, high school, or “other” level of sport, respectively. Athletes from the following sports were represented: football ($n = 21$), baseball/softball ($n = 22$), soccer ($n = 10$), track/cross country ($n = 17$), volleyball ($n = 2$), basketball ($n = 8$), lacrosse ($n = 5$), gymnastics ($n = 16$), golf ($n = 3$), and rugby ($n = 1$). Participants were informed of the study purpose, details of their participation, and target outcomes prior to providing electronic consent at the start of the survey before being allowed to continue. This survey was approved by the Institutional Review Board of the University of Wisconsin—La Crosse (IRB# 20-AJ-388 5/22/2020) in compliance with the Human Subjects Guidelines for Research.

Data Collection Procedure

An electronic survey (Qualtrics, Provo, UT, USA) was distributed via email and social media, targeting practitioners, athletic trainers, strength staff, and coaches to further distribute the survey to their athletes. The survey consisted of 36 questions that were designed to assess basic demographic information ($n = 10$), the current training-related resources and programming available ($n = 8$), changes in training habits ($n = 12$), and how their perceptions of effort, enjoyment from training, motivation to train, and perception of overall mental health changed, as a result of the COVID-19-related shutdown measures ($n = 6$). An anonymous link to the survey was publically posted on social media for sharing and redistribution. Additional participants were sent emails with an accompanying link from their athletics staff or coaches on behalf of select institutions within the United States who were asked to participate in the study through word of mouth.

Statistical Analysis

The data were analyzed using descriptive statistics to summarize participant demographics and current resource changes in training habits and perceptions. Paired sample *t* tests were used to assess changes in training habits. All data are presented as means $\pm$ standard deviation with 95% confidence intervals. Statistical significance was determined at $p < 0.05$. All data were analyzed using SPSS V.25 (IBM Corporation, Armonk, NY, USA).

TABLE 1 | A summary of equipment available to athletes at home.

Available equipment	<i>n</i> = 105	%
Resistance bands	65	61.9
Kettlebells	22	21.0
Dumbbells	61	58.1
Barbells and plates	32	30.5
Stationary machines	23	21.9
Other	16	15.2

RESULTS

Athlete Background and Resources

Seventy (66.7%) athletes reported being actively participating in a winter or spring sport that was canceled due to the COVID-19 shutdown measures. Eighty-eight (83.8%) athletes reported that they were completing current training activities alone. Ninety-nine (94.3%) athletes continued to receive guidance from their primary sport coach or strength training staff. A summary of the equipment available to the survey respondents at the time of survey completion is presented in **Table 1**.

Training Habits

A summary of self-reported training goals during COVID-19 related shutdown period are presented in **Table 2**. Notable reductions in overall training frequency were reported during the COVID-19-related shutdown period. Pre-COVID-19, 83 (79%) athletes reported training 5–6 days per week compared to only 48 (45.7%) during the COVID-19-related shutdown period. A complete summary of changes in training frequency are presented in **Table 3**. There was a significant ($p < 0.001$) decrease (mean $\pm$ SD) in self-reported participation time for strength training (-1.65 ± 4.32 h $\cdot$ wk $^{-1}$), endurance (-1.47 ± 3.93 h $\cdot$ wk $^{-1}$), and mobility (-1.09 ± 2.24 h $\cdot$ wk $^{-1}$), with the largest reduction coming from participation time in sport-specific activities (-6.44 ± 6.28 h $\cdot$ wk $^{-1}$) pre- to post-shutdown. Changes in time spent completing specific styles of training are presented in **Table 4**. Female athletes self-reported a greater decrease in time spent doing sport-specific (females: -8.16 ± 5.12 ; males: -2.79 ± 6.41 h; $p < 0.001$) and mobility training (females: -1.52 ± 2.21 ; males: -0.30 ± 1.66 h; $p < 0.01$) compared to males.

Perceptions of Training and Mental Well-Being

Seventy-one (67.6%) athletes reported a decrease in the level of motivation to train compared to pre-COVID-19 times, while 18 (17.1%) reported the same level of motivation to train. Sixty-nine (65.7%) athletes reported lower training satisfaction scores while only 14 (13.3%) reported the same levels of training satisfaction, compared to pre-COVID-19 times. When asked to rate their current state of emotional well-being using a visual analog scale of 0–100, the mean score was 51.59 ± 19.59 AU.

TABLE 2 | Frequency of self-reported training goal during COVID-19 related shutdown period.

Self-reported training goal	<i>n</i> = 105	%
Strength	21	20
Muscular endurance	8	7.6
Muscle growth	8	7.6
Increase weight	2	1.9
Lose weight	12	11.4
Maintain weight	4	3.8
Training for competition/sport	38	36.2
General health	5	4.8
Stress management	3	2.9
Enjoyment/leisure activity	4	3.8

TABLE 3 | Changes in training frequency.

Training frequency	Pre-COVID-19	Currently
	<i>n</i> (%)	<i>n</i> (%)
1 day per week	0 (0)	11 (10.5%)
2 days per week	2 (1.9%)	12 (11.4%)
3 days per week	4 (3.8%)	13 (12.4%)
4 days per week	10 (9.5%)	17 (16.2%)
5 days per week	46 (43.8%)	25 (23.8%)
6 days per week	37 (35.2%)	23 (21.9%)
7 days per week	6 (5.7%)	4 (3.8%)

TABLE 4 | Changes in time spent on specific styles of training.

Training time per week (hrs.)	Pre-COVID-19	Currently	Delta	95% CI	<i>p</i> -value
Strength training	6.88 $\pm$ 4.37	5.22 $\pm$ 3.73	1.65 $\pm$ 4.32	0.81, 2.49	<0.001
Conditioning activities	6.45 $\pm$ 4.16	4.98 $\pm$ 3.19	1.47 $\pm$ 3.93	0.71, 2.24	<0.001
Mobility / flexibility	3.80 $\pm$ 2.53	2.70 $\pm$ 2.15	1.09 $\pm$ 2.24	0.66, 1.53	<0.001
Sport-specific activities	10.51 $\pm$ 5.59	4.07 $\pm$ 3.59	6.44 $\pm$ 6.28	5.19, 7.69	<0.001

DISCUSSION

In 2020, the world was faced with a global pandemic that resulted in an unprecedented disruption in sport. The resulting impact on the specific training habits and perceptions of athletes has yet to be elucidated. The primary purpose of the current study was to investigate the effects of the US government-mandated COVID-19 shutdown measures on the training habits and perceptions of athletes. The principle findings of the current study were that athletes self-reported significant changes to their training frequency, time spent doing training activities, motivation to train, enjoyment from training, training effort, and dietary habits compared to pre-COVID-19 activities. Specifically, the survey

results indicated that those training 5–6 days per week dropped from 79% of respondents prior to COVID-19 to 46% at the time of survey completion. However, none of the athletes reported a complete cessation from training during the pandemic. There were significant decreases in the amount of self-reported weekly training time dedicated to strength, conditioning, and mobility activities (**Table 4**). The largest such change in training habits occurred in relation to the time spent completing sport-specific activities, in which there was a decrease of ~6.4 weekly training hours from pre- to post-shutdown, which was likely attributed to the cessation of in-person organized team practices as part of the COVID-19 shutdown measures.

The most frequently reported training goal during the COVID-19 shutdown period was “training for competition and sport” at 36.2% and “training for strength” at 20%. Training for weight loss (11.4%), weight gain (1.9%), stress management (2.9%), and general health (4.8%) were less common. Additionally, the majority of the athletes self-reported making a change to their dietary habits as an adjustment to their altered training. The majority of the athletes surveyed (94.3%) reported receiving continued guidance from their respective strength and conditioning professionals or sport coaches, which is noteworthy as 83.8% of athletes reported completing training activities alone. These findings demonstrate the importance of continued communication between athletes and strength and conditioning professionals in the event of in-person activities not being permitted. As a result of the COVID-19 shutdown measures, many of the athletes had to complete training on their own, likely in unique environments with varying resources. Nearly half of the athletes in the current study reported having access to resistance bands and dumbbell weights, whereas very few had access to barbells or kettlebells. Therefore, without any degree of consistency across players, strength staff were likely faced with numerous challenges when trying to implement appropriate training programs with any degree of cohesiveness or structured periodization scheme. This lack of resources and preparation was likely exacerbated when little notice of such a drastic transition, as with the current situation with COVID-19, was provided, thus limiting athletes’ ability to make adequate preparations ahead of time and their ability to follow a structured training program to help facilitate the appropriate progression of regular adaptations to training.

Collectively, disruption in normal sport activities and prohibition of in-person activities may influence an athlete’s perception of and willingness to train. When athletes in the current survey were asked to rate their training motivation, 68% reported a decrease while only 17.1% reported the same level of motivation to train during the COVID-19 shutdown period compared to pre-COVID-19 times. Athletes also reported decreases in training satisfaction as 65.7% reported lower training satisfaction scores while only 13.3% reported the same levels of training satisfaction. Furthermore, the majority of survey participants who reported training at lower intensities compared to pre-COVID-19 shutdown measures took effect. Albeit subjective, this self-reported decrease in perceived training intensity could diminish an athlete’s state of physical readiness when a return to sport is possible. However, the downstream

and long-term effects of these disruptions in sport activities and training will not be fully elucidated for several years to come. It is likely safe to presume that a lack of in-person support and instruction from coaches, strength staff, and athletic trainers would have a detrimental impact on the quality and safety of training and sport-specific activities, certainly as it pertains to tactical strategies, team chemistry, and game flow. Further, the lack of interaction with team members is likely to negatively influence the mental health of athletes while perpetuating feelings of isolation, lack of motivation, and desire for in-person socialization. Athletes in the current study self-reported their overall state of mental well-being to be approximately at a score of 50, or “average” on a scale of 0–100.

Another major concern stemming from disruptions in proper physical training for sport is the increased risk of future injuries when athletes return to play. Myer et al. (2011) reported a 4-fold increase in Achilles tendon ruptures during the pre-season period in National Football League players following a player lockout when compared to the average number of ruptures during the preceding five seasons. The authors speculated that a lack of an adequate preparatory strength and conditioning period likely resulted in a detraining effect, thus predisposing athletes to the greater risk of soft-tissue injuries during explosive activities (Myer et al., 2011). Therefore, as athletes return to competition in the 2020–2021 season, there may be an increased incidence of sports-related injuries; however, future observational research is needed to support this hypothesis. While not necessarily a direct risk to athlete health, extended periods of detraining are also likely to result in several physiological changes, including reductions in strength, power, speed, and endurance (Mujika and Padilla, 2000a,b; Ingle et al., 2006; Izquierdo et al., 2007; Ormsbee and Arciero, 2012; Melchiorri et al., 2014), which may have a subsequent impact on sport performance and may also play a role in the aforementioned increased risk of injury. For example, Ormsbee and Arciero (2012) reported significant increases in body fat percentage and body weight with a concomitant decrease in aerobic capacity after only 5 weeks of detraining following a competitive season. Recently, Muriel et al. (2020) were the first to quantify objective measures of training load during the COVID-19 lockdown period in elite cyclists. The authors noted 34% reductions in total training volume and reductions in weekly volumes across intensity zones ranging from 25 to 52% (effect size: 0.83–1.57) during the lockdown period, which contributed to reductions in maximal effort cycling performance (Muriel et al., 2020). Similarly, Zinner et al. (2020) observed reductions in overall weekly training time (–27.6%) and the average length of training sessions (–15.4%) during a COVID-19 lockdown period in highly trained German kayakers and canoeists. The authors also observed an increase in the number of strength-focused training sessions with no change in sport-specific activities, which is contradictory to the findings from the current study (Zinner et al., 2020). It is possible that athletes at the elite level may have had better access to strength equipment, thereby allowing for increased opportunities for strength workouts. While a brief period of rest or detraining at certain time points throughout an annual training cycle is common practice, the unprecedented cessation of certain sport activities and robust disruption of training experienced by most athletes in 2020 will likely lead

to notable decrements in training adaptations similar to those noted by Muriel et al. (2020). Further, the specific decreases in performance-related measures may be more pronounced in athletes lacking adequate home-based training equipment or those unable to complete sport-specific activities. There have been several sport-specific return-to-play guidelines (Elliott et al., 2020; Jukic et al., 2020; Mohr et al., 2020; Sarto et al., 2020) recently published that outline progressive and sport-specific methods to slowly re-condition athletes and prepare them for future competitions, which will be essential for coaching staff to be cognizant of. Additionally, there are also commentaries available regarding special considerations for athletes returning to sport post COVID-19 infection (Dores and Cardim, 2020; Elliott et al., 2020), which is another major concern of the current pandemic. Because of the novelty of this virus, there is a paucity of data available regarding the long-term physiological effects of infection, which has resulted in a high level of concern from sports medicine professionals regarding the decision to allow sporting activities to resume and when or how to clear athletes to a return-to-play post-infection.

LIMITATIONS

We note several limitations of this study. First, the survey period was cut short because of the loosening of government-mandated shutdown measures, which allowed some athletes to return to in-person training activities. Thus, a limited sample size was included in the final analysis. The majority of responses received for our survey came from NCAA Division III collegiate athletes during the onset of the COVID-19 pandemic, which increases the risk of selection bias and subsequent relevance and generalizability to athletes in different settings (i.e., NCAA Division I collegiate, and professional athletes). As such, the athletes in the current study likely have differing levels of access to training modalities and resources, including certified strength and conditioning professionals that may be more readily available at higher levels of competition or those with more financial resources. Another limitation is the use of self-reported measures of training time to quantify changes in training activities rather than objective measures of training load or volume. More controlled methods of training load monitoring could have helped discern specific modifications that were made to the training programs of each cohort of athletes. Further, pre-COVID-19 measures of performance would have allowed for more precise insight regarding how the current state of detraining would have impacted measures of strength, power, endurance, and sport-specific tasks. Lastly, the lack of open-ended survey questions reduce the ability for athletes to elaborate on how COVID-19 impacted their perceptions of training or what contextual factors may have also contributed to the observed changes in training.

CONCLUSIONS

Although likely rare, the field can learn from this unprecedented stoppage in sport and seek strategies to better prepare in

the event of future pandemics of this nature. Results of the current study indicate that athletes did not have a diverse array of resistance training equipment available to them at the time of the shutdown measures. Additionally, athletes reported notable reductions in training frequency and time spent on sport-specific training activities. An important caveat to the current situation is that athletes and coaches did not have adequate time to appropriately prepare training programs designed for in-home training, especially for an extended period of time, or to secure appropriate equipment for home-based training. As the current pandemic situation continues to evolve, or in the event of another global pandemic, athletes and strength staff can learn from this situation to have contingency plans in place if home-based training is needed again in the future. Moving forward, strength and conditioning professionals should prepare in-home training program options and look to integrate easy-to-implement training modalities (i.e., body weight, bands, kettlebells, plyometrics, etc.), to elicit the desired training stress required to optimize or at least maintain training adaptations in the event of another shutdown period. Additionally, athletic departments may consider investing in mobile training equipment kits that could be checked out to athletes in the event of extended periods of lockdown. The ability to maintain training adaptations and conditioning levels during a pandemic or lockdown would likely contribute to increased injury resilience and a safe return to sport following an extended period of decreased physical activity.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board for the Protection of Human Subjects at the University of Wisconsin-La Crosse. The study was conducted according to the Declaration of Helsinki guidelines. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AJ, JL, CC, and AA: conceptualization. AJ, JL, JE, and AA: methodology. AJ, AA, and CC: formal analysis. AJ, JL, AF, GW, and AA: writing—original draft preparation. AJ, JL, AF, GW, JE, AA, and CC: writing—review and editing. All authors have read and agreed to the published version of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The Coronavirus Pandemic as a Game-Changer: When NBA Players Forced America to Think. Again.

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Keywords: NBA, #BlackLivesMatter, LeBron James, activism, COVID - 19

Alone we can do so little; together we can do so much.

Helen Keller

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On August 26, 2020, some of the best-known athletes in the world decided to act. Players from the National Basketball Association's Milwaukee Bucks did not arrive for their playoff game against the Orlando Magic and the league was forced to cancel the match. The Bucks refused to play the fifth game of the series in protest against the firing of an unarmed black man, Jacob Blake, in Kenosha, Wisconsin, only few miles from where they usually play. Many teams in other American leagues followed the Bucks and Magic. Players from all NBA teams held emergency meetings, during which players requested to end the season immediately.

Another major turning point related to the NBA occurred 5 months earlier, on March 18, 2020. Rudy Gobert from the Utah Jazz was the first player in the league to test positive for COVID-19 and the governors of the states decided it was time to bring many daily activities to a halt. The event that made Americans realize that COVID-19 was not going to disappear within a week or two was not President Donald Trump's announcement of a partial closure of the skies for flights from Europe that day, but rather a decision by NBA Commissioner Adam Silver to stop the NBA season. Some countries returned to their routines faster than others (and their economies paid a price for it), but 2020 will probably be remembered as a year in which the pandemic was a real turning point.

Silver came up with a plan for how the season could still be saved during the summer, but a lot has happened in the intervening months. The killing of African-American man George Floyd by a white policeman, the Black Lives Matter protests, and Florida becoming a COVID hotspot, were not in the commissioner's plans when he announced that Orlando would host all league teams in a bubble that would allow the season to end at the end of July; therefore, the NBA was back playing in sub-optimal conditions.

The NBA administration worked not only to keep players healthy inside the bubble, but allowed players to express themselves to an unprecedented degree. The players recognized the attention that was on them and saw the tournament as an opportunity to convey messages that would run much deeper than just basketball. The impact of the struggle for black rights in America following Floyd's death has been largely due to the league's current and past stars. When LeBron James, Steph Curry, and Giannis Antetokounmpo joined the protest and sometimes even marched alongside the protesters, the world listened. Stephen Jackson, a close friend of Floyd who had played basketball at Golden State and Indiana, has become one of the symbols of the struggle.

Sport-based activism refers to specific actions taken by athletes to alter and mitigate the hegemonic nature of structural arrangements, rules/policies/bylaws, and practices through sport organizations that serve to reinforce subordination, marginalization, and exploitation of certain groups (Cooper et al., 2019, p. 22). For many years, American athletes have spoken out about social

and political issues; examples include Muhammad Ali, Jackie Robinson, Bill Russel, Tommie Smith (with John Carlos), Mahmoud Abdul-Rauf, Craig Hodges, Billie-Jean King, and, more recently, Colin Kaepernick. Most of these athletes paid a price, in terms of financial penalties caused by speaking out on polarizing topics, that current athletes, especially minorities, are less likely to pay (Coombs and Cassilo, 2017).

As many sport scholars, including myself, have claimed, sport does not operate in isolation from broader society. Instead, sport serves as a site where societal inequalities such as racism, sexism, economic stratification, and other forms of oppression are reproduced, exacerbated, and/or ignored (Cooper et al., 2019; Galily, 2019).

However, sport, like other cultural domains, is torn between spirit and matter. On one hand, sport is primarily about values—the personal stories of the competitors, striving for excellence, commitment to the team, and adherence to a goal. On the other hand, the laws of business stipulate that the show must go on for the hundreds of millions of viewers around the world. The NBA has a turnover of over USD\$10 billion a season, and such a business has little room for mistakes or changes.

While the American basketball realm includes many stakeholders—the owners, the advertising and sales people, the field workers, and the media—the league ultimately belongs to the players. Fans look up to them and their special status gives them tremendous power to influence and change reality.

On October 4, 2019, at the height of protests in Hong Kong against the allegedly repressive Chinese regime, Daryl Murray, the general manager of the Houston Rockets, tweeted an expression of support for the protesters: “Fight for freedom. Stand with Hong Kong.” The tweet caused a stir among Chinese spectators, who make up about 10–15 percent of all NBA fans, and many called for a boycott of league games. Chinese broadcasters announced they would stop broadcasting the games. The league, fearing huge losses worth billions of dollars due to the loss of Chinese crowds, was quick to rectify the situation. Murray deleted the tweet and apologized, and even superstar player LeBron James was recruited to express a position that he does not support Murray’s position and that he does not oppose Chinese regime action. This point event demonstrated that the red line passes where revenue begins to hit.

However, it appears that when it comes to America—and, this time, when it comes to the African-American community in the US—the players have chosen not to remain silent and to stand *together*. Regardless of the economic consequences, NBA players decided to boycott the playoffs as a protest against US police violence. Players listen to their audience and public mood, and have used their status as cultural heroes and influence on social media to advance the values and goals of the #BlackLivesMatter protest. The latest incident has changed the future rules of the game between the players, who are trapped in fat but binding contracts, and the giant corporations of the teams in the league when it comes to the right to protest. As I have argued elsewhere (Galily, 2019), by mastering social media in general and Twitter in particular, NBA players today are reaching far more people

who, under other circumstances, would not pay attention to the political issues that athletes are discussing (Xu and Zhou, 2020).

A (REAL) GAME CHANGER

On March 2012 before a game against Detroit, LeBron James recruited Miami players to protest by wearing hooded sweatshirts after the shooting of Trevion Martin. This started a new wave of action among the athletes who held the power and money the system depends on. The years that followed were marked by incidents such as the strangulation of George Floyd by police in New York, which led to athletes wearing “I Can’t Breathe” shirts; or five St. Louis Rams’ players entering game with their hands raised as a tribute to the “Hands Up, Don’t Shoot” protest after Michael Brown was shot by police in Ferguson, Missouri; and certainly Colin Kaepernick, who knelt during the national anthem before a game in 2016, which became a picture of protest and a central and divisive discourse in America. After decades of coming to terms with the current situation, the previous decade was accompanied by dozens of athletes taking an active part in protests against what they felt was built-in discrimination in America, and especially police violence (Mudrick et al., 2019).

Regardless of whether the more recent incidents are a continuation of the same wave or a new wave, the system is changing. Everyday life has been turned upside to an almost unprecedented degree during COVID-19, so the current protests that also unite other pressure groups besides the African-American population have led to a change in public opinion, even among the wealthy and decision-makers. The same NFL that condemned Kaepernick moved to support protesting athletes. The US Olympic Committee that dumped Smith and Carlos after the 1968 Mexico City Olympics’ power salute went on to support the right of athletes to protest. The US Soccer Association that banned Megan Rapinoe for kneeling during the national anthem (one of the first white athletes to actively join Kaepernick’s protests) also eventually moved to support the protests. Alongside established sportspeople, there have also been new voices of athletes, such as the abovementioned Stephen Jackson, 16-year-old Coco Gauff who speaks in exceptional adulthood, or Bubba Wallace, the only African-American NASCAR driver. Wallace himself did not define himself as a social activist until the last wave of protests, when he began to learn more and worked for protests in NASCAR races and the removal of Confederate flags from races in one of the industries that is most closely identified with Southern, white, Republican audiences.

The protests had an international impact. In the United Kingdom, for example, Arsenal and Manchester City players knelt before an English Premier League game, Marcus Rashford took aim at child poverty with a new taskforce, and even the International Olympic Committee allowed the Athletes Committee to recommend how to deal with protests consistent with the Olympic spirit. Whether because of the pandemic or because of the protests, a new social order is being formed.

At the same time, however, it might worth mentioning, as basketball star Kareem Abdul-Jabbar did, that “It’s

great that athletes are speaking out. But some of them are spouting nonsense.” He was referring to American Volleyballer Kerri Jennings, who posted on Instagram an extended rationalization for going shopping without a mask, which she called “a little exercise in being brave” and faced a lot of criticism. Another example is tennis star Novak Djokovic, who not only organized a tournament at the peak of the pandemic and contracted COVID-19, alongside his wife and many who participate without masks or social distancing, but subsequently stated that he would have done it again since he did not break any law. Abdul Jabbar commented:

“... Being responsible role models during a worldwide pandemic that has killed nearly a million people isn’t about laws; it’s about concern and respect for the lives of others, especially the others who can’t afford to miss work or don’t have access to good healthcare.” (Abdul-Jabbar, 2020).

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- As Sunkara (2020) correctly observed recently, NBA players might not be common laborers, but they have far more in common with the working-class communities that supported so many of them in youthful than with the moguls they now work for. The COVID-19 pandemic era has been an opportunity to make a difference, and just like all workers along history, they have to consolidate collectively. As journalist Branko Marcetic put it: “Millions of people are seeing workers they admire, even idolize, effectively striking in solidarity with a bigger cause” (Marcetic, 2020). As sports can provide a guide for young people (and athletes) to learn concepts of teamwork, leadership, work ethic and integrity, we ought to add social justice.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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A Cross-Cultural Exploratory Study of Health Behaviors and Wellbeing During COVID-19

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This study explored the influence of the COVID-19 pandemic on perceived health behaviors; physical activity, sleep, and diet behaviors, alongside associations with wellbeing. Participants were 1,140 individuals residing in the United Kingdom ($n = 230$), South Korea ($n = 204$), Finland ($n = 171$), Philippines ($n = 132$), Latin America ($n = 124$), Spain ($n = 112$), North America ($n = 87$), and Italy ($n = 80$). They completed an online survey reporting possible changes in the targeted behaviors as well as perceived changes in their physical and mental health. Multivariate analyses of covariance (MANCOVA) on the final sample ($n = 1,131$) revealed significant mean differences regarding perceived physical and mental health "over the last week," as well as changes in health behaviors during the pandemic by levels of physical activity and country of residence. Follow up analyses indicated that individuals with highest decrease in physical activity reported significantly lower physical and mental health, while those with highest increase in physical activity reported significantly higher increase in sleep and lower weight gain. United Kingdom participants reported lowest levels of physical health and highest increase in weight while Latin American participants reported being most affected by emotional problems. Finnish participants reported significantly higher ratings for physical health. The physical activity by country interaction was significant for wellbeing. MANCOVA also revealed significant differences across physical activity levels and four established age categories. Participants in the oldest category reported being significantly least affected by personal and emotional problems; youngest participants reported significantly more sleep. The age by physical activity interaction was significant for eating. Discussed in light of Hobfoll (1998) conservation of resources theory, findings endorse the policy of advocating physical activity as a means of generating and maintaining resources combative of stress and protective of health.

Keywords: coronavirus, inactivity, food consumption, behavior change, resources

INTRODUCTION

Pandemics are identified as large-scale outbreaks of infectious diseases. They significantly increase morbidity and mortality over an extensive geographic area and contribute to substantial economic, social, and political disruption (Madhav et al., 2017). The World Health Organization (World Health Organization, 2020) declared COVID-19 a global pandemic the likes of which have not been experienced in modern times (Kickbusch et al., 2020). In order to minimize the spread of the virus, many countries introduced confinement/lockdown measures including “stay at home” orders, closure of schools, businesses and places of congregation, and travel restrictions. During this time, people were allowed to leave their homes only to purchase essential items (e.g., food, medicines), seek essential treatment, go to work (only for jobs considered essential), or to assist and care for dependents. Given the severity of the pandemic and scale and duration of containment measures, there has been a call to examine potential changes in health behaviors during the COVID-19 pandemic along with mental health outcomes. It is of importance to examine both, as health behaviors are strongly associated with mental health (Mammen and Faulkner, 2013; Parletta et al., 2016).

This study examined sleep, eating, and physical activity outcomes during the COVID-19 pandemic along with physical and mental wellbeing. Previous literature has shown the importance of each health behavior and evidenced how they may be affected by pandemics. Associations with health and wellbeing for each health behavior will be examined followed by emerging literature specific to the context of the COVID-19 pandemic. Starting with sleep; sleep loss, alterations to sleep-wake timings, and/or increased night awakenings are known to compromise immune function (Besedovsky et al., 2012) as well as cause disruptions to a range of metabolic hormones that affect energy homeostasis (Spiegel et al., 2004, 2005; Capers et al., 2015). Increased susceptibility to the common cold has been evidenced following reduced sleep efficiency (Cohen et al., 2009) and an increased long-term risk of developing chronic diseases (von Ruesten et al., 2012). Inadequate sleep has also been shown to affect other health behaviors, for example, leading to poor dietary habits and reduced motivation to exercise (Spiegel et al., 2004, 2005; Kline, 2014; Capers et al., 2015). Sleep loss and disturbance may also exacerbate existing mental health problems via effects on affective functioning; which is inclusive of mood, emotion, and emotion regulation (Watling et al., 2017). The effects of sleep loss and disruption on mood may trigger and maintain a negative spiral leading to ongoing sleep problems and psychopathology (Pilcher and Huffcutt, 1996; Short and Louca, 2015).

The containment measures of COVID-19 have the potential to influence sleep behaviors. There is the possibility of sleep disruptions due to emotional responses to the pandemic (e.g., stress, anxiety, and depression) while, on the other hand, the ‘stay at home’ mandate may provide increased flexibility in sleep-wake timings and sleep duration. Early findings regarding sleep during COVID-19 evidence both detriments and gains to sleep quantity and quality. Fitbit (2020) revealed that people globally appear to be going to bed later and achieving more sleep

than usual since the COVID-19 outbreak. However, a survey completed by 2,254 United Kingdom respondents revealed that 38% reported sleeping less or less well than prior to the country being placed on lockdown (Kings College London (KCL), 2020). Within the same survey, 49% of respondents reported feeling more anxious and depressed as a direct result of COVID-19. Gupta et al. (2020) examined changes in sleep pattern and sleep quality during COVID-19 using a questionnaire distributed via social media platforms. Compared to the pre-lockdown period, all occupational groups (except health professionals) evidenced a shift to a later bedtime, a reduction in night-time sleep, an increase in day-time napping, and a deterioration in sleep quality. Reductions in sleep duration were associated with depressive symptoms. Collectively, these findings offer support for the contention that sleep disruption may be associated with emotional responses to the pandemic.

With regards to eating, research has identified several reasons for modified eating behaviors including opportunity induced eating and coping with unpleasant emotions (Verhoeven et al., 2015). Emotional eating is defined as (over) eating in response to emotions including depression, irritability, stress, or anxiety (van Strien et al., 2013; Frayn et al., 2018; van Strien, 2018), with food consumption used to regulate emotions (Nicholls et al., 2015; Devonport et al., 2017). For example, snacking behavior may be elicited by emotions such as boredom or stress with snacking providing a distraction from anxiety or relief from boredom. Food may also be used to connect with others, form part of celebrations or be used as a reward or a treat (Locher et al., 2005). Emotional eating that leads to increased calorie consumption over time can lead to obesity and associated health concerns (Micanti et al., 2017; van Strien, 2018).

Since the outbreak of COVID-19, panic buying and stockpiling of household items in response to “stay at home” mandates have been well reported. On the one hand, this may support the preparation of more home cooked meals and consumption of fewer preservatives/additives. On the other hand, this may increase snacking behaviors driven by opportunity induced eating, increased screen/sedentary time and an increase in unpleasant emotions such as stress, anxiety, and boredom. Di Renzo et al. (2020) undertook an online survey between 24 April and 18 May, 2020 among Italian participants (when confinement measures were in place). They found that a high percentage of respondents experienced a depressed mood, anxious feelings, hypochondria and insomnia (61.3, 70.4, 46.2, and 52.2%, respectively). Almost half felt anxious due to their eating habits, consumed comfort food and were inclined to increase food intake to feel better. A systematic review and meta-analysis of literature examining the prevalence of stress, anxiety and depression among the general population during COVID-19 (Salari et al., 2020) found evidence of an increase in each unpleasant emotion during the pandemic. There has been a call for further investigation of eating behaviors during COVID-19 with larger population studies (Di Renzo et al., 2020). Following the notion that unpleasant emotion may result in eating behaviors, there is reason to contend that people may consume more food during the pandemic. Finally, the benefits of physical activity for physical and emotional health are well

established (Mammen and Faulkner, 2013; Pedersen and Saltin, 2015). For example, Mammen and Faulkner (2013) identified physical activity as an important protective factor in reducing the risk of developing depression. Physical activity strengthens the immune system (Hojman, 2017) and is effective in preventing and treating non-communicable conditions, such as heart disease and diabetes (Powell et al., 2018). Such conditions lead to poorer outcomes among those contracting COVID-19 (Chen et al., 2020; Ma and Holt, 2020). In addition to direct health benefits, physical activity is known to affect other key health behaviors. For example, a systematic review highlights the positive role of both acute and regular exercise on sleep quality (Kredlow et al., 2015). Sallis and Pratt (2020, p. 2) advocate that “due to its multiple benefits, physical activity should not be an afterthought during this pandemic. Being active should be a key recommendation.” Indeed, when first introducing containment measures, many governments, encouraged individuals to exercise with mandates around where and how often. Pertinent to the present study, this included Finland, Latin America, North America, and the United Kingdom. This promotion of exercise while concurrently emphasizing social distancing measures indicates that exercise was recognized and advocated as a means of maintaining physical and mental wellbeing during the pandemic (Matias et al., 2020).

Despite physical activity being encouraged in many countries, for many, social distancing measures, increased screen time, lost incidental physical activity (such as walking to and for work), and the closure of facilities including gyms, parks, and sports facilities may have led to reduced levels of physical activity (Chen et al., 2020). Particularly when combined with the increased possibility of sedentary behaviors (sitting, reclining, TV viewing, using mobile devices, or playing video games) resulting from prolonged homestay. For example, Di Sebastiano et al. (2020) used a national physical activity tracking app to determine device-measured physical activity levels among 2,338 Canadians to determine changes in physical activity four weeks pre-pandemic and six weeks post-pandemic declaration. Although moderate-to-vigorous physical activity returned to pre-pandemic levels, significant and sustained declines in incidental light physical activity and steps were observed indicating a sustained loss of incidental physical activity.

Wearable activity trackers provide a useful measure of population physical activity and correlate highly with actual steps in experimental conditions (Evenson et al., 2015), so these data could be used to provide an indicator of activity during the pandemic. Fitbit (2020) reported a decline in step count across every country examined during the week of 22 March, 2020 compared to the same week in 2019, with European countries showing the most dramatic decline ranging from 7% (Germany) to 38% (Spain). Garmin (2020b) documented a 12% decline in total worldwide steps during April 2020, with worldwide steps from workout activities increasing by 24%. Garmin (2020a) data also evidenced a transition to indoor activities such as indoor cycling and running when comparing the five weeks prior to and after March 9th (where national lockdowns started to take effect in Italy). In Spain and Italy, where countrywide lockdowns were most extreme during this period, outdoor running dropped significantly with respective

decreases of 68 and 42%. A switch to indoor running was evident, with country increases of 130, 84, and 18% for Italy, Spain, and France, respectively. Indoor cycling showed an increase of 157, 273, and 309% in France, Spain, and Italy respectively; steep increases in an activity that typically decreases during this time. When undertaking indoor cycling, many used platforms such as Zwift allowing them to connect with others worldwide and ride together. It must be borne in mind that those sufficiently motivated to invest in tracking equipment such as Fitbit and Garmin may form part of a habitually active community, and so physical activity data from a representative sample is required. When examining emerging effects of COVID-19 on mental wellbeing, stressors resulting from the pandemic include infection fears posed by COVID-19, social distancing requirements, boredom, frustration, inadequate supplies, inadequate information, media reporting negatively skewed number of people infected and resultant deaths, financial loss, job loss, and stigma (Brooks et al., 2020; Garfin et al., 2020; Hamel et al., 2020; Nelson et al., 2020; Van Lancker and Parolin, 2020). Wang et al. (2020) conducted a cross-sectional study with more than 1,000 Chinese adults, and found that emotional disturbance was evident during the pandemic. This included experiencing depression (13.8% mild depression symptoms, 12.2% moderate depression, and 4.3% severe depression), stress (24.1% reported suffering from mild stress while 8.1% reported moderate or severe stress levels) and anxiety (7.5% mild, 20.4% moderate, and 8.4% severe). Furthermore, requirements for social distancing have hindered access to a commonly used and effective coping strategy; social support. Support provided from others can help individuals cope with stress, regulate emotions, attain informational and practical assistance, and remain resilient during difficult times (Greenglass, 1993; Jetten et al., 2017; Williams et al., 2018). As such, it is expected that citizens from COVID-19-afflicted countries would experience similar deleterious effects on mental wellbeing (Wang et al., 2020).

Hobfoll's conservation of resources (COR; Hobfoll, 2011) theory posits that individual resources connect with quality of life and wellbeing. Resources and their growth associate with a higher quality of life, while their loss is associated with lower quality of life. However, “resource loss is disproportionately more salient than is resource gain” (Hobfoll, 1998, p. 62). Stress occurs in situations that exceed the capabilities of resources, threaten them, lead to their exhaustion, or when resources do not generate the intended effects (Hobfoll et al., 2018). In fact, research has shown that resource loss is associated with deleterious outcomes above and beyond the effects of the trauma itself (Hobfoll, 2011). Investing in resources to protect against resource loss, recover from losses, and gain resources is of importance (Hobfoll, 1998). Individuals who are able to generate, accumulate, and maintain resources are less likely to experience resource loss, and as such are more likely to experience a sense of success and gain, leading to life satisfaction (Zhou and Lin, 2016). Those with more resources are less vulnerable to reduced mental wellbeing, while those who lack resources are more likely to experience a loss spiral whereby a continuous loss cycle is entered (Hobfoll, 1998; Hobfoll and Shirom, 2001).

There is an increased risk of loss spirals in situations of chronic stress, such as that presented by COVID-19. Resources may include external resources such as social support, mobility, co-parenting, finance, as well as internal resources such as physical health, self-efficacy, emotional intelligence, or knowledge. In the context of the present study, the health behaviors of sleep, eating, and physical activity present an investment in resources supportive of physical and mental wellbeing. Studies released to date indicate that for many, the pandemic and associated containment measures have required radical lifestyle changes that disrupted usual daily activities (Jiménez-Pavón et al., 2020). We contend that for some, this has resulted in maladaptive changes in health behaviors including reduced or altered physical activity behaviors, increased food consumption, and disturbed sleep (Di Renzo et al., 2020; Di Sebastiano et al., 2020; Kings College London (KCL), 2020), and presented consequences for resource accumulation and maintenance, and thus mental health (Liu et al., 2020; Salari et al., 2020; Sun et al., 2020; Wang et al., 2020). Examining the health behaviors and wellbeing outcomes of individuals during the COVID-19 pandemic could help identify groups most vulnerable to loss spirals, and reduced health and wellbeing during similar eventualities. In particular, understanding short and long-term effects, along with the interactions of health behaviors with mental health could inform the deployment of resources in future eventualities with shared characteristics.

The social context has an important effect on pandemic response (Van Bavel et al., 2020), so variation in response between countries is of interest, and exploring this can inform future response planning and target interventions appropriately. With reference to the COR theory (Hobfoll, 2011), there is good justification to expect variation between countries, as those with prior experience of lockdown, through epidemics such as SARS, may have been able to call upon previously developed resources to engage effective and practiced coping strategies, and so experience better outcomes in terms of their wellbeing. Brooks et al. (2020) called for a need to better understand cultural differences in the psychological impact of quarantine. However, emerging research on response to the COVID-19 pandemic is tending toward single country samples, for example, Italy (Landi et al., 2020), China (Liu et al., 2020), Spain (Rodríguez-Rey et al., 2020b), and Netherlands (van Tilburg et al., 2020), which offers limited opportunity to explore the possible influence of cross-cultural variation. Thus, generalization and application of research findings internationally can only be done with caution.

The present study aimed to examine health behaviors and wellbeing nationally, with a view to exploring the emerging trends between a selection of countries with different confinement measures. Based on the literature reviewed, we focused on examining potential changes in physical activity as well as eating, sleep, health, and wellbeing. Drawing on Hobfoll (2011) conservation of resources theory, we expect that participants experiencing strict containment measures during the COVID-19 pandemic will experience a loss of resources, which will be associated with reduced physical and emotional health. Our first aim was to examine potential differences in individuals' perceived health behaviors during the COVID-19 pandemic (i.e., eating and

sleep) and wellbeing across countries and changes in physical activity. In line with the extensive body of work on the benefits of physical activity (Mammen and Faulkner, 2013; Pedersen and Saltin, 2015; Hojman, 2017; Powell et al., 2018), we expected exercise to be associated with less detrimental consequences of the pandemic on health behaviors. Due to the variability in the containment measures put into place to slow the spread of the virus in different countries or regions, significant differences in the study variables were expected, with individuals experiencing most strict restrictions perceiving most detrimental changes in health behaviors. Because COVID-19 is considered most deadly among older people (United Nations, 2020), our second aim was to examine differences in the targeted health behaviors by age groups. Due to the novelty of the virus, no specific hypotheses were drawn regarding age comparisons.

MATERIALS AND METHODS

A web-based survey was prepared using the Qualtrics platform, which allowed gathering information from an international sample of individuals during the COVID-19 pandemic period.

Participants

An initial sample of 1,458 participants took part in the study, from which 1,200 were valid completed surveys. Participants resided in United Kingdom and Ireland ($n = 230$), South Korea ($n = 204$), Finland ($n = 171$), Philippines ($n = 132$), Latin America ($n = 124$), Spain ($n = 112$), North America ($n = 87$), and Italy ($n = 80$). Selection of countries' targeted cultural diversity and their status in terms of response to the pandemic. Sixty participants (4.8%) indicated living in a different country at the time of the study. Due to different restrictions put into place in different countries, data from participants living in other countries than the ones targeted were excluded. Participants' age ranged from 18 to 76 years ($M = 33.91$, $SD = 12.88$). More than half of the participants² were female ($n = 745$; 65%), single ($n = 598$; 53%), and living with two or more household members ($n = 671$; 59%). Most participants reported living in a detached house or family house with a garden or yard space ($n = 425$; 37%), while 18% of participants reported living in apartments without a balcony, terrace or private garden.

Measures

The survey assessed participants' physical and mental health, as well as changes in sleep, eating, exercising, and wellbeing during the COVID-19 pandemic.

¹We aimed at recruiting participants from single Spanish-speaking countries in South America (e.g., Chile) and Central America (e.g., Costa Rica) as well as Mexico, through associations and institutional contacts (e.g., universities, colleges of psychologists). Due to low participation from single countries (e.g., Chile [$n = 48$], Mexico [$n = 29$], and Costa Rica [$n = 25$], were most represented), all participants were included within the same group, which we refer to as Latin America.

²Demographic characteristics of participants ($n = 1,140$) can be found in the **Supplementary Table S1**.

Demographic Information and Current Living Situation

Participants were asked to provide demographic information including their age, gender, country of residence, and relationship status. Their current living situation was assessed with questions relating to their perception of being in lockdown or not and living arrangements (i.e., type of property and household members they live with). Varied responses to the pandemic across and within countries, and the differential implications determined by factors such as occupation (keyworker status), age and region, presented a rationale for using an individual's *perception* of whether or not they were in lockdown at the point of completing the survey. This personal perception is important, as individuals with job roles deemed essential in running health and community services (e.g., front line health workers, postal services, refuse collection, and food outlets) continued working as normal, and so may have not self-defined as being in lockdown. Conversely, while Finland had no mandated lockdown, individuals may have chosen to self-isolate and so perceived themselves to be so. This personal perception, therefore, provided more precise information on individual experience than applying the countrywide status to that individual.

Physical and Mental Health

Two items from the SF-8 Health Survey (Ware et al., 2001) were used as indicators of physical and mental health. The items typically ask participants to rate their health in considering how they have felt during the previous month. Due to the rapidly changing conditions caused by the pandemic, the time frame was delimited to perceptions during the previous week. To measure participants' physical health, the following item "Overall, how would you rate your health during the past week?" was rated on a six-point scale (1 = *very poor*, 6 = *excellent*). As indicator of mental health, using the same timeframe of "during the past week," a second item asked participants to assess "How much did personal or emotional problems keep you from doing your usual work, school or other daily activities?", which used the following anchors: 1 (*not at all*), 2 (*very little*), 3 (*somewhat*), 4 (*quite a lot*), and 5 (*could not do daily activities*). Previous research has demonstrated that the SF-8 Health Survey is a feasible, reliable, and valid instrument, which is widely used with translations to over 30 languages (Yiengprugsawan et al., 2014).

Perceived Changes in Working Situation, Health Routines, and Wellbeing

Participants were asked to report changes in their working situation indicating whether their workload had increased, decreased, or remained the same, if they worked from home, were laid-off, or unemployed as a consequence of the COVID-19 pandemic. They also reported possible changes in their basic health routines (i.e., eating, sleeping, and exercising), weight, and wellbeing. These changes were assessed on an 11-point scale (−5 = *significant decrease*, 0 = *no change*, +5 = *significant increase*). Single item measures with high face validity, as in this case, have received strong support (Bowling, 2005; Tenenbaum et al., 2007) and are deemed appropriate in situations where reducing respondent burden and

administration simplification is required. Previous research has demonstrated the appropriateness of single item measures in the assessment of changes in physical activity (Portegijs et al., 2017; O'Halloran et al., 2020), restrictive eating (Haynos and Fruzzetti, 2015), and mental health (Ahmad et al., 2014).

Procedure

Separate web-based surveys were constructed using the Qualtrics platform, including all information and questions in the native languages of the targeted countries. On the first page of the survey, individuals were informed of the nature and purpose of the study and what their participation would entail. They were also informed of their right to withdraw from the study. Participants were asked for their informed consent to continue, which was granted electronically. This study received ethical approval from the University of Wolverhampton ethics committee (Unique code: 01/20/AF1/UOW). The research was launched and distributed using social media platforms, with colleagues located in targeted countries asked to disseminate the project. The survey links were distributed online via social networking sites such as Facebook, Twitter, and LinkedIn. As an example of reach, there were 27,532 twitter impressions for announcements of the United Kingdom survey from one co-author alone. One inclusion criterion applied; that the participant was required to be over 18 years of age. Completion of the web-based survey took approximately 10 min.

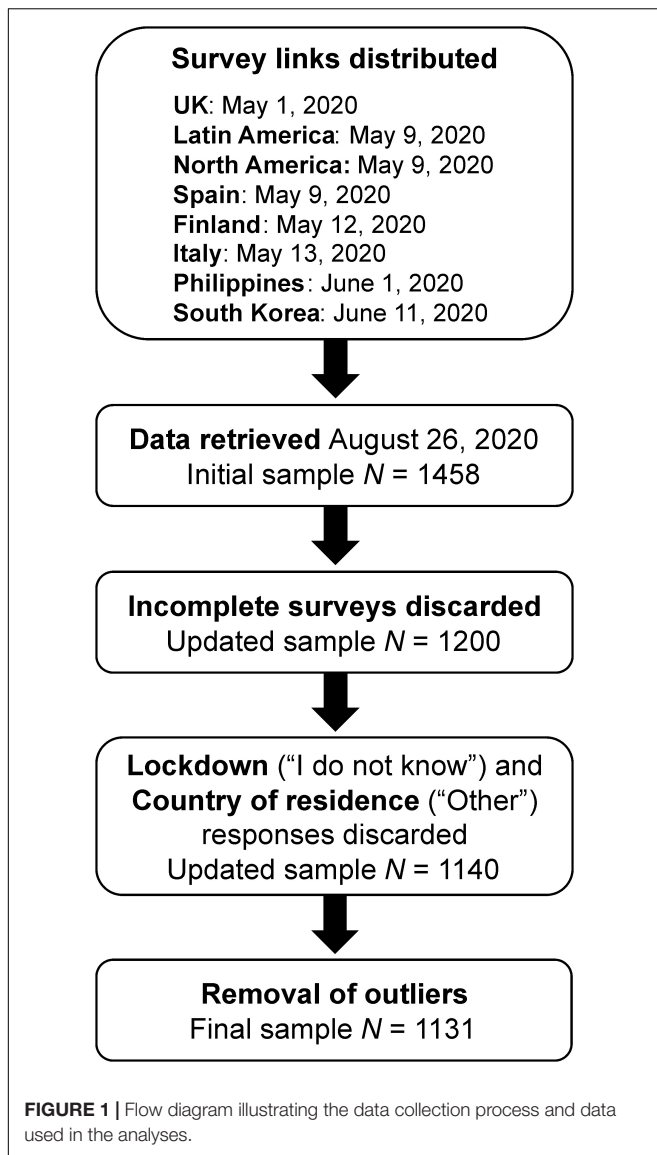
Data Analysis

Prior to the main analysis, data were screened for missing values, potential outliers, and violations of assumptions of normality, linearity, multicollinearity, and homoscedasticity (Tabachnick and Fidell, 2019). Descriptive statistics and Pearson product-moment correlation coefficients were computed for all studied variables (see **Supplementary Tables S2, S3**). Four groups were created based on quartile splits for different levels of physical activity during the COVID-19 pandemic and age groups. Two multivariate analyses of covariance (MANCOVAs) were conducted. The first one examined group differences considering change in Physical Activity by Country and the second considering Physical Activity by Age. Perceived physical and mental health, change in health routines (i.e., sleep and eating), weight, and wellbeing during the COVID-19 pandemic were the outcome variables. Perception of lockdown (yes vs no), working situation (employed vs unemployed or laid off), and household number (one/two/more than three) were entered as covariates. Bonferroni adjustment for multiple comparisons was used.

RESULTS

Descriptive Statistics

Data screening suggested the removal of nine cases identified as outliers (Mahalanobis' distance, $p < 0.001$). The final sample consisted of 1,131 participants (see **Figure 1**). Group comparisons across Physical Activity levels and Country of residence will be presented first, followed by Physical Activity by Age comparisons. Four groups of participants were identified



based on reported physical activity as follows: very inactive ($n = 359$, -3.24 ± 1.14), inactive ($n = 294$, -0.32 ± 0.47), active ($n = 328$, 2.17 ± 0.79), and very active ($n = 150$, 4.57 ± 0.50). The number of participants by country of residence is reported in the Participants section. The following four age groups were identified: 18–23 years ($n = 326$), 24–30 years ($n = 302$), 31–43 years ($n = 323$), and older than 43 years ($n = 298$).

Differences Across Reported Physical Activity and Country

Differences in participants' health behaviors and wellbeing were first examined across participants' reported changes in physical activity and country of residence. The results of the MANCOVA indicated significant main effects of Physical Activity, Wilk's $\lambda = 0.768$, $F(18, 3,094) = 16.544$, $p < 0.001$, $\eta_p^2 = 0.084$, and Country, Wilk's $\lambda = 0.820$, $F(42, 5,040) = 5.197$, $p < 0.001$, $\eta_p^2 = 0.033$. The Physical Activity by Country interaction

was also significant, Wilk's $\lambda = 0.858$, $F(126, 6,594) = 1.325$, $p = 0.009$, partial $\eta_p^2 = 0.025$. Two of the covariates were significant, perception of being or not in lockdown, Wilk's $\lambda = 0.979$, $F(6, 1,074) = 3.785$, $p < 0.001$, $\eta_p^2 = 0.021$, and being or not employed, Wilk's $\lambda = 0.975$, $F(6, 1,074) = 4.634$, $p < 0.001$, $\eta_p^2 = 0.025$. Same significant results were obtained after excluding the covariates.

Post hoc analysis on the main effects of Physical Activity indicated that individuals reporting highest increases in physical activity rated significantly higher mean scores for physical health perceived "during the last week" and wellbeing compared to individuals reporting higher decrease in physical activity (see **Table 1** for pairwise comparisons). Individuals who reported highest decrease in physical activity rated significantly higher scores assessing emotional impact "during the last week," reflecting lowest mental health compared to the rest of participants. Individuals reporting highest decrease in physical activity also reported significantly higher scores for eating compared to individuals with a moderate decrease in physical activity. Significant differences were also found in regard to sleep, with individuals reporting highest increase in physical activity indicating more sleep than those with highest decrease in physical activity. Individuals with highest decrease in physical activity reported significantly higher weight gains compared to the rest of participants.

Post hoc analysis on the main effects of Country revealed significant mean differences in ratings of physical health perceived "during the last week" (see **Table 2** for pairwise comparisons). Mean scores for United Kingdom participants were the lowest and significantly different from participants from Finland, who reported highest mean scores (see **Figure 2**). Regarding mental health perceived "during the last week," significant mean score differences were found in ratings of Latin American participants who indicated being most affected by personal or emotional problems, while South Koreans reported being significantly least affected compared to most countries. Participants from the Philippines reported significantly higher mean scores for both sleep and eating behaviors compared to most countries. There were no significant differences in mean scores of changes in weight across the countries, with large variability ranging from ± 1.90 (Spain) to ± 2.61 (Philippines). In regard to perceived changes in wellbeing, Italian participants reported significantly lower mean scores compared to participants from Philippines and Finland, who reported highest scores.

Follow-up analysis revealed significant Physical activity by Country interaction for the participants' perceived changes in their wellbeing ($p = 0.049$, $\eta_p^2 = 0.030$). Significant differences were found in wellbeing scores for Filipino participants who reported highest decrease in physical activity compared to the rest of countries studied. Filipinos also showed lowest decrement in wellbeing during the pandemic. In addition, wellbeing scores for Italian participants reporting a moderate increase in physical activity were significantly lower compared to Finnish ($p = 0.003$), Koreans ($p = 0.003$), North Americans ($p = 0.048$) and Filipinos ($p = 0.029$).

TABLE 1 | Descriptive statistics and pairwise comparisons considering reported changes in participants' physical activity.

Variables	Physical activity	Descriptive statistics			Pairwise comparisons			
		M	SD	N	Very inactive	Inactive	Active	Very active
Physical health during last week	Very inactive	3.42	1.05	359	—	—	—	—
	Inactive	3.91	1.00	294	**	—	—	—
	Active	3.94	1.03	328	**	n.s.	—	—
	Very active	4.42	1.04	150	**	**	**	—
Emotional impact during last week	Very inactive	2.97	1.10	359	—	—	—	—
	Inactive	2.28	1.11	294	**	—	—	—
	Active	2.47	1.09	328	**	n.s.	—	—
	Very active	2.23	1.05	150	**	n.s.	n.s.	—
Eating	Very inactive	1.34	2.24	359	—	—	—	—
	Inactive	0.70	1.58	294	**	—	—	—
	Active	1.17	1.94	328	n.s.	*	—	—
	Very active	1.07	2.21	150	n.s.	n.s.	n.s.	—
Sleep	Very inactive	0.27	2.86	359	—	—	—	—
	Inactive	0.19	1.98	294	n.s.	—	—	—
	Active	0.88	2.33	328	*	*	—	—
	Very active	1.05	2.65	150	*	*	n.s.	—
Weight	Very inactive	1.63	2.31	359	—	—	—	—
	Inactive	0.89	1.62	294	**	—	—	—
	Active	0.55	2.02	328	**	n.s.	—	—
	Very active	0.09	2.32	150	**	*	n.s.	—
Wellbeing	Very inactive	−1.46	1.99	359	—	—	—	—
	Inactive	−0.26	1.70	294	**	—	—	—
	Active	−0.02	1.97	328	**	n.s.	—	—
	Very active	1.44	2.70	150	**	**	**	—

** $p < 0.001$, * $p < 0.05$, n.s., non-significant.

Differences Across Reported Physical Activity and Age

MANCOVA yielded significant differences by Age, Wilk's $\lambda = 0.930$, $F(18, 3,083) = 4.437$, $p < 0.001$, $\eta_p^2 = 0.024$, and Physical activity by age interaction, Wilk's $\lambda = 0.928$, $F(54, 5,562) = 1.513$, $p = 0.009$, $\eta_p^2 = 0.012$. Two of the covariates were significant, Perception of lockdown (i.e., yes vs no), Wilk's $\lambda = 0.913$, $F(6, 1,090) = 17.384$, $p < 0.001$, $\eta_p^2 = 0.087$, and Working situation (i.e., being employed vs not being employed), Wilk's $\lambda = 0.981$, $F(6, 1,090) = 3.523$, $p = 0.002$, $\eta_p^2 = 0.019$, while the effect of Number of household members was not significant. Same significant results were obtained after excluding the covariates.

Post hoc analyses on the main effects of Age revealed significant differences in mental health with participants older than 31 years (i.e., 31–43 and >43) reporting being least affected by personal or emotional problems compared to their youngest counterparts (see **Table 3**). Participants in the youngest age category (i.e., 18–23) reported a significantly higher increase in sleep compared to older than 31 years of age participants. There were no significant differences for comparisons across age groups for physical health perceived “during the last week,” changes in weight, or wellbeing.

Follow-up analysis revealed significant Physical activity by Age group interaction for eating ($p = 0.003$, $\eta_p^2 = 0.022$).

Significantly higher eating scores ($p < 0.001$) were observed for the youngest participants (i.e., 18–23) with high increases in physical activity compared to participants in older age categories (i.e., 31–43 and >43, $p = 0.001$, $p < 0.001$, respectively).

Comparisons in the outcome variables for age groups and country could not be calculated because of the imbalanced number of participants in each group (e.g., 88% of Spanish participants were older than 30, while 77% of South Koreans were younger than 31). **Supplementary Figure S1** presents means and standard deviations for the outcome variables for participants across countries and age groupings. Differences across gender were not calculated for the same reason (i.e., 32% of the total of participants were male).

DISCUSSION

The current study examined the influence of the COVID-19 pandemic on physical and mental health perceived “over the last week,” along with changes in physical activity, sleep, eating, body weight, and wellbeing. This was based on self-reported data from individuals residing in seven countries and Latin America. Overall, changes in physical activity during the pandemic were significant for participants' health (physical and mental) and wellbeing. There was great variability in participants' physical

TABLE 2 | Descriptive statistics and pairwise comparisons across country.

Variables	Region	Descriptive statistics			Pairwise comparisons							
		M	SD	N	United Kingdom	South Korea	Finland	Philippines	Latin America	Spain	North America	Italy
Physical health during last week	United Kingdom	3.57	1.10	230	—							
	South Korea	3.73	1.06	201	n.s.	—						
	Finland	4.18	0.97	171	**	*	—					
	Philippines	3.63	1.10	129	n.s.	n.s.	**	—				
	Latin America	4.07	1.09	123	*	n.s.	n.s.	*	—			
	Spain	3.99	0.94	112	*	n.s.	n.s.	n.s.	n.s.	—		
	North America	3.99	1.13	86	*	n.s.	n.s.	n.s.	n.s.	n.s.	—	
	Italy	3.66	1.09	79	n.s.	n.s.	*	n.s.	n.s.	n.s.	n.s.	—
Emotional impact during last week	United Kingdom	2.53	1.14	230	—							
	South Korea	1.98	1.14	201	**	—						
	Finland	2.35	0.92	171	n.s.	*	—					
	Philippines	3.07	0.94	129	**	**	**	—				
	Latin America	3.16	1.04	123	**	**	**	n.s.	—			
	Spain	2.72	1.17	112	n.s.	**	n.s.	n.s.	*	—		
	North America	2.72	1.04	86	n.s.	**	n.s.	n.s.	n.s.	n.s.	—	
	Italy	2.18	1.08	79	n.s.	n.s.	n.s.	**	**	*	*	—
Eating	United Kingdom	1.35	2.13	230	—							
	South Korea	0.55	1.75	201	*	—						
	Finland	0.85	1.81	171	n.s.	n.s.	—					
	Philippines	1.76	2.22	129	n.s.	**	*	—				
	Latin America	1.28	1.89	123	n.s.	*	n.s.	n.s.	—			
	Spain	0.95	1.84	112	n.s.	n.s.	n.s.	*	n.s.	—		
	North America	1.01	2.22	86	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	—	
	Italy	1.15	2.09	79	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	—
Sleep	United Kingdom	0.33	2.63	230	—							
	South Korea	0.41	2.30	201	n.s.	—						
	Finland	0.58	1.89	171	n.s.	n.s.	—					
	Philippines	1.71	2.66	129	**	**	*	—				
	Latin America	0.15	2.78	123	n.s.	n.s.	n.s.	**	—			
	Spain	0.35	2.32	112	n.s.	n.s.	n.s.	*	n.s.	—		
	North America	0.92	2.78	86	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	—	
	Italy	−0.16	2.31	79	n.s.	n.s.	n.s.	**	n.s.	n.s.	n.s.	—
Weight	United Kingdom	1.18	2.28	230	—							
	South Korea	0.86	2.00	201	n.s.	—						
	Finland	0.68	1.92	171	n.s.	n.s.	—					
	Philippines	0.94	2.61	129	n.s.	n.s.	n.s.	—				
	Latin America	0.81	1.98	123	n.s.	n.s.	n.s.	n.s.	—			
	Spain	0.85	1.90	112	n.s.	n.s.	n.s.	n.s.	n.s.	—		
	North America	0.86	2.01	86	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	—	
	Italy	1.09	2.25	79	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	—
Wellbeing	United Kingdom	−0.68	2.32	230	—							
	South Korea	−0.17	2.07	201	n.s.	—						
	Finland	−0.08	2.09	171	n.s.	n.s.	—					
	Philippines	0.35	2.48	129	*	n.s.	n.s.	—				
	Latin America	−0.62	2.07	123	n.s.	n.s.	n.s.	*	—			
	Spain	−0.30	2.14	112	n.s.	n.s.	n.s.	n.s.	n.s.	—		
	North America	−0.45	2.18	86	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	—	
	Italy	−1.06	2.20	79	n.s.	n.s.	*	**	n.s.	n.s.	n.s.	—

** $p < 0.001$, * $p < 0.05$, n.s., non-significant.

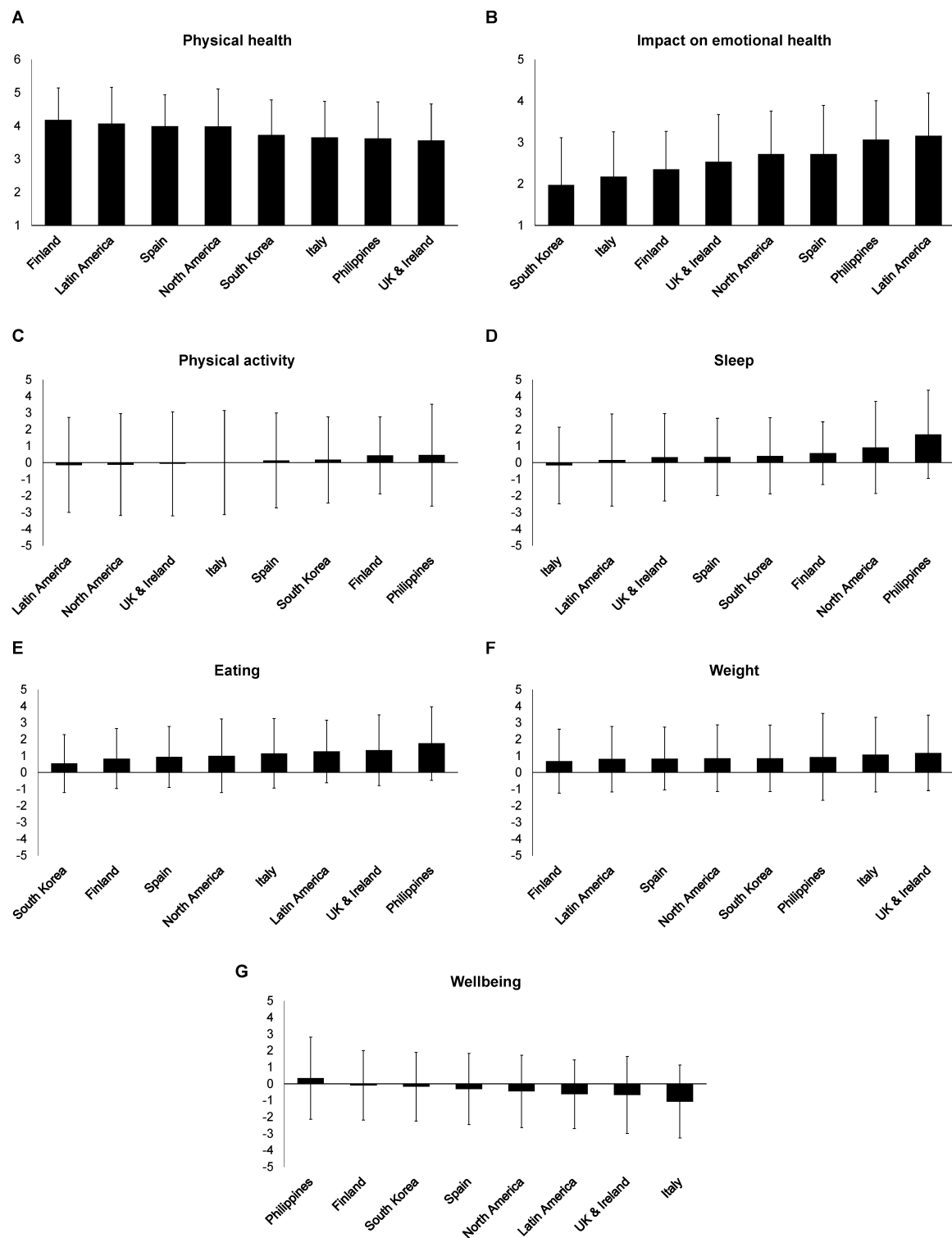


FIGURE 2 | Means and standard deviations of the reported physical (A) and emotional (B) health perceived over the last week, reported changes in physical activity (C), sleep (D), eating behaviors (E), weight (F), and wellbeing (G) during the COVID-19 pandemic across countries ($N = 1,131$).

TABLE 3 | Descriptive statistics and pairwise comparisons across age groups.

Variables	Age groups	Descriptive statistics			Pairwise comparisons			
		M	SD	N	18–23	24–30	31–43	>43
Physical health during last week	18–23	3.78	1.15	310	–			
	24–30	3.82	1.14	270	n.s.	–		
	31–43	3.78	1.02	271	n.s.	n.s.	–	
	>43	3.95	0.99	280	n.s.	n.s.	n.s.	–
Emotional impact during last week	18–23	2.79	1.18	310	–			
	24–30	2.67	1.14	270	n.s.	–		
	31–43	2.44	1.06	271	*	n.s.	–	
	>43	2.26	1.06	280	**	**	n.s.	–
Eating	18–23	1.06	2.25	310	–			
	24–30	1.22	2.05	270	n.s.	–		
	31–43	1.05	1.99	271	n.s.	n.s.	–	
	>43	1.03	1.69	280	n.s.	n.s.	n.s.	–
Sleep	18–23	1.10	2.78	310	–			
	24–30	0.60	2.53	270	n.s.	–		
	31–43	0.25	2.31	271	**	n.s.	–	
	>43	0.10	2.16	280	**	n.s.	n.s.	–
Weight	18–23	0.77	2.11	310	–			
	24–30	0.90	2.25	270	n.s.	–		
	31–43	1.08	2.29	271	n.s.	n.s.	–	
	>43	0.95	1.85	280	n.s.	n.s.	n.s.	–
Wellbeing	18–23	–0.36	2.36	310	–			
	24–30	–0.49	2.33	270	n.s.	–		
	31–43	–0.39	2.25	271	n.s.	n.s.	–	
	>43	–0.15	1.91	280	n.s.	n.s.	n.s.	–

** $p < 0.001$, * $p < 0.05$, n.s., non-significant.

activity, with some individuals experiencing a high increase while others reporting a great decrease (Figure 2).

Comparisons between physical activity and country of residence, and between physical activity and age suggested that increased physical activity was related to less detrimental consequences of the pandemic on perceived physical and mental health. Perceptions of increased physical activity associated with better physical health as rated “over the past week,” along with increased wellbeing and sleep as compared to those perceiving a reduction in physical activity (Table 1). In contrast, decreased physical activity was related to worse mental health (represented by more personal and emotional problems), and a significant increase in eating and weight. Differences between increased exercise and perceived changes in eating were highly variable dependent on age and country of residence.

While the benefits of engaging in physical activity are widely accepted, it may hold increased value during scenarios such as pandemics where, as evident in the present study, the possibility of detriment to physical and mental health are increased. As findings indicate, physical activity seemed to buffer the deleterious effects of stressors. The mechanisms for this are subject to ongoing investigation, with contemporary research suggesting that improved mood post exercise (Zajenkowski et al., 2014; Basso and Suzuki, 2017) is attributable to opioid endogenous activity in the central and peripheral nervous system stimulated by physical activity (Anderson and Shivakumar, 2013;

Fuss et al., 2015; Szabo et al., 2019). Beyond these chemical causes, physical activity is also cited by many as a valuable way of coping with stress (Steptoe et al., 1998; Cairney et al., 2014). Physical activity may reduce tension, induce relaxation, provide a distraction, and lessen rumination over stressors, which are all considered effective means for coping with stress (Hilt and Pollak, 2012; Sharon-David and Tenenbaum, 2017). A single bout of exercise can be enough to bring about a positive change, with research suggesting that as little as 10 min of aerobic exercise can have a positive effect on mood, reduced stress, and perceived energy levels (Rudolph and Butki, 1998; Loy et al., 2013, 2018).

United Kingdom participants reported significantly poorer physical health “during the last week” than did participants from Finland. While we could look to demographic factors to explain the poorer outcomes of the United Kingdom sample (e.g., they were the second oldest of the international groupings ($Mage = 38.6$, $SD = 12.78$), predominantly female (80%) and married (64%), these demographic characteristics are shared by Finland, and therefore do not hold as an explanation. The factor differentiating Finland from the United Kingdom, and thus having possible influence, was the lockdown situation, with only 2% of Finnish participants perceiving a lockdown situation, as compared to 87% of those in the United Kingdom. While the United Kingdom had a mandated lockdown, it is of note that 13% of those from the United Kingdom did not self-define as such. This presents an example of where the measurement

of perceived lockdown status offers a more precise indicator of personal experience than applying the Government mandated lockdown status of the respective country, providing support for the appropriateness of our approach. Further evidence for the possible influence of lockdown derived from interactions between country and physical activity, which indicated an effect on the reported wellbeing of participants, but no effect on the other outcome variables. Participants from Finland reported positive outcomes regarding perceived changes in wellbeing, along with those from the Philippines. In contrast, Italian participants reported the lowest wellbeing outcomes, and the United Kingdom the second lowest. The outcomes for Finland, the United Kingdom, and Italy partially align with lockdown status. While a low percentage of those in Italy perceived themselves to be in lockdown, it is worth noting that they were the earliest European country to enter lockdown and at the time of data collection were experiencing an easing of restrictions. Filipino participants did not align with the lockdown and wellbeing trend as a high proportion perceived themselves to be in lockdown (84%) at the time of data collection, yet still reported positive outcomes in terms of wellbeing. It is possible that the low average age ($Mage = 29.61$, $SD = 10.71$) of the Filipino sample, and the high proportion (82%) of single status individuals included, denote a population with fewer responsibilities than those of the age to be in full time employment and with parenting and/or other caring responsibilities. In support of this finding, in previous quarantine situations, it has been found that undergraduate students experienced no adverse outcomes in terms of stress or general mental health (Wang et al., 2011).

Poorer perceived outcomes for mental health were observed in Latin American participants, compared with South Koreans who were significantly less affected. Again, this reflects lockdown status, with those in lockdown perceiving the most adverse outcomes. An early study in China recorded higher levels of anxiety and depression for those involved in quarantine situations, compared with those unaffected by quarantine (Lei et al., 2020). Of further note, countries with poorer outcomes were more severely affected by the virus at the time of data collection. Across the international groupings sampled, Latin America and the United States had high number of total cases and COVID-19 related deaths, while the lowest cases and deaths were observed in Finland and South Korea (Roser et al., 2020). South Korea also falls into the category of successfully managing the pandemic, if the principle of “flattening the curve” is used as an indicator (Leslie et al., 2020). Conversely, this indicator would denote Italy, United States, United Kingdom (Leslie et al., 2020), and Spain (Baniamin et al., 2020) as under-performing as they faced a long period of exponential growth. Perceiving containment of the virus may have provided reassurance to the Korean participants and may explain why they did not report such adverse outcomes. A key stressor reported in previous quarantine situations was a lack of information and lack of clarity from health and government officials (Brooks et al., 2020). In respect of sleep and eating, participants from the Philippines reported significantly higher mean scores compared to most other countries. The country experiencing the least change in eating behavior was

South Korea. Again, these findings follow the pattern of those in lockdown reporting more change. No significant differences between countries were observed for changes in body weight. However, it is possible that grouping “by country” has masked a moderating effect resulting in large variations in reporting within countries.

In summary, the countries least affected by adverse outcomes could be characterized by not being in lockdown status and experiencing lower mortality and prevalence of COVID-19 at the time of data collection. It is of note that prior experience of epidemics did not consistently result in improved outcomes, as may be the case when applying the COR theory (Hobfoll, 2011). South Korea recently experienced the MERS-CoV epidemic, and the comparatively favorable outcomes observed in the present study may suggest that this provided valuable opportunity to identify and establish resources facilitative of coping with the subsequent pandemic. Conversely, experience of the Zika Virus in Latin America does not seem to have offered the same protective mechanisms to participants in the present study. It could be argued that South Korea’s response to MERS-CoV shared some similarities with responses to COVID-19, for example, quarantine of those with the virus, and restrictions on travel (World Health Organization, 2015). While the Zika virus was declared a public health risk of international concern, no restrictions on individuals or travel were deemed to be justifiable (World Health Organization, 2016). Therefore, it could be argued that the experience of the Zika epidemic was not sufficiently similar to COVID-19 for individuals to have opportunity to utilize any prior coping experience.

When comparing mental health across the four age groups, participants in the oldest category (>43 years of age) reported being least affected by personal and emotional problems than those in the youngest groups. The finding is interesting considering that older people have been disproportionately affected by COVID-19, with fatality rates five times higher than the global average for individuals aged 80 or older (United Nations, 2020). This result, however, is in line with a study of 1,679 Dutch participants aged 65 or older, who did not experience a decrease in mental health during the COVID-19 pandemic compared to 6 months prior (van Tilburg et al., 2020). Studies in China (Liu et al., 2020), Italy (Di Renzo et al., 2020), and Spain (Rodríguez-Rey et al., 2020a) also indicate a higher level of anxiety among younger participants during pandemic.

Working situation was a significant covariate in explaining the variance in outcomes. Overall, only 25.6% of participants reported a similar workload during the pandemic. Homeworking, experienced by 34.6% of respondents, may also have signified a change in the way of working for many. While a shift to homeworking may bring some relief from stress through less time spent commuting, remote workers may experience conflicting demands on time (de Menezes and Kelliher, 2011). During lockdown, this was exacerbated among those with caring and home-schooling responsibilities. A minority of 8.7% were affected by job loss; which is well documented to have a detrimental impact on mental health (Paul and Moser, 2009), and has also been demonstrated in previous viral epidemics (Taylor et al., 2008).

When considered in the context of the conservation of resources theory (Hobfoll, 2011), physical activity may be considered a beneficial coping resource utilized in preventing or ameliorating the effects of stress. Support for this notion is offered by findings of the present study which indicate that irrespective of age and country of residence, participants self-reporting reduced physical activity typically experienced poorer physical health and mental health as rated 'over the past week' along with reduced wellbeing. Reduced exercise also associated with perceptions of weight gain and decreased sleep. Associations between increased exercise and perceived changes in eating were variable dependent on age and country. These findings endorse the policy of advocating physical activity as a means of generating and maintaining resources combative of stress and protective of health during the pandemic (Zhou and Lin, 2016).

When examining physical activity behaviors during COVID-19, it was apparent that while many individuals perceived a large-to-moderate increase in physical activity, many also perceived a large-to-moderate decrease. This is to be expected, as existing research indicates that social isolation is associated with an increase in sedentary behaviors (Tully et al., 2019), and affiliation is a common motive for physical activity participation (Estabrooks and Carron, 2000). In addition, the closure of gyms, parks, and recreational facilities likely had a negative influence on physical activity for many (Arora and Grey, 2020). As such, for individuals to maintain or increase exercise during the pandemic, both an intent and the means to increase exercise are necessary. A recommendation is that to engender intent, and facilitate means, physical activity guidelines for indoor and outdoor exercise are developed that take into account government containment measures and meet affiliation needs in alternative ways. These recommendations should be widely disseminated via a range of media and supplemented with information on the acute and chronic benefits of physical activity. For example, older adults who may be shielding, and thus face constraints in undertaking outdoor exercise, may use technology to support indoor physical activity. Anecdotal evidence suggests that video communication technologies (e.g., zoom) have been widely used to facilitate the continuation of exercise classes (e.g., Pilates) during the pandemic, presenting a social opportunity also. In a further illustrative example of the use of technology, de Moraes et al. (2020) found acute mood benefits for older adults who followed 60 min of Xbox exercise. Where it is not physically or practically possible to accommodate longer durations of physical activity, individuals may follow "exercise snacking," a term that describes short bouts (e.g., 2–10 min) of physical activity undertaken across the day (Perkin et al., 2019). Two papers examining the psychological consequences of COVID-19, independently concluded that suggestions for the effective regulation of emotions should be provided during times of uncertainty, such as COVID-19, which presents the potential for increased stress (Brooks et al., 2020; Pietrabissa and Simpson, 2020). In this regard, based on findings from the present study, we advocate the use of physical activity as a resource for coping and emotion regulation. By recommending and disseminating credible resources, such as those provided by World Health Organization (WHO), n.d., practitioner and

academic communities may facilitate a means of exercise across a broader range of socio-demographic populations.

Limitations of the present study have emerged due to the practicalities of undertaking research during a pandemic; those being recruitment trends associated with online data collection and gathering data via self-report rather than direct measurement. The use of a web-based survey to recruit participants meant reliance individuals coming across, then completing the survey on a voluntary basis. The distribution of the survey links via social networking sites such as Facebook, Twitter, and LinkedIn may have also contributed to the skewed demographic composition of participants. For example, 77% of participants were aged 18 to 44, and only 2% aged >65. It is likely that the low recruitment of older adults (65 years and above) reflects patterns of technology use typically evidenced among older and younger adults. Research indicates that younger adults (18–28 years) use the internet fairly frequently across a wide variety of domains, while usage by older adults (65–90 years) is typically limited to communication or searching for information about community, health, news, and travel (Olson et al., 2011). This may explain why few older adults took part in the present study. Caution must be exercised in generalizing findings to older adults, and the need to consider other means of recruiting participants in future research is highlighted.

Collection of self-reported online data has the potential of introducing reporting and recall bias. For example, compared to device measured data, Pursey et al. (2014) found web-based self-reported weight to be underestimated (by -0.55 kg, $SD = 2.03$), Lauderdale et al. (2008) found sleep to be over-reported (1.3 and 0.3 hours respectively for participants sleeping 5 and 7 h), and Cerin et al. (2016) found that participants over-reported ($929 \text{ min} \cdot \text{wk}^{-1}$) total physical activity over a week. However, evidence shows that there is moderate to high agreement between self-reported and measured data, therefore, online self-report can be a valid method of collecting data (Pursey et al., 2014). This is particularly the case where device measurement is impractical or prohibited, as in the case of the present study. Despite the limitations of online recruitment and data collection, it is worth noting that web-based survey administration allows truly voluntary participation, with the confounding of data due to extrinsically motivated measure completion less likely to occur (Reips, 2006), and in the case of social distancing restrictions, it was the only form of administration viable.

Wellbeing outcomes could not consistently be explained by the staging of containment measures. The two countries experiencing the virus for the longest duration were South Korea, in which comparatively better outcomes were observed, and Italy, where outcomes were poorer. This suggests that variables other than staging of response may be important in determining the outcomes under investigation. Future research may further investigate the impact of the phase of response on wellbeing indices by utilizing a phased approach which takes into account the containment policy of participating countries. This may be done in tandem with a long-term follow up of impact on wellbeing, so that we can better understand the trajectory of wellbeing outcomes in response to pandemic development.

Further research could examine how the effects of physical activity on wellbeing indicators vary according to other demographic variables, which the data did not allow for in the present study. For example, COVID-19 has had a disproportionately high impact on Black, Asian and minority ethnic groups, and low-income populations (Khalatbari-Soltani et al., 2020), which may have bearing on wellbeing. In addition, there is evidence of gender inequalities whereby women are assuming more responsibility for unpaid caring, childcare, and home-schooling (Landivar et al., 2020), suggesting poorer outcomes may be expected for women when compared to men.

It was found that younger participants (18–23 years) who reported increased physical activity also ate more, compared to those with reduced physical activity during the pandemic. It is worth noting that these participants reported the highest unemployment ratings (up to 35%). Interestingly, younger Italian participants (18–30 years) reported eating more to manage their anxiety during lockdown (Di Renzo et al., 2020). While it is possible that younger participants were engaging in compensatory eating (West et al., 2017), it is also possible that this group may be less likely to have caring responsibilities and occupational stressors. When coupled with a higher unemployment rate, this may result in an increased availability of time to engage with activities such as eating and exercise as self-soothing activities targeted at helping them to cope with the pandemic situation. Given that the perception of lockdown status and working situation were both significant covariates, the potential for compensatory eating and potentially emotional eating could be higher among younger participants (West et al., 2017; Di Renzo et al., 2020) and could be associated with the higher level of personal and emotional difficulties reported. The impacts of COVID-19 and its associated lockdown restrictions could manifest themselves differently leading to either an accumulation or loss of resources (Hobfoll, 2011), depending on environmental factors and personal circumstances, such as age and psychological coping mechanisms.

At the time of writing, the potential of a second lockdown and the reality of renewed localized containment measures could bring about further changes in health behavior and wellbeing as the pandemic unfolds. Future research might aim to better understand the causal pathways behind health behaviors and their long-term impact on wellbeing. It is plausible that participants initiated a range of coping strategies that impacted positively upon their wellbeing. Knowing what participants are doing to ameliorate the impact of the pandemic on their wellbeing, and what effect this has on wellbeing indicators, can

offer insight into the development of interventions and activities recommended for use. Therefore, there is scope to explore the means by which individuals seek to cope with the pandemic using qualitative methodologies.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

This study was carried out in accordance with ‘the ethical principles of research in the humanities and social and behavioral sciences and proposals for ethical review’ drafted by the National Advisory Board on Research Ethics in Finland (TENK). This study received ethical approval from the University of Wolverhampton ethics committee (Unique code: 01/20/AF1/UOW). In accordance with the Declaration of Helsinki, all participants gave informed consent, after anonymity and confidentiality were assured.

AUTHOR CONTRIBUTIONS

MR, TD, and C-HC-W: conceptualization and methodology. C-HC-W: data management. MR and C-HC-W: data curation. MR and CR: formal analysis. MR, TD, C-HC-W, and WN: writing – original draft. MR, TD, C-HC-W, WN, JC, JF-M, YC, and CR: writing – review and editing. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.608216/full#supplementary-material>

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The Impact of the COVID-19 Lockdown on Coaches' Perception of Stress and Emotion Regulation Strategies

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The recent global outbreak of the COVID-19 pandemic has influenced the lives of people across multiple countries including athletes, coaches, and supporting staff. Along with everybody else, coaches found themselves constrained to an at-home self-isolation, which limited their ability to normally engage with their profession and to interact with their athletes. This situation may also have impacted their own psychological well-being. With this study, we explored coaches’ perceptions of stress in relation to their emotion regulation strategies depending upon their gender and competitive level (elite vs. non-elite). A sample of 2272 Italian coaches were surveyed during the period of lockdown. Mean values for perceived stress and emotion regulation strategies were compared to normative data of the two instruments as reported in the original studies. Furthermore, two Multivariate analyses of variance (MANOVAs) were completed to observe the potential differences in the coaches’ emotion regulation strategies and perception of stress. Finally, a blockwise regression analysis was run to assess how coaches’ emotion regulation strategies impacted upon their perception of stress. Both women and men reported higher levels of perceived stress than those reported in the normative data. Similarly, average scores for emotion regulation strategies were significantly different from those reported for normative data, in particular, coaches reported slightly higher use of emotion regulation strategies than participants in the original study. Significant gender-based differences emerged in terms of emotional regulations, with men adopting more suppression than women. No differences by competitive level were found. In terms of perceived stress, male coaches and elite coaches showed to be more in control of the situation (positive stress) than female coaches and non-elite coaches, respectively, while women experienced more negative stress than men. The blockwise regression evidenced how reappraisal resulted to be predictive in helping coaches to reduce their perception of stress, while suppression predicted higher stress perceptions.

Keywords: sport psychology, adversity, isolation, psychological well-being, performance, coronavirus

INTRODUCTION

In the last months of 2019 and in the early months of 2020, the surge of the new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) affected the whole globe. Between February and March 2020, the outbreak of the Corona Virus Disease (COVID-19) affected most European countries, as well as countries in Asia, Oceania, and North, Central and South America (WHO, 2020). The spread of the virus led the World Health Organization to declare the COVID-19 a “Global Pandemic” (WHO, 2020). In this scenario, Italy represented a peculiar case characterized by a rapid escalation much earlier in the global pandemic than almost any other country.

In late February 2020 the Italian government declared a mandatory home isolation, initially for specific regional areas, which was then extended to the entire national territory on the 9th of March (Gazzetta Ufficiale, 2020). This mandatory period of national lockdown (56 days of home isolation) limited any possibility of outdoor and in person social activities, with exceptions for essential workers, or for health-related and other essential reasons (e.g., weekly grocery). In the present article, we used the expression “COVID-19 lockdown” to refer to this situation, as this led to the development of chronic stressors, with negative effects for mental and physical well-being (Cao et al., 2020; Flesia et al., 2020; Fuzéki et al., 2020).

The COVID-19 global pandemic also impacted the world of sports and athletics. For example, major national and international sporting competitions were suspended or postponed for 1 year (Corsini et al., 2020; Gallego et al., 2020; Schinke et al., 2020). In addition to its large-scale impact on competition, the COVID-19 lockdown also impacted athletes, coaches, and supporting staff, who were kept away from their usual working (and social) environments (Costa et al., 2020; Di Fronso et al., 2020; Jukic et al., 2020). In addition to limiting their ability to compete in the current season and to prepare for the next, these restrained living conditions and consequential forced physical isolation, may also have negatively impacted the psychological wellbeing of athletes, coaches and supporting staff. In this study, we are particularly interested in coaches' perception of stress and their ability to regulate their emotions during this once-in-a-lifetime situation.

From a theoretical standpoint, perceived stress has been operationalized as a twofold construct (Cohen et al., 1983). On one hand, positive stress is conceptualized as the perception of being in control of a situation, while, on the other hand, negative stress is conceptualized as the perception of lacking control over a situation and the consequential sense of cognitive overwhelmingness (Cohen et al., 1983; Cohen and Williamson, 1988). High levels of perceived stress can be considered as a lack of positive stress and an abundance of negative stress (Cohen et al., 1983). The perception of stress has been widely investigated among coaches in non-emergency situations, often linking higher perceptions of stress to burnout symptoms (e.g., Kelley et al., 1999; Malinauskas et al., 2010; Knight et al., 2013). Collectively, these findings seem to suggest that women perceive high levels of stress more commonly than men. However, this body of

work presents some mixed results about the possible differences between coaches working at different levels of competition. While some scholars did not find any differences in stress perceptions (Kelley et al., 1999), others reported how expert coaches seem to be more prone to burnout than non-expert coaches (Malinauskas et al., 2010).

The relationship between perceived stress and emotion regulation has been explored also in healthcare professionals, as well as in clinical and non-clinical populations (e.g., Moore et al., 2008; Extremera and Rey, 2015; Katana et al., 2019). While some scholars explored the potential predictive role of emotion regulation on stress perceptions (Katana et al., 2019), others explored the moderating effect that emotion regulation may have on the relationship between stress perception and well-being (Extremera and Rey, 2015). In particular, Katana et al. (2019) found that the reappraisal of positive emotions was associated with lower levels of perceived stress, while the suppression of positive emotions was associated with greater levels of perceived stress. When investigating the moderator role of emotion regulation on the relationship between perceived stress and well-being, Extremera and Rey (2015) found that the ability to regulate one's own emotions can minimize the negative impact of perceived stress on an individual's well-being. To our knowledge, no studies have explored the relationship between emotion regulation strategies and perceived stress in a sample of sports coaches.

The model of emotion regulation proposed by Gross (1998, 2001) posits that, while experiencing an emotion-generation process, an individual can adopt two main and consequential regulatory strategies: one focused on the antecedent, “reappraisal,” and one focused on the emotional response, “suppression.” Reappraisal consists in changing the way one thinks about a situation and it is generally implemented early on in the process. Suppression involves inhibiting the expressions of emotions and it is generally implemented later on in the process. For example, one could experience sadness for a certain situation, but can be able to change his perspective and then experiencing relief. If this reappraisal strategy does not work, the person can still try to suppress their sadness, but, while this may lead to lesser negative emotions, it may also reduce positive emotions. Gross (1998; 2001) also described how the way an individual reappraises a specific situation influences the way they express emotions. Gross and John (2003) highlighted how reappraisal strategies lead to greater positive emotions, interpersonal functioning and well-being and lesser negative emotions. Suppression strategies – generally more commonly implemented by men – are less adaptive than reappraising strategies and may lead to poorer interpersonal functioning and wellbeing (Gross and John, 2003). Scholars have shown how the same emotion regulation model can explain the reaction of coaches and athletes in sporting contexts (e.g., Lane et al., 2012; Davis and Davis, 2016).

To the best of our knowledge, no published studies have explored the potential impact that a forced isolation experience, like the one during the lockdown implemented in the efforts against COVID-19, may have on coaches' stress and on their

ability to manage it through emotional regulation. In the present study, we aimed to explore how the prolonged experience of imposed lockdown impacted coaches' perception of stress and their emotion regulation strategies. Moreover, we wanted to explore possible existing differences based on coaches' reported gender identities as well as their level of competition (elite vs. non-elite). Finally, we aimed to explore the predictive role of emotion regulation strategies toward perceived stress. Despite the explorative nature of the present study, we hypothesized that during the lockdown: (a) coaches perceive higher levels of stress and implement more emotion regulation strategies when compared to the normative data derived from the original developmental studies; (b) elite coaches would perceive higher levels of stress when compared to non-elite coaches; (c) women would experience higher levels of perceived stress than men; (d) men would implement more suppression emotion regulation strategies than women; and (e) emotion regulation strategies would impact on the coaches perceived level of stress, with reappraisal predicting lower levels of perceived stress and suppression predicting higher levels of perceived stress.

MATERIALS AND METHODS

Sample

A sample of 2272 Italian coaches was surveyed between April and early May 2020, period during which they were confined at home due to COVID-19 related forced lockdown. Coaches, predominantly men ($n = 1,532$ men; $n = 740$ women), reported an age between 18 and 80 years ($M_{age} = 41.57$; $SD_{age} = 11.99$). Participants reported to coach individual (e.g., skating, swimming, gymnastics, dancesport, fencing, and tennis) and team (e.g., rugby, soccer, volleyball, and basketball) sports at different competitive levels (i.e., local, regional, national, and international). Following the classification used by Swann et al. (2015) for athletes, coaches were classified as "elite" ($n = 889$), when working at the national and international levels, and "non-elite" ($n = 1,383$), when working at the local and regional levels.

Measures

The participants were asked to complete an online survey composed by a battery of questionnaires, encompassing: (a) a demographic information form; (b) the Perceived Stress Scale (PSS; Cohen and Williamson, 1988); and (c) the Emotion Regulation Questionnaire (ERQ; Gross and John, 2003).

Demographic Information

After completing the informed consent, each participant was asked to respond to four demographic questions. Specifically, they were asked about their gender, age, and they were also asked to report the typology of sport they were coaching at the time of the survey (individual or team sport) and their competitive level (local, regional, national, or international).

Perceived Stress Scale

The Italian version of the Perceived Stress Scale (IPSS-10 – Mondo et al., 2019) consists of 10 items divided in two

sub-dimensions, respectively, labeled as positive and negative perceived stress. Items were scored on a 5-point Likert scale ranging from 0 (never) to 4 (very often). The IPSS items are designed to evaluate whether respondents find their lives unpredictable, uncontrollable, and overloading (Cohen et al., 1983; Mondo et al., 2019). All items were introduced by the stem "In the last month..." with four items measuring "positive stress" and the remaining six items measuring "negative stress." While the two dimensions can provide independent scores, they can also contribute to the computation of a total score. The total score per each individual was calculated as the sum of all items scores, after reversing the positive stress items scores. Reliability values for Cronbach's alphas in the Italian version (Mondo et al., 2019) are all from acceptable to good and range from 0.74 for the aggregate score, 0.72 for the "positive stress" subscale and 0.84 for the "negative stress subscale."

Emotion Regulation Questionnaire

The Italian version of the ERQ (Balzarotti et al., 2010) consisted of two dimensions and 10 items scored using a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The first dimension, labeled "reappraisal" consisted of six items while the second dimension, "suppression," consisted in the remaining four items. The Italian version of the instrument demonstrated acceptable psychometric properties with Cronbach's alpha values of 0.84 for the "reappraisal" subscale and 0.72 for the "suppression" subscale (Balzarotti et al., 2010).

Procedure

Coaches were mainly recruited using convenience and snowball sampling techniques. The online survey was posted on the websites and social networks of individual national sport governmental bodies. Moreover, the survey distribution was also supported by the School of Sport of the Italian Olympic Committee (SDS-CONI) by posting the survey link on their main page generally visited by athletes and coaches from the entire national territory. Concurrently, the researchers engaged in a snowball sampling process, by directly inviting coaches in their own personal and professional networks to participate in the study and by asking them to forward the invitation to their colleagues (Sadler et al., 2010). Once the coaches accessed the online survey, they were provided with a brief description of the study and were asked to confirm their agreement to participate in the study as described in the informed consent. The study was conducted in accordance with the declaration of Helsinki and received approval by the institutional review board from the last author's university.

Data Analysis

At first, we completed an initial exploratory data analysis. Screening the sample, we removed 139 cases (i.e., lack of information about level of competitiveness or typology of sport, repeated or incomplete cases, or response patterns). As indicated in the informed consent, participants could exit the survey at any point, however, if interested in taking part in the study,

they were required to complete it in full. For this reason, no missing values were detected exploring the dataset. Data was then analyzed using IBM SPSS 20.0 for observing distribution and reliability.

We first compared the mean scores (and standard deviations) of coaches' perceptions of stress and emotion regulation strategies – suppression and reappraisal – reported during the COVID-19 lockdown with those reported by the authors of the two questionnaires in the original developmental studies (Cohen and Williamson, 1988; Gross and John, 2003). This decision was made based on the similarities in size and demographic characteristics between the samples in the three studies. Moreover, Cohen and Williamson (1988) recommended the use of the values of the means and standard deviations from their samples as “norms for use in evaluating scores from other samples” (p. 61). To provide a detailed overview of the extent to which the COVID-19 lockdown impacted on the perception of stress and emotion regulation, we compared the data of women and men separately through calculation of Cohen's d (Cohen, 1988). For Cohen's d , effect sizes of 0.20, 0.50, and 0.80 are considered small, medium, and large effects, respectively. We then completed two Multivariate Analyses of Variance (MANOVAs) aiming to explore the possible differences in terms of perceived stress and emotion regulation strategies between men and women as well as elite coaches and non-elite coaches. Effect sizes were calculated using partial eta square, η_p^2 (Lakens, 2013), with 0.01, 0.06, and 0.14 considered small, medium, and large effects, respectively (Cohen, 1988). Finally, a blockwise regression was run to observe the predictive role of emotion regulation strategies toward perceived stress. In line with Gross and John's (2003) theory, the emotion reappraisal variable was introduced first in the blockwise regression model, followed by emotion suppression variable.

RESULTS

An examination of histograms, and values of skewness and kurtosis showed adequate levels of normality in the collected data leading to the decision that further parametric tests could be undertaken. Internal consistency reliability in our sample was acceptable to good for both the PSS and the ERQ. In particular, for the PSS, Cronbach's alpha values were 0.74 for the “positive stress” subscale, 0.79 for the “negative stress” subscale, and 0.82 for the aggregated score, while for the ERQ, they were 0.82 and 0.73 for the “reappraisal” and “suppression” sub-scales, respectively.

The comparison between data related to the perception of stress collected during COVID-19 lockdown and the normative data (see **Table 1**) showed significant differences (and medium effect sizes), with increased perceived stress during lockdown for both men (difference = 2.840, $t = 13.513$, $df = 2936$, $p < 0.0001$, Cohen's $d = 0.49$) and women (difference = 4.310, $t = 14.006$, $df = 1664$, $p < 0.0001$, Cohen's $d = 0.69$). Despite the small effect sizes observed, also suppression and reappraisal mean scores were significantly higher during COVID-19 lockdown

TABLE 1 | Means (and standard deviations) of Italian coaches' perceived stress, suppression, and reappraisal prior to and during COVID-19 lockdown.

	Normative data		During COVID-19	
	Women	Men	Women	Men
Perceived stress	13.70 (6.60)	12.10 (5.90)	18.01 (5.76)	14.94 (5.49)
Suppression	3.14 (1.18)	3.64 (1.11)	3.49 (1.28)	3.96 (1.22)
Reappraisal	4.61 (1.02)	4.60 (0.94)	5.03 (1.02)	5.03 (0.99)

Perceived stress—Original sample: Women = 926; Men = 1,406; During COVID-19 sample: Women = 740; Men = 1,532; Suppression and reappraisal—Original sample: Women = 936; Men = 547; During COVID-19 sample: Women = 740; Men = 1,532.

if compared with normative data (see **Table 1**), for both men (suppression: difference = 0.320, $t = 5.389$, $df = 2077$, $p < 0.0001$, Cohen's $d = 0.27$; reappraisal: difference = 0.420, $t = 8.630$, $df = 2077$, $p < 0.0001$, Cohen's $d = 0.43$) and women (suppression: difference = 0.350, $t = 5.808$, $df = 1674$, $p < 0.0001$, Cohen's $d = 0.28$; reappraisal: difference = 0.422, $t = 8.371$, $df = 1674$, $p < 0.0001$, Cohen's $d = 0.41$).

Examining the relationship between participants' gender and competitive level, we completed two MANOVAs. In the first MANOVA, we examined a 2×2 matrix with gender and competitive level as fixed factors and the two sub-dimensions of the PSS as dependent variables. Results showed significant differences both for gender [Wilks' $\lambda = 0.938$, $F(2,2267) = 75.35$, $p < 0.00$, $\eta_p^2 = 0.062$, observed power > 0.999] and competitive level [Wilks' $\lambda = 0.995$, $F(2,2267) = 5.61$, $p < 0.00$, $\eta_p^2 = 0.005$, observed power = 0.859]. In particular, women exhibited lower “positive stress,” $F(1,2271) = 76.03$, $p < 0.00$, $\eta_p^2 = 0.032$, observed power > 0.999 , and higher “negative stress,” $F(1,2271) = 134.9$, $p < 0.00$, $\eta_p^2 = 0.056$, observed power > 0.999 . Non-elite coaches also reported lower “positive stress” levels, $F(1,2271) = 10.27$, $p < 0.00$, $\eta_p^2 = 0.005$, observed power = 0.893, when compared with elite coaches.

In the second MANOVA, we examined a 2×2 matrix (gender $\times$ competitive level) with the dimension of the ERQ as dependent variables. Significant differences for gender emerged [Wilks' $\lambda = 0.969$, $F(2,2267) = 75.35$, $p < 0.00$, $\eta_p^2 = 0.031$, observed power > 0.999], with men more prone to use “suppression” as an emotion regulation strategy, $F(1,2271) = 70.31$, $p < 0.00$, $\eta_p^2 = 0.030$, observed power > 0.999 . No other significant differences emerged from the analysis. Means and standard deviations for women and men, and for elite and non-elite coaches on the PSS and the ERQ are shown in **Table 2**.

Finally, we conducted a blockwise regression analysis to observe the impact of emotion regulation strategies on the perception of stress. Results of the regression [$R^2 = 0.068$; $F(2,2271)$; $p < 0.001$] showed how both reappraisal and suppression regulations were predictive of perceived stress, although the model was only able to explain 7% of the variance. Specifically, reappraisal was a negative predictor ($\beta = -0.239$; $p < 0.001$), while suppression was a positive predictor ($\beta = 0.137$; $p < 0.001$) of perceived stress. Which means that individuals

TABLE 2 | Means and Standard Deviations for the PSS and the ERQ.

		Perceived Stress Scale		Emotion Regulation Questionnaire	
		Positive stress	Negative stress	Reappraisal	Suppression
Gender	Women	9.66 ^a (2.64)	11.67 ^a (4.02)	5.03 (1.02)	3.49 ^a (1.29)
	Men	10.66 ^a (2.28)	9.60 ^a (3.68)	5.03 (0.99)	3.96 ^a (1.22)
Competitiveness	Elite	10.49 ^b (2.45)	10.30 (3.92)	5.05 (1.01)	3.84 (1.28)
	Non-elite	10.23 ^b (2.45)	10.25 (3.91)	5.02 (1.00)	3.79 (1.25)

^aSignificantly different for men/women. ^bSignificantly different for elite/non-elite coaches.

with high capacity of reappraisal have a protective factor toward the perception of stress. On the other hand, participants that suppressed their cognitive emotion were prone to experience more stress (see **Table 3**).

DISCUSSION

In the present study, we explored the levels of perceived stress experienced by coaches during the period of lockdown due to the COVID-19 emergency. Two months of lockdown may represent a highly stressful experience for coaches, and distressed coaches can exhibit emotions and engage in behaviors which may be detrimental for athletes' mental well-being (Davis and Davis, 2016). Thus, it was important to study coaches' emotional reactions to the compulsory lockdown in response to the COVID-19 emergency. With this study, we contributed to extend the current body of knowledge focused on perceived stress and emotion regulation among coaches during periods of mandatory or forced isolation.

Overall, findings may suggest that the COVID-19 lockdown had a harmful effect on coaches' perceived stress, which was significantly higher than the levels of stress reported in the normative data. The observed detrimental impact on both men and women might be due to the uncommon characteristics of the COVID-19 crisis. Moreover, the postponement and/or cancelation of all competitions and sport-related events due to this emergency may also have contributed to worsen the perceived stress of athletes (e.g., Di Fronso et al., 2020) as well as coaches. As a consequence, during the COVID-19 confinement, male and female coaches reported levels of emotion regulation strategies greater than those reported in the normative data.

In the uniqueness of this COVID-19 emergency, female coaches reported to experience higher level of perceived stress than male coaches. These results are in line with past literature (Kelley and Gill, 1993; Kelley, 1994; Kelley et al., 1999), but might have been exacerbated over the period of the forced isolation due to the mandatory lockdown. In particular, three aspects might have played a role in causing higher levels of perceived

stress among women: (a) pre-existing gender differences; (b) perception and experienced social support; and (c) organizational support. First, the fact that gender differences exist in perceived stress has been previously established (e.g., Kelley and Gill, 1993) and it emerged, in this period of lockdown, also among Italian athletes, with women experiencing more stress than men (Di Fronso et al., 2020). With regards to social support, scholars previously showed how male coaches who experienced social support also reported reduced levels of perceived stress (Kelley, 1994). The effect of social support on perceived stress may also have been experienced by the coaches participating in the present investigation with men more prone to seek online social interactions than women, thus potentially receiving higher levels of social support. Finally, at an organizational level, female coaches may have felt less supported than male coaches. Previous literature shows how within sporting organizations, women generally receive lower salaries and experience lesser job stability than men (Carson et al., 2018). These gender-based organizational differences, may have been exacerbated during the COVID-19 lockdown, leading women coaches to experience lower levels of job security and financial stability.

In terms of differences by competitive level, elite coaches reported to be more in control of the situation ("positive stress") and these results did not support our hypothesis. In fact, we expected to find elite coaches to be more stressed than non-elite coaches as they may have greater job responsibilities and more professional expectations for sporting results. However, elite coaches may also work in highly structured sport organizations able to provide them with higher level of support to their remote professional activities (Larner et al., 2017; Wagstaff et al., 2018; Arnold et al., 2019). Moreover, these coaches may have worked with athletes who were able to continue their training also during lockdown, due to the organizational instrumental support (Fletcher and Arnold, 2017). On the other hand, instead, non-elite coaches may have been working with athletes who divested from their athletic role (Costa et al., 2020). Finally, due to their highly competitive working conditions and environment, elite coaches may have developed the ability to effectively and positively cope with high stressful situations (Mellalieu et al., 2009; Fletcher and Scott, 2010; Olusoga et al., 2012).

Findings from the present investigation are somehow in contrast with previous studies. For example, Kelley et al. (1999) did not find any significant differences in tennis coaches' perceptions of stress based on their competitive level. Moreover, Malinauskas et al. (2010) reported how experienced coaches were

TABLE 3 | Predictors of perceived stress.

	B	SEB	β	p	C.I.
Reappraisal	-1.308	0.112	-0.239	0.000	-1.528; -1.089
Suppression	0.597	0.089	0.137	0.000	0.423; 0.771

more prone to burnout than less experienced coaches. Several reasons may explain these different results. On one hand, Kelley and colleagues explored a specific sample of tennis coaches and their study was not performed under a pandemic situation. On the other hand, Malinauskas et al. (2010) studied experienced coaches, who are not necessarily elite coaches, and focused on their experience of burnout, which, although related to perceived stress, is a different construct. In light of Malinauskas et al. (2010) results, it may be interesting to extend the present investigation and explore more in detail the potential differences in the levels of perceived stress and emotional regulations between coaches in relation to both their level of experience and presence of burnout symptoms.

Gender-based differences in emotion regulation and, specifically with regards to “suppression” regulation, confirm the existing literature showing that men tend to suppress their emotions more commonly than women (e.g., Gross and John, 2003). From our study, it also appears that emotion regulation strategies played a role in predicting the perceived stress of coaches during the COVID-19 lockdown. In particular, although with a small effect, we observed how the ability of Italian coaches to reappraise the situation derived from the COVID-19 emergency helped them to reduce their experience of stress. On the contrary, the use of suppression as a strategy predicted an increase of perceived stress levels among the coaches participating in our study. These results combined seem to suggest that men have a more common tendency to adopt a less adaptive emotion regulation strategy than women. To change this trend, it could be important to teach male coaches to use more reappraisal, instead of suppression, as an emotion regulation strategy.

Based on our results, some practical implications can be provided to coaches, sport psychology practitioners, and organizations on how to intervene to reduce stress, disclose one's own emotions and reappraise the situation. At individual/group level, coaches could benefit from learning and possibly engaging in some mindfulness meditation activities with the scope of regulating their levels of perceived stress (Austin, 1997; Longshore and Sachs, 2015). Coaches could also engage in written emotional disclosure interventions to promote and support their own emotional expressivity (Lumley and Provenzano, 2003). Sport psychology practitioners could support coaches in these efforts by directly developing and implementing these techniques as well as other interventions to help coaches to learn how to regulate their own emotions during stressful situations (Kivity and Huppert, 2016; Dryman and Heimberg, 2018). Additionally, practitioners could also share instructional material with coaches to engage them in self learning. At an organizational level, sports clubs and federations could build support systems to help manage stressful situations by either providing training or giving access to coaches to sport psychology practitioners (Taylor, 1992). Due to the unique nature of a forced isolation as the one due to the COVID-19 emergency, the possibility to access web-based interventions might be helpful to support coaches, alleviating their stress and potentially protecting them from negative mental health symptoms (Morris et al., 2015).

We also acknowledge some limitations of this study. For example, we had to rely on a convenience sample, which, regardless of its size, lacks randomization, limiting our ability to generalize our findings. Additionally, the results of the comparison to the datasets derived from the original developmental studies for the PSS (Cohen and Williamson, 1988) and the ERQ (Gross and John, 2003) may not have been optimal. For example, these differences may have not been necessarily due to the impact of the mandatory lockdown during the COVID-19 emergency on the participating coaches, and instead could be impacted by the specific characteristics of the surveyed population (i.e., coaches vs. non-coaches). It should also be noted that this study is based on a cross-sectional design and the inferences on how stress perceptions and emotion regulation strategies varied across time are limited to this comparison with normative data. Longitudinal investigations of how the coaches' levels of perceived stress varied across the whole period of the COVID-19 emergency would allow inferences to be made on the causality and would enrich the literature on this unique situation. Moreover, future studies conducted during the COVID-19 pandemic or similar emergencies leading to forced isolation, could also explore other aspects, such as the level of experience of the coaches and burnout symptoms. Finally, it will be important to take into consideration also the effect that coaches' emotions have on athletes' reactions (e.g., Thelwell et al., 2008; Friesen et al., 2018). Since athletes also suffered the effects of the COVID-19 emergency (e.g., Di Fronso et al., 2020), future studies might want to explore the coach-athlete relationship and its association with coaches' mental health during similar period of high non-sport related stress.

CONCLUSION

In conclusion, by exploring the levels of perceived stress and the emotion regulation strategies within a large sample of Italian sports coaches during the period of the COVID-19 lockdown, we found a series of noteworthy results. First, we found that these Italian coaches during the mandatory lockdown reported to experience higher levels of perceived stress and to implement more emotion regulation strategies than those proposed in the normative data. Elite coaches seem to perceive themselves to be more in control of the situation (“positive stress”) than their non-elite counterparts. While female coaches appear to experience higher levels of perceived stress than male coaches, male coaches seem to adopt “suppression” more often as a regulatory strategy than their female counterparts. Lastly, we have observed a small impact of emotion regulation strategies on the coaches' levels of perceived stress, with reappraisal regulatory strategy predicting lower levels of perceived stress and suppression regulatory strategy predicting higher levels of perceived stress. While we do recognize the peculiarity of this study in this particular period, our findings can be generalized to other cases of forced isolation, such as those due by illness or injury. Indeed, even in those cases, coaches can find themselves confined at home and they can find support in web-based interventions (e.g., Morris et al., 2015; Lane et al., 2016).

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

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AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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The Impact of Coronavirus Disease 2019 Lockdown on Athletes' Subjective Vitality: The Protective Role of Resilience and Autonomous Goal Motives

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The lockdown resulting from coronavirus disease 2019 (COVID-19) has had a huge impact on peoples' health. In sport specifically, athletes have had to deal with frustration of their objectives and changes in their usual training routines. The challenging and disruptive situation could hold implications for their well-being. This study examined the effect of the COVID-19 lockdown on changes in athletes' reported eudaimonic well-being (subjective vitality) and goal motives (autonomous and controlled) over time (i.e., pre-lockdown and during lockdown). The relationship of resilience to changes in subjective vitality was also determined, and changes in athletes' goal motives were examined as potential mediators. Participants were 127 Spanish university athletes aged between 18 and 34 years ($M = 21.14$; $SD = 2.77$). Approximately 4 months before the start of the lockdown in Spain (T1), athletes responded to a questionnaire assessing their resilience, goal motives, and subjective vitality. Around 6 months later into the lockdown period (T2), athletes' goal motives and subjective vitality were assessed again. Growth modeling using hierarchical linear models revealed a significant decrease of autonomous goal motives and subjective vitality during the lockdown, but athletes did not show change over time in controlled goal motives. Path analysis, adjusting T2 measures for their corresponding T1 measures, showed that resilience significantly predicted changes in athletes' autonomous goal motives, which then accounted for changes in subjective vitality. The indirect effect was significant. Resilience did not predict changes in athletes' controlled goal motives. However, changes in controlled goal motives negatively predicted changes in subjective vitality during lockdown. The findings suggest negative impacts of the COVID-19 lockdown on athletes' goal motives and eudaimonic well-being. Results also support the hypothesized mediational role of autonomous goal motives in the relationship between resilience and subjective vitality during the lockdown. As such, findings confirm the relevance of resilience to a key feature of athletes' eudaimonic well-being and the importance of enhancing their autonomous goal striving.

Keywords: resilience, goals, vitality, well-being, athletes, motivation, COVID-19, lockdown

INTRODUCTION

The coronavirus disease 2019 (COVID-19) has become a health global issue, with millions of confirmed cases in many countries around the world (Satici et al., 2020). The pandemic has put at risk people's physical health and functioning, and also their psychological health and well-being (Bakioğlu et al., 2020). Research has reported a wide range of associated negative psychological responses such as anxiety and depression (Harper et al., 2020; Taylor et al., 2020), as well as a decrease in emotional well-being (Yang and Ma, 2020). The risk of being infected by COVID-19 and/or passing the virus onto others, together with the sense of social isolation caused by the lockdown and quarantine, can escalate people's anxiety and fear (Rubin and Wessely, 2020).

One of the populations affected by the pandemic has been athletes, who also have experienced cancelation of important competitive events, restrictions to training, and disruption of everyday life. During the lockdown period, the measures and restrictions varied from country to country. In some countries like Spain, sport and physical activities were canceled because these were not considered as essential activities. For athletes, their only alternative to train therefore was to train at home, with the limitations that this implies. In these circumstances, athletes have encountered issues not only related to their options to compete and maintain their usual training routines but also challenges presented by social isolation and need to distance from partners and teammates (Schinke et al., 2020). This has resulted in a decrease in athletes' training intensity and training volume and other consequences such as a reduction of sleep quality (Mon-López et al., 2020) and changes in their dietary patterns (Roberts et al., 2020). Athletes have also reported COVID-19-related psychological distress and worries about one's sport and about one's own future in sport (Håkansson et al., 2020). Recent evidence suggests that the challenges brought about by COVID-19 have physical, nutritional, and psychological consequences that may affect their overall health (Pillay et al., 2020).

Understanding the psychological mechanisms that allow athletes to maintain eudaimonic well-being in a stressful situation can contribute to greater insight into contributors to their mental health. Such information is relevant to the development and delivery of preventive, health-based psychological interventions in the sport setting.

Eudaimonic well-being is referred to actualizing one's human potentials and is considered a positive subjective state that is the product of the pursuit of self-realization rather than the objective being sought (Waterman, 2007). As Waterman pointed out, eudaimonia is stronger when it is associated with opportunities to develop one's best potentials, with investing a great deal of effort, with having clear goals, and with feeling challenged. It can be considered that lockdown period has restricted, for several months, these opportunities. A key construct that has traditionally been used as an indicator of people's positive mental health and eudaimonic well-being specifically is subjective vitality (Ryan and Deci, 2001). Ryan and Frederick (1997) defined subjective vitality as "the experience of having positive

energy available to or within the regulatory control of one's self" (Ryan and Frederick, 1997, p. 530). This concept not only involves somatic factors, but psychological factors are also strongly implicated. When individuals indicate that they have high subjective vitality, they feel alive, vigorous, and energetic. In fact, subjective vitality has been considered as "perhaps the most general characteristic of a fully functioning person" (Ryan and Deci, 2017, p. 256). In sport (e.g., Mack et al., 2011; Adie et al., 2012; Castillo et al., 2017), it has been found that subjective vitality is positively related to other indicators of well-being (e.g., life satisfaction and global self-esteem) and negatively related to indicators of ill-being (e.g., emotional and physical exhaustion). One aim of the present study is to examine whether there was a change in athletes' reported subjective vitality from before to during the lockdown.

Ryan and Frederick (1997) pointed out that when people are involved in activities driven by volition, these activities catalyze energy, whereas if the same activities are driven by external motives, such feelings of energy can be depleted. Autonomous self-regulation implies less control and inhibition than when people are involved in activities fueled by more external or internally contingent forces. Drawing from self-determination theory (SDT; Deci and Ryan, 1985, 2000), it is expected that when autonomous, rather than controlled motivation, directs human behavior, reported vitality is higher. Consonant with SDT tenets, past research has revealed athletes' subjective vitality to be positively predicted by autonomous motivation (e.g., Mouratidis et al., 2008; Gunnell et al., 2014).

Athletes, as is the case for humans in general, are constantly pursuing goals that specify and direct their behavior (Sheldon, 2014), although they sometimes are not explicitly aware of those goals (Emmons, 1989). From this perspective, it could be assumed that even during the lockdown period, athletes directed their behavior (consciously or unconsciously) to achieve some goals. Grounded within the larger SDT framework, the self-concordance model (SCM; Sheldon and Elliot, 1999) focuses on the motives underlying personal goal striving and allows, through an idiographic methodology proposed by Sheldon (2002), the examination of specific goals generated by the person and their underlying motivational regulations. According to the SCM, goals can be guided by two different forms of motivation termed as autonomous or controlled, depending on whether goal motives are more or less concordant with the person. Autonomous goal motives are based on personal interest, enjoyment, or perceived importance, whereas controlled goal motives are regulated by external or internal pressures and contingencies that are related with social approval (Sheldon and Elliot, 1999). Therefore, autonomous goal motives are intrinsically motivated or integrated with a person's sense of self, whereas controlled goal motives are based on external and introjected regulations (Martela et al., 2016).

Empirical research has supported the adaptive role of autonomous goal motives in comparison with controlled goal motives across different contexts (Healy et al., 2020). For example, Judge et al. (2005) found that more self-concordant goals in the work domain corresponded with greater job and

life satisfaction. In sport, the SCM was successfully adapted and tested by Smith et al. (2007). Smith et al. found that autonomous goal motives positively predicted psychological well-being (operationalized in respect to more hedonic aspects of well-being and ill-being), whereas controlled goal motives emerged as a negative predictor. Autonomous goal motives have been positively related with a range of self-regulatory processes and with adaptive coping strategies (Sanjuán and Ávila, 2018), as well as to greater persistence in goal pursuit (Ntoumanis et al., 2014), goal-directed effort and goal attainment (Smith et al., 2011), and well-being (Smith et al., 2011; Healy et al., 2014). Conversely, controlled goal motives have been unrelated to goal attainment (Ntoumanis et al., 2014) and positively related to reported ill-being (Healy et al., 2014; Gaudreau and Braaten, 2016). In the present study, the form of motivation (autonomous and controlled) underlying athletes' goals during the lockdown was examined in relation to their feelings of subjective vitality.

Previous evidence suggests that, aligned with the principles of SDT, controlled and autonomous goal motives can be influenced by features of the social environment as well as by personal dispositions (Healy et al., 2018). As for the social environment, the lockdown and its consequences in athletes' daily activities could affect the self-concordance of their goals, diminishing autonomous goal motives and increasing the controlled ones. Literature has largely demonstrated that when social contexts frustrate the humans' basic psychological needs of autonomy, competence, and relatedness, the autonomous motivation tends to decrease, whereas the controlled motivation tends to flourish (Deci and Ryan, 2000; Ryan and Deci, 2017). During the lockdown, athletes have had less opportunities for choice in general, and their relationships have been affected because of their isolation. To this must be added that in this situation the external pressures on human agency increased significantly, especially those exercised by the government and authorities, putting at risk a more autonomous functioning. Regarding the personal dispositions, recent studies have analyzed the mediating role of motivation in the relationship between personality dispositions and indicators of well-being and/or ill-being, including constructs such as perfectionism (Atienza et al., 2020) and resilience (León-Guereño et al., 2020).

The present study focuses on the role of resilience, not only as a personality disposition that should differentially correspond to goal motives, but also as a likely positive predictor of athletes' vitality. Considering that the characteristics and correlates of this personality disposition would be expected to further understand why, in adverse situations, the subjective vitality of athletes is more or less affected.

Resilience is defined as an individual's ability to cope effectively and overcome life's adversities (Rutter, 1993). This personal disposition allows people to be more likely to achieve stable healthy functioning and cope more optimally with stress (Devi, 2020), in part due to its role as a buffer to disease and links to an adaptive immunological system. Characteristics such as sense of control, optimism, and persistence among others are considered typical attributes of resilient people (Grant and Kinman, 2014; Collins, 2015). Previous research has shown resilience to positively correlate with adaptive behaviors within

adverse situations (Olsson et al., 2003). In addition, past studies suggest that individuals with high levels of resilience have more positive cognitions and higher levels of life satisfaction (Mak et al., 2011), self-esteem (Benetti and Kambouropoulos, 2006), and perceived self-efficacy (Schwarzer and Warner, 2013). Within work based on SDT, research has focused on studying contextual need support as a positive predictor of resilience (e.g., Vansteenkiste and Ryan, 2013). Little is known about whether and how resilience corresponds to heightened well-being in athletes, particularly during uncertain, challenging times.

In sport, competition stimulates athletes to use psychological abilities and efforts to use effective coping strategies to improve their performance in often stressful conditions (Nicholls and Polman, 2007). Resilience is one of these abilities and can help athletes adapt to difficult situations and promote their personal growth (Galli and Vealey, 2008). This ability to "bounce-back" from a defeat or disappointment in order to overcome future challenges contributes to the psychological well-being and performance of athletes (Gupta and Sudhesh, 2019). In this line, past sport research suggests that resilience is positively related to other psychological resources such as self-efficacy (Cardoso and Sacomori, 2014), optimism and coping strategies (Belem et al., 2014), and intrinsic motivation and self-regulation (Brown et al., 2015). In contrast, resilience in athletes has been negatively related to pessimism, self-blame, anxiety, and depression (Sarkar and Fletcher, 2014) as well as to stress and burnout (Codonhato et al., 2018; Wagstaff et al., 2018). In the same way, previous literature in university student athletes demonstrated that resilience had a positive relationship with performance and psychological well-being and a negative relationship with psychological disorders (Hosseini and Besharat, 2010). More recently, González et al. (2019) found resilience to positively predict enjoyment and negatively predict boredom in sport.

Due to the importance of subjective vitality for athletes in their daily and sporting lives and particularly in periods of challenge and/or crisis (such as lockdown by COVID-19), it is important to understand the mechanisms by which personal dispositions (i.e., in this case, resilience) may be predictive of changes in athletes' reported vitality over time. In this research, athletes' goal motives (autonomous and controlled) as possible mechanisms by which resilience can predict changes in subjective vitality during the COVID-19 pandemic was examined. A number of recent studies, conducted across different populations and countries, have described the impact of COVID-19 lockdown on athletes (e.g., Håkansson et al., 2020; Mon-López et al., 2020; Pillay et al., 2020; Roberts et al., 2020). However, to our knowledge, there has been no research about the role of resilience and goal motives on changes in athlete's subjective vitality during lockdown.

Specifically, the two main objectives of this study were as follows:

Objective 1: Examine the effect of the COVID-19 lockdown on changes in athletes' reported eudaimonic well-being (subjective vitality) and goal motives (autonomous and controlled), by comparing their scores before (T1) and during the lockdown (T2).

Objective 2: Study the predictive role of resilience (T1) to changes in subjective vitality (T2 controlling for T1) and to test whether athletes' goal motives serve as mediators of this relationship (T2 controlling for T1).

Based on previous evidence and theoretical tenets, two hypotheses were formulated:

Hypothesis 1: There will be significant differences between T1 and T2 athletes' scores in subjective vitality and goal motives. Specifically, it is expected that subjective vitality and autonomous goal motives will decrease during the lockdown. Conversely, it is hypothesized that controlled goal motives will increase during these adverse circumstances.

Hypothesis 2: Athletes' resilience (T1) will predict changes in subjective vitality (T2 controlling for T1) during the lockdown, through changes in goal motives (T2 controlling for T1). Specifically, it is expected that resilience will positively predict changes in autonomous goal motives, which in turn will positively predict changes in subjective vitality. Conversely, resilience will negatively predict changes in controlled goal motives, which in turn will negatively predict changes in subjective vitality.

MATERIALS AND METHODS

Participants

An *a priori* power analysis using GPower (Faul et al., 2009) indicated that 125 participants were necessary to attain a statistical power level of 0.80 in regard to detecting the expected relationships. One hundred twenty-seven athletes from two different Valencian universities (Spain) were recruited to participate in the study [age range of 18–34 years ($M = 21.14$, $SD = 2.77$)]. Females constituted 50% of the sample. All the athletes competed in the Autonomic Championship of University Sports (CADU) and participated in one of a variety of team sports (e.g., basketball, handball, football, rugby, and volleyball).

Procedure

After obtaining ethical approval from the Human Research Ethics Committee of the university, researchers contacted the directors of each sport service to present the project and request their willingness to allow their athletes to participate. Taking into account the characteristics of the Spanish language, which has different verb conjugations to make reference to male or female, the questionnaires were adapted for each sex.

Before the data collection, participants received brief instructions and signed an informed consent to voluntarily participate in the research. Confidentiality and anonymity were guaranteed through an identification code, which permitted monitoring of the responses of the participants over time. The first assessment was carried out at the beginning of the university season in November, and the second assessment took place in May, during the period of lockdown resulting from COVID-19. At T1, data were collected from the athletes in

small groups at the sport facilities. At T2, due to the lockdown, questionnaires were adapted to be completed through an online survey. All the athletes completed the package of questionnaires measuring the variables of interest at both T1 and T2 (before and during the lockdown).

Instruments

The Spanish version (Castillo et al., 2017) of the Subjective Vitality Scale (SVS; Ryan and Frederick, 1997) was used to measure the athletes' subjective vitality. The SVS comprised six items (e.g., "I feel alive and vital") to evaluate the subjective experience of being full of energy and alive. All responses were provided on a 7-point Likert scale from 1 (*not at all true*) to 7 (*very true*). The reliability and validity of this scale have been supported in previous studies conducted in the sport domain and in the case of Spanish athletes, with alphas ranging between 0.77 and 0.89 (e.g., Álvarez et al., 2012; Balaguer et al., 2012; González et al., 2015; Balaguer et al., 2018).

Resilience was assessed via the Spanish version (González et al., 2019) of the Resilience Scale developed by Wagnild and Young (1993). The scale has 25 items grouped into two subscales: personal competence (17 items; e.g., "I usually manage one way or other") and acceptance of oneself and life (8 items; e.g., "I get along with myself"). Participants responded on a Likert scale with a range from 1 (*strongly disagree*) to 7 (*strongly agree*). Following previous literature, a global resilience score was computed adding responses provided to both subscales (Wagnild and Young, 1993; Ruíz et al., 2012). Recently, González et al. (2019) used the scale in the sport domain, obtaining evidence of adequate validity and reliability ($\alpha = 0.86$).

Personal goal motives items were adapted for use with Spanish athletes drawing from the ideographic methodology employed in previous self-concordance research (Sheldon, 2002). Most of past studies assessed more than one self-generated goal by participant, so the reliability of personal goal motives was obtained through the intraclass correlation coefficients (ICCs). This methodology has been marked by adequate validity and reliability (ICC = 0.87–0.95) and has been used in previous sport studies conducted in other countries (e.g., Smith et al., 2011; Smith and Ntoumanis, 2014). Based on this methodology, but adapting it for measure only one goal, in the present study, athletes were asked to identify their most important personal goal in relation with sport that they were currently pursuing. To assess the motives underlying goal striving, athletes rated the extent that they were striving for their current goal with extrinsic (two items; e.g., "Because someone else wants you to"), introjected (two items; e.g., "Because you would feel ashamed, guilty, or anxious if you didn't"), identified (two items; e.g., "Because you personally believe it's an important goal to have"), and intrinsic (two items; e.g., "Because of the fun and enjoyment the goal provides you") motives. Responses were given on 7-point Likert scale ranging from 1 (*not at all*) to 7 (*very much so*). Autonomous motives were computed from intrinsic and identified motives, and controlled motives were calculated from introjected and extrinsic motives, consistent with past SCM research (e.g., Healy et al., 2014).

Data Analysis

The IBM SPSS Statistics 25 software package was used to conduct preliminary analyses, i.e., calculate descriptive statistics, internal consistency of the scales (Cronbach's alpha), and Pearson correlation analyses. The change over time (before and during the lockdown) on reported goal motives (autonomous and controlled) and subjective vitality (Hypothesis 1) was tested through growth modeling (Duncan et al., 2013) using hierarchical linear models (Bliese and Ployhart, 2002; Heck et al., 2013). The following models for each of the three aforementioned variables were tested: Model 1 (M1) or "random intercept model" to estimate within-individual variance (σ^2) and between-individual variance ($\sigma^2_{\tau00}$), as well as the ICCs (Bliese, 2000); Model 2 (M2) or "linear growth model," to check linear change over time (γ_{10}); and Model 3 (M3) or "random slope model," to test whether the linear trajectories varied across individuals ($\sigma^2_{\tau11}$).

To test Hypothesis 2, path analysis was conducted using Mplus (Version 7; Muthén and Muthén, 2012). To determine the fit of the model, different fit indices were examined, such as chi-square (χ^2), the comparative fit index (CFI), the Tucker–Lewis index (TLI), the standardized root mean square residual (SRMR) index, and the root mean square error of approximation (RMSEA) index. A non-significant χ^2 -value ($p > 0.05$) indicated that the path model fit the data well (Shah, 2012). Values of CFI and TLI of 0.95 or higher are considered acceptable (Hu and Bentler, 1999). For SRMR and RMSEA, values of 0.05 or lower indicate good model fit. Within the analyses, athletes' reported goal motives and subjective vitality were controlled for their measures in T1 (i.e., T2 measures were adjusted in regard to their corresponding T1 measures), so that the effective outcome measures can be considered measures of change in the variable in question (Finkel, 1995). This methodology to measure the change in targeted variables has been widely applied in previous studies (e.g., Papaioannou et al., 2004; Chen et al., 2011; Balaguer et al., 2012).

RESULTS

Preliminary Analysis

Prior to the main analysis, missing data and outliers were analyzed. The criterion applied for accept missing data was that omitted values were below 5% in each variable (e.g.,

Graham and Hofer, 2000). In this study, this criterion was met, being that the observed percentage of missing data was too small (0.5%) to be a potential problem. Outliers were analyzed in the measurements taken in both T1 and T2 using Z-scores, and the criterion applied was that values higher than ± 3.29 were considered extreme (Tabachnick and Fidell, 2007, 2013; Field, 2013). With the use of the univariate trimming method, analyses identified and removed four participants from the sample, because they showed extreme values in autonomous goal motives (three participants) and resilience (one participant).

Descriptive Statistics, Reliabilities, and Bivariate Correlations

Results of the descriptive analyses, scale reliability coefficients, and bivariate correlations are presented in Table 1. Skewness and kurtosis coefficients were in the recommended range of (−1, 1) for normal distributions (Muthén and Kaplan, 1985, 1992; Ferrando and Anguiano-Carrasco, 2010). In addition, Cronbach's alpha coefficients showed satisfactory reliability for all the scales, except for autonomous goal motives, which were below the 0.7 criterion (0.62). Mean scores indicated that, overall, athletes had high levels of resilience. Moreover, athletes as a group were marked by high levels of subjective vitality in T1, but in T2, the scores were low. At T1 and T2, athletes scored high in autonomous goal motives and low in controlled goal motives.

Bivariate correlations showed that resilience measured in T1 was significantly and positively related with subjective vitality at T1 and T2. Moreover, resilience was positively related with autonomous goal motives at T1 and T2, whereas its relationship with controlled goal motives was negative at the two time points. Regarding goal motives, autonomous goal motives at T2 correlated positively with subjective vitality, whereas controlled goal motives correlated negatively with this well-being indicator, although these relationships were not significant at T1. In addition, consistent with previous research, autonomous goal motives and controlled goal motives were unrelated at T1 and T2 (Koestner et al., 2008; Smith and Ntoumanis, 2014). Finally, when comparing over time, autonomous goal motives at T1 and T2 did not show significant correlations, whereas controlled goal motives at T1 and T2 correlated positively. Reported subjective vitality was also significantly and positively correlated with levels at T1 and T2.

TABLE 1 | Descriptive statistics, reliabilities, and bivariate correlations for variables at T1 and T2.

	Range	<i>M</i>	<i>SD</i>	α	Skewness	Kurtosis	1	2	3	4	5	6	7
Resilience (T1)	1–7	5.56	0.63	0.89	−0.29	−0.25	–						
Autonomous goal motives (T1)	1–7	6.04	0.77	0.62	−0.87	0.37	0.34**	–					
Autonomous goal motives (T2)	1–7	5.74	1.04	0.71	−0.90	0.66	0.30**	0.08	–				
Controlled goal motives (T1)	1–7	2.53	1.23	0.73	0.69	−0.17	−0.25**	−0.17	0.02	–			
Controlled goal motives (T2)	1–7	2.73	1.46	0.77	0.65	−0.18	−0.20*	0.01	−0.14	0.24**	–		
Subjective vitality (T1)	1–7	5.01	1.06	0.87	−0.32	−0.33	0.43**	0.12	0.18*	−0.11	−0.15	–	
Subjective vitality (T2)	1–7	3.69	1.26	0.89	0.08	−0.57	0.22*	−0.05	0.26**	−0.14	−0.31**	0.27**	–

* $p < 0.05$; ** $p < 0.01$.

Differences Before and During Lockdown

Results from M1 showed that the within-individual variance over time was statistically significant for autonomous goal motives ($\sigma^2 = 0.81, p < 0.01$), controlled goal motives ($\sigma^2 = 1.40, p < 0.01$), and subjective vitality ($\sigma^2 = 1.80, p < 0.01$). Additionally, between-individual variance was also statistically significant for controlled goal motives ($\sigma^2_{\tau00} = 0.42, p < 0.05$), and subjective vitality ($\sigma^2_{\tau00} = 0.36, p < 0.01$), indicating that there were cross-time differences in athletes' means on both variables. Between-individual variance was not statistically significant for autonomous goal motives ($\sigma^2_{\tau00} = 0.04, p > 0.05$). Furthermore, the ICC values indicated that the percentage of total variance produced by differences across individuals (between-individual variation) were as follows: autonomous goal motives = 4.8%; controlled goal motives = 23%; and subjective vitality = 17%.

Results from M2 indicated a significant decrease in autonomous goal motives ($\gamma_{10} = -0.30, p < 0.01$) and subjective vitality ($\gamma_{10} = -1.33, p < 0.01$) during the lockdown; however, there was no significant change over time in controlled goal motives ($\gamma_{10} = 0.20, p > 0.05$). Additionally, results from M3 revealed that there were no differences in the linear growth trajectories across individuals for controlled goal motives ($\sigma^2_{\tau11} = 0.61, p > 0.05$), and subjective vitality ($\sigma^2_{\tau11} = 0.46, p > 0.05$). There was significant variability, however, in the rate of change for autonomous goal motives ($\sigma^2_{\tau11} = 0.48, p > 0.01$). See Table 2 for the results of M1, M2, and M3.

Path Analysis

The hypothesized model (see Figure 1) presented an adequate fit to the data: $\chi^2(7) = 7.33, p > 0.05$, RMSEA = 0.020, CFI = 0.991, TLI = 0.981, and SRMR = 0.048. The results, controlling for T1 variable values, showed that resilience did not directly predict changes in subjective vitality ($\beta = 0.04, p > 0.05$). However, resilience in T1 positively predicted changes in athletes' autonomous goal motives ($\beta = 0.31, p < 0.01$), which in turn positively predicted changes in subjective vitality during lockdown ($\beta = 0.18, p < 0.05$). These results indicate that athletes

with lower resilience reported a more pronounced decrease in autonomous goal motives over time and that athletes with greater decreases in autonomous goal motives over time exhibited more marked decreases in subjective vitality.

Results also revealed that resilience in T1 did not predict changes in athletes' controlled goal motives ($\beta = -0.15, p > 0.05$). However, changes in athletes' controlled motives negatively predicted changes in subjective vitality ($\beta = -0.25, p < 0.01$), indicating that athletes with greater decreases in controlled goal motives over time also reported less decreases in subjective vitality.

In order to test the hypothesized mediational effects, the significance of indirect effects was tested by bias-corrected (BC) bootstrap 95% confidence intervals (CIs) and its effect size with the P_M value or mediation ratio, which has been proposed as one of the effect size measures for mediation models (Preacher and Kelly, 2011). The indirect effect of resilience on subjective vitality through autonomous goal motives was significant ($IE_{a1b1} = 0.11$; BC bootstrap 95% CI = [0.02, 0.30]; $P_M = 0.58$), with the P_M value indicating that around 58% of the total effect of resilience on subjective vitality was mediated through autonomous goal motives. However, the expected mediational role of controlled goal motives was not supported ($IE_{a2b2} = 0.07$; BC bootstrap 95% CI = [-0.002, 0.25]; $P_M = 0.47$).

DISCUSSION

During the uncertainty and lockdown restrictions caused by the COVID-19 pandemic, athletes had to dramatically adapt their daily routines and functioning in regard to their sport training, planned competitions, and their lives in general (Pillay et al., 2020; Schinke et al., 2020). Given these challenging circumstances, the main purpose of this study was to analyze through a time-lagged design the impact of lockdown on an indicator of athletes' eudaimonic well-being (i.e., subjective vitality) and goal motives. There was also interest in examining the role of dispositional resilience and the form of motivation (i.e., autonomous, controlled)

TABLE 2 | Change in goal motives (autonomous and controlled), and subjective vitality over time.

Parameter	Autonomous goal motives		Controlled goal motives		Subjective vitality	
	Estimate	SE	Estimate	SE	Estimate	SE
M1. Random intercept model						
Within-individual variance (σ^2)	0.81**	0.10	1.40**	0.18	1.80**	0.16
Between-individual variance ($\sigma^2_{\tau00}$)	0.04	0.08	0.42*	0.17	0.36**	0.13
M2. Linear growth model						
Intercept (γ_{00})	6.04**	0.08	2.53**	0.12	5.01**	0.10
Time (γ_{10})	-0.30**	0.11	0.20	0.15	-1.33**	0.13
M3. Random slope model						
Intercept (γ_{00})	6.04**	0.07	2.53**	0.11	5.01**	0.10
Time (γ_{10})	-0.30**	0.11	0.20	0.15	-1.33**	0.13
Slope ($\sigma^2_{\tau11}$)	0.48**	0.16	0.61	0.32	0.46	0.24

SE, standard error. * $p < 0.05$; ** $p < 0.01$.

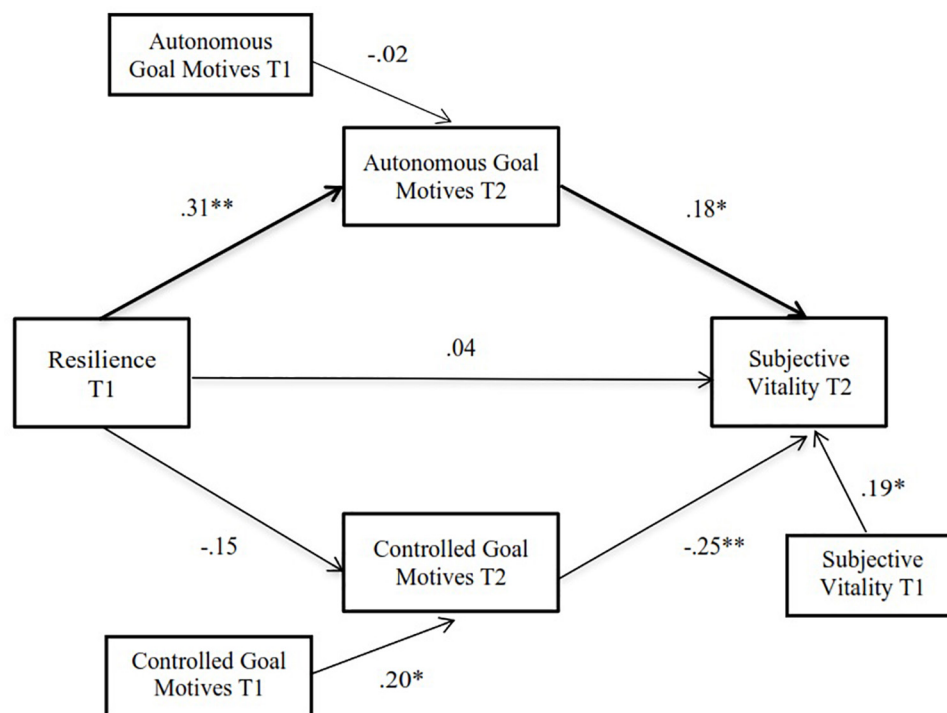


FIGURE 1 | Path model of the associations between resilience, autonomous and controlled goal motives and subjective vitality over time. Statistics are standardized regression coefficients. Bold lines represent significant indirect paths. * $p < 0.05$; ** $p < 0.01$.

underlying athletes' goals in relation to athletes' changes in their subjective vitality during this new and uncertain situation. Specifically, potential changes in athletes' goal motives and their reported subjective vitality were examined, comparing their scores before and during the lockdown (Objective 1). Moreover, this study determined whether resilience predicted changes in subjective vitality, and this study tested the potential mediating role of changes in athletes' goal motives in regard to this relationship (Objective 2).

With respect to the first hypothesis, results revealed a significant decrease in both athletes' subjective vitality and autonomous goal motives during the lockdown (when contrasted with pre-lockdown values), whereas no significant change was found in controlled goal motives. In Spain, during the lockdown, athletes were not able to leave their house. They lived in a situation where they were socially restricted in their usual day-to-day activities as athletes and of course, as people. They had to organize their training and their everyday sport-related activities at home. As subjective vitality encompasses both somatic and psychological factors, restrictions resulting from lockdown could drain their overall sense of personal energy. During 2020, a number of studies have been conducted examining the effects of COVID-19 and lockdown on psychological health and well-being. These studies point to a substantial increase in reported psychological problems in the general population (Harper et al., 2020; Taylor et al., 2020) and a significant decrease in well-being (Yang and Ma, 2020). In sport, when comparing athletes' scores before and during the COVID-19 crisis, research has

found an increase in perceived stress (di Fronso et al., 2020) and other ill-being indicators (Lades et al., 2020). The results of the present study confirm the hypothesized negative impact of the COVID-19 lockdown on athletes' psychological responses with a significant decrease in feelings of personal energy and vitality revealed.

Aligned with prior predictions, a significant decrease in autonomous goal striving emerged when contrasting athletes' goal motives before the lockdown to what they reported during the lockdown. It seems that the lockdown, an external and uncontrollable "force," may have had an influence on athletes' more self-determined reasons for pursuing their sporting goals. Contrary to the hypothesis though, controlled goal motives did not increase from pre-lockdown to lockdown. As they were socially and logistically restricted in their typical activities because of the virus and government restrictions, it was expected that the athletes would view their goals as more regulated by external factors. However, the present findings suggest that among the present sample of athletes, their sport goals as they went from pre-lockdown to during lockdown were not more fueled by controlled reasons. That is, it seems that during this time period, their motives for goal pursuit were less intrinsic and identified (i.e., pursuing the goal because of personal volition, interest, and personally valued implications of achieving the goal) but not more based on extrinsic and identified factors.

Regarding the second hypothesis, a model was tested, which postulated that resilience would predict changes in autonomous and controlled goal motives, which in turn would

predict changes in subjective vitality during the time period of interest (i.e., pre-lockdown and during lockdown). In line with the hypothesis, resilience, through its effect on autonomous goal motives, positively and significantly predicted changes in subjective vitality. Athletes with higher resilience showed more pronounced increases in autonomous goal motives over time, and athletes with greater increases in autonomous goal motives exhibited greater increases in subjective vitality over time. Or the other way around, athletes with lower resilience showed greater decreases in autonomous goal motives over time, which in turn corresponded to greater decreases in subjective vitality over time. These results support previous evidence regarding the adaptive impact of resilience in adverse situations and its positive contribution to athletes' well-being (Gupta and Sudhesh, 2019) and self-regulation (Brown et al., 2015). Further, the present findings are consonant with past studies grounded in the SCM, which have found that autonomous goal motives positively predict well-being (Smith et al., 2011; Healy et al., 2014).

Contrary to the hypothesis, resilience did not predict also changes in controlled goal motives. In spite of the evidence indicating that resilience is linked to diminished ill-being (Sarkar and Fletcher, 2014; Codonhato et al., 2018; Wagstaff et al., 2018), there is less research on the implications of resilience on motivation-related processes that may be operating in any relationship between this personality disposition and well-being or ill-being outcomes. In line with current findings, past research has found that when the predictor was a positive personality variable (e.g., self-oriented perfectionism and resilience), only autonomous motivation was a significant mediator between this personality factor and well-being or ill-being. In previous research and aligned with present results, controlled motivation did not play a significant mediational role (Atienza et al., 2020; León-Guereño et al., 2020). Therefore, results suggest that resilience can act as a promoter of well-being through ensuing increases in autonomous goal motives, without influencing the controlled goal motives over time.

Concerning the interplay between controlled goal motives and well-being, the present results revealed changes in controlled goal motives to negatively predict changes in subjective vitality. That is to say, athletes with greater decreases in controlled goal motives over time exhibited less decrement in reported subjective vitality. Therefore, those athletes who most decreased in their controlled goals during confinement were able to maintain higher levels of subjective vitality. These results are in line with previous evidence that has supported a negative relationship between controlled goal motives and indicators of well-being (Healy et al., 2014; Gaudreau and Braaten, 2016).

The results of the present study correspond to findings of previous sport studies grounded in the SCM. That is, the results are consonant with past findings indicating that autonomous goal motives, and conversely for controlled motivation, will lead to better well-being (e.g., Smith et al., 2007, 2011; Gaudreau and Braaten, 2016) and, specifically, to better subjective vitality (e.g., Healy et al., 2014). Moreover, the present findings contribute to the literature by indicating that autonomous goal motives, as

one psychological mechanism, mediate the relationship between resilience and subjective vitality. In regard to study limitations, it should be noted that all the participants were university-level athletes participating in team sports. Further research might explore the relationships of interest in athletes from individual sports and from other age groups. In addition, the results of this study have been obtained in specific circumstances resulting from the COVID-19 pandemic. Thus, caution should be taken in generalizing present findings to other stressful, uncertain, and unusual circumstance. Finally, it should be taken into account that in this research, a relative stability of resilience over time was assumed, that is, the presumed more dispositional nature of this variable (Block and Kremen, 1996; Klohnen et al., 1996; Friborg et al., 2003). For this reason, resilience was only measured once during the study. Other research employing longitudinal designs conducted in other contexts have assessed resilience (as the key dispositional/individual difference factor) only once (e.g., Ayala and Manzano, 2014). In the sport domain, there are limited longitudinal studies examining resilience over time. Existing evidence has not found significant differences when resilience has been measured at different time points during the competitive season (Secades et al., 2016). However, in a recent review, Bryan et al. (2019) found past studies suggesting that resilience can also be more dynamic, which could change and potentially develop through the learning obtained from experiencing adverse situations (McLarnon and Rothstein, 2013). Accordingly, future sport research could consider measuring resilience more than once in order to give light to this matter regarding the assumed stability of athletes' resilience over time.

Despite these limitations, this study contributes to the knowledge base regarding the benefits of resilience. The findings suggest that through its relationship with autonomous goal motives, resilience is promotive of or at least contributes to the maintenance of athletes' well-being in spite of adverse situations. Thus, these results confirm the importance of including personal dispositions in the study of self-regulation processes. The present research provided further understanding of the interplay between resilience–goal motives–well-being and as such is relevant to researchers but also informative for sport practitioners who may need to implement interventions with athletes who are struggling during particularly challenging times. During the current COVID-19 pandemic, a wide range of online programs have been available with the aim of maintaining people's well-being and diminishing any negative impact of the lockdown and uncertainty on psychological health. From an SDT perspective (Deci and Ryan, 1985, 2000), researchers have developed interventions with the objective of promoting well-being during the lockdown. Results suggest that participants who have received the intervention (basic psychological need-satisfying activities during 10 days), self-regulated more autonomously, reported higher well-being, and exhibited lower levels of stress (Behzadnia and FatahModares, 2020). With such findings in mind, these results encourage researchers to specifically develop and implement interventions oriented to promote athletes' more autonomously regulated goal striving.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the University of Valencia. The patients/participants provided their written informed consent to participate in this study.

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AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Sport Cyberpsychology in Action During the COVID-19 Pandemic (Opportunities, Challenges, and Future Possibilities): A Narrative Review

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Interest in sport cyberpsychology has become more popular over the last decade, primarily due to the increased use of technology and the online world, including social media, within sport settings (Hurley, 2018). In 2020, this became even more apparent for many athletes, their support teams and their sport organisations, when their professional and social worlds became cyber-dominated due to the COVID-19 pandemic. Many challenges were encountered by: (i) the athletes, in their efforts to remain active and well during this time when all competitions were cancelled and (ii) the healthcare professionals, working with these athletes, in their efforts to continue to support the athletes, when severe travel restrictions and social distancing were in place for considerable periods of time. The purpose of this paper, using a narrative review process, is to present and scrutinise an array of Internet interventions, remote psychological supports and applications (apps) that the athletes and their support personnel used to help them meet their physical, social, and emotional needs during the pandemic. The beneficial and restrictive features of these online options will be presented. Two main themes will be considered in order to focus this discussion, namely, (i) the potential physical and mental opportunities and challenges using the online world extensively during this time presented for the individuals working in sport and (ii) suggestions for how such online interventions used by the athletes, their coaches and sport science personnel during the pandemic may be maintained in some positive ways into the future, to help the athletes prepare for their upcoming competitions, their training and their future careers when they retire from elite sport.

Keywords: sport cyberpsychology, COVID-19, technology, pandemic, social media, video analysis, GPS, online consulting

INTRODUCTION

Competing at major sport events, such as an Olympic Games, are often the culmination of years of preparation and competition for many athletes. However, in 2020, the COVID-19 pandemic halted competitive sport across the globe, much to the distress and disappointment of these athletes, their support personnel, sport organisations and the sponsors of these events (Hytner and Butler, 2020;

McCurry and Ingle, 2020; O'Connor, 2020; RTE, 2020). Their worlds, like so many other groups, also became dominated by online interactions. This has resulted in some major challenges for many of these athletes, such as: (i) how to identify themselves, when they were not able to compete and earn a living from their sport, and (ii) how to remain active, fit and holistically well when their training venues were closed and they were forced to spend long periods of time in isolation, like so many other populations (Schinke et al., 2020).

The potential negative health risks, excluding the threat of contracting covid-19 itself that the imposed restrictions and necessary isolation periods presented for many of these individuals have been, in some ways, similar to the general population (Schinke et al., 2020). For example, increased sedentary behaviours [see Chtourou et al. (2020) for a comprehensive review of the importance of physically activity during the pandemic], poorer dietary choices and unhealthy levels of alcohol consumption are coping strategies frequently linked with lower levels of physical and psychological well-being (Ingram et al., 2020; López-Bueno et al., 2020) and like many groups during the pandemic, athletes may also have employed some of these coping strategies when prevented from training daily with their peers in their typically disciplined environments. Also, within the general population, for which athletes make up a proportion, increased levels of domestic abuse, violence and mental health distress, including suicide rates, have been reported throughout the pandemic (Schinke et al., 2020). However, athletes may have experienced specific challenges unique to their cohort too, such as various forms of mental health distress (Davis et al., 2020; FIFPRO, 2020; Hull et al., 2020) and the pressure of public expectations (Foskett and Longstaff, 2018) to be national and international 'leaders' in promoting healthy coping strategies throughout the pandemic. They may have felt obliged to take part in various sport challenges, as well as to communicate public health messages to their, typically large, fan-base, using their online social media platforms, for example (Sharpe et al., 2020).

In contrast, however, some athletes may have opportunistically used the 'lock-down' time during the pandemic in a positive way, to 'upskill' perhaps in preparation for their lives after sport (MacIntyre et al., 2020; Schinke et al., 2020). However, engaging in these activities for some athletes may have also triggered an enforced acknowledgment of the precarious nature of a sport career (Schinke et al., 2020). That said, in studying the impact of the pandemic, both personally and professionally on Spanish Olympic and Paralympic athletes, Clemente-Suárez et al. (2020) reported that some athletes appear to have coped well when restrictions were placed upon them. Clemente-Suárez et al. (2020) proposed that this was, perhaps, due to these athletes' additional cognitive resources and abilities that they could call upon from their specific, sport-developed, and coping skills. Further, they reported that the athletes who participated in their study appeared to remain within non-pathological parameters for anxiety during the pandemic. They also noted that the educational status of the athletes in their study appeared to play a role in their ability to develop psychological flexibility during the pandemic, with third level (college/university) educated

athletes appearing to display this more than their high-school educated counterparts.

Psychological flexibility refers to the ability to be able to positively adapt to changing situations as they arise (Clemente-Suárez et al., 2020). Applying this ability has been shown to psychologically benefit a number of populations throughout the pandemic (Landi et al., 2020). A large part of the challenge facing many athletes has also been applying such an ability throughout 2020. Their additional skills, such as their typical levels of conscientiousness and effective scheduling of their daily activities to help them maintain their athletic performances prior to 2020, could also have helped them to manage their disrupted lives when the pandemic began. To explain, while as human beings athletes are no less potentially prone to distractions and disruptions in their daily routines as other members of the general population are, many of them do train themselves to respond in positive ways to such situations and to be solution-focused when they occur. Thus, many athletes may have aimed to maintain some form of that 'normality' throughout 2020 by using their routine-management skills (Pierce et al., 2018; Kendellen and Camiré, 2019). For many of these athletes' support providers, helping them to achieve this sense of some control and 'normality' over their lives during the pandemic was also a likely priority (Earley, 2020a,b; MacIntyre et al., 2020; Whales et al., 2020). From such a support personnel perspective, how to advise and help these athletes, while severe travel restrictions and social distancing has remained in place throughout 2020 has been challenging. Technology use has been at the core of the solution-focused strategies used by many athletes and their support providers, as it has been for other service providers (Seshadri et al., 2020) dealing mainly with the general public, where patient monitoring has been required (for example, medical consultants, general practitioners (GPs) and physiotherapists). Luckily, in recent years, many athletes and their support scientists have worked together to produce advanced technologies that effectively record training data and allow them to communicate remotely when necessary (Hurley, 2018). Never have such developments been more potentially valuable than during the 2020 coronavirus pandemic. So, with all of the above in mind, questions such as: (i) what tools and techniques, with the help of some of these advanced technologies, have the athletes and their support personnel relied upon to help them to continue to make progress with their training and service provision throughout the pandemic, (ii) what performance and data monitoring, even when in enforced isolation and travel restriction situations, have they been able to apply effectively and (iii) what benefits and limitations do such technology-based performance, health and lifestyle data systems offer to athletes, especially considering their mental health needs during this time of great uncertainty throughout 2020, are worth exploring. Thus, the purpose of this paper is to consider, and provide some answers to the above questions, by completing a narrative review of research in the relevant areas. An array of technology-based-internet interventions, remote psychological supports and applications (apps) that athletes and their support personnel have used during the pandemic to help them to meet their physical, social, and emotional needs will be discussed.

The information will be presented under the following nine main headings: (i) A brief overview of the 'scene,' including an explanation of the term sport cyberpsychology, (ii) video analysis technology use, (iii) virtual reality technology use (iv) global positioning system (GPS) technology use, (v) wearable applications (apps), that monitor various relevant activity levels, sleep behaviours and calendar/scheduling features, for example, (vi) online sport psychology consulting during the pandemic (benefits and threats), (vii) online delivery of training and coach development during the pandemic, (viii) athletes' use of social media during the pandemic and, finally, (ix) some conclusions and final thoughts, including future research possibilities moving forward to the end of 2020 and into 2021.

A BRIEF OVERVIEW OF THE 'SCENE' – INTRODUCING THE TERM SPORT CYBERPSYCHOLOGY

Before the various technologies used are outlined, a relevant psychological term, sport cyberpsychology, should first be explained. In simple terms, sport cyberpsychology could be described as the study of cyberpsychology within sport settings, which prompts the question: what is cyberpsychology? In brief, Kirwan (2016a) described the discipline as: (i) the study of how people interact with each other when using technology, (ii) technology development for the benefit of users' requirements, and (iii) the examination of how technology specifically impacts psychological states and behaviour. Hurley (2018) proposed sport cyberpsychology to be the study of how humans interact with various technologies, including the Internet, mobile devices, virtual reality and gaming systems within sport settings, and how such technologies, including social media use, for example, impact athlete behaviour and well-being. Over the past two years especially, a number of studies have supported the previously, and predominantly anecdotal evidence, that various new technologies used within sport settings are enabling athletes to prepare for, and compete better in, their sport (Figueira et al., 2018; Torres-Luque et al., 2018; Bedir and Erhan, 2020; Lund, 2020). Technologies using virtual reality and GPS tracking, as well as various mobile apps are constantly being designed to give more accurate, objective measures to athletes and their coaches regarding their performances (Earley, 2020a,b), as well as monitoring and providing them with feedback on their recovery status (i.e., their sleep quality, sleep quantity and heart rates; Peake et al., 2018). In the world of sport, where competitive performances are typically based upon very objectively measured, numerical data (rather than performance judgements of others, which notably are still in place in sports such as boxing, gymnastics and diving, for example), athletes and their support personnel have responded enthusiastically to the emergence of these new technologies (Farrell, 2019). The reason why is perhaps because they can provide them with more objective data, that gives them specific information on aspects of their training and recovery that historically could only be determined, to some degree, via subjective and, therefore, somewhat less reliable, self-report measures (Robson, 2016;

Smith, 2017). Of course, many of the available technologies (mental well-being apps, for example) can also be used by athletes and their support staff to continue to document and record their psychological states, such as their perceptions of their emotions, on a daily basis. Many teams gather such helpful data from their athletes in order to monitor their well-being and in order for them to decide how best to continue supporting the athletes. Some of the benefits and limitations of these specific types of technologies athletes and their support personnel have been using during 2020 to help them maintain their training standards and general wellbeing, both physically and mentally, will now be considered.

VIDEO ANALYSIS TECHNOLOGY USE

The use of video technology to record and analyse the movements of athletes as they train and compete in real-time in order for often-specialised sport scientists (typically biomechanics experts) to identify areas for technique improvement, has been in place for a number of years (Hurley, 2018). The science of biomechanics has become an integral part of sport performance, not only for performance benefits but also, importantly, for injury prevention and rehabilitation purposes (McGinnis, 2013). However, video analysis has also been introduced into various sport settings for other beneficial purposes, such as into stadia to help officials make on-field decisions regarding the scoring of goals, tries or points. They also help them to review and adjudicate potential illegal actions by athletes during competitive events and then whether or not to issue various penalties, such as red, yellow or black cards in sports such as soccer, rugby, tennis, basketball and Gaelic football for example (van Biemen et al., 2018; Sors et al., 2019). Video play back has also become part of the normal spectator and fan-experience when watching sport, either from their homes or in person in stadia during breaks in competition or play (Arkenberg et al., 2019).

Throughout the pandemic, athletes have been able to use their smartphone devices' camera function to video record their own training sessions (Whales et al., 2020). They could then share these recordings after or indeed, 'live,' with their coaches and sport science personnel (as well as with their social media followers quite often throughout 2020). Such mobile technology is very useful for the athletes and their support teams because it can be employed anywhere. Its use is not confined to the formal training venue as may have been the case in the past. Some research studies have identified both the strengths and challenges this technology presents in modern day sport (Groom, 2012). Various physical and mental benefits of using video technology during the pandemic for athletes and their coaches could have included: (i) the objective nature of the data recorded – it is real and evident for all to see, (ii) its ability to help keep the athletes accountable and motivated to train (for example, if such video evidence of completing training sessions was requested by coaches and the athletes' various support staff), (iii) its potential ability to improve athletes' self-efficacy (self-belief) and mental imagery skills (Buck et al., 2016), as well as (iv) its use in positively aiding their

decision-making skills (Pagé et al., 2019) and pre-performance routines (Cotterill, 2018). However, the challenges of using such technology can also include: (i) the pressure it potentially places on athletes who may not feel comfortable recording themselves on camera, (ii) the sense they may have that their training is always being observed and scrutinised rather than them being trusted to complete various sessions without such objective video evidence (Ogden, 2011), and (iii) the feelings of guilt or disappointment they may experience at not 'being perfect' in their execution of their skills when they watch-back the video evidence of their performances (Middlemas and Harwood, 2017; Harris, 2018). These are all issues that individuals supporting athletes should be aware of and discuss with them in advance of requiring or encouraging such video recordings of athletes' training sessions. Such discussions can ensure a best-practise, athlete-centred approach, regarding how to proceed or how to modify training sessions for the duration of the pandemic, to the satisfaction of all concerned. This approach is more likely to help maintain the desirable 'facilitative' sport environment, where athletes are challenged and are also well-supported (Sarkar, 2018).

VIRTUAL REALITY TECHNOLOGY USE

Virtual reality and immersive technology advances have enabled athletes to train in simulated environments when they cannot train in their real-life environments due to, for example, adverse weather conditions, injury or the very nature of the sport (Farley et al., 2020). Training of medical, military and aviation personnel using this technology has also been beneficial in recent decades (Langfield, 2019). The use of virtual reality and immersive video technology to enable athletes to specifically practise their reaction time skills, their decision making skills as well as their concentration skills when they are not able to compete, such as when rehabilitating from injury, for example, has been a positive application of this technology for a number of years (Panchuk et al., 2018; Farley et al., 2020). VR technology has also been used effectively to treat clinical conditions including anxiety, paranoia and phobias across various populations (Coyle et al., 2011; Gega et al., 2013; Flood, 2016; Kirwan, 2016b).

During 2020, VR technology could have offered a way for athletes to immerse themselves in some form of their sport environment that mimicked their 'real' competitive worlds, including the use of gaming options perhaps (Hurley, 2016; Kirwan, 2016b), when they could not physically experience them due to the suspension of all sport, especially in the earlier months of 2020. They could also have used VR technology for the purposes of computerised cognitive behavioural therapy (cCBT; Twomey et al., 2013), if required, as such computerised therapy can be therapist-lead or self-lead. Both could have been good options to have access to during the pandemic, when in-person CBT was frequently not feasible for psychologically distressed individuals, including those from within sport settings. However, while VR technology can be somewhat beneficial to athletes for the reasons stated above, the feasibility of using such technology during the pandemic, when most athletes would not have been

able to access the most sophisticated versions of such technology in their own homes, for example, is a main limitation of such VR training. It is also important to note that even the most advanced VR devices and advances in haptic technology do not exactly mimic the performance setting (Wang et al., 2019). This technology, that attempts to create kinaesthetic communication or '3D touch' by applying forces, vibrations and motions to the user remains limited. For example, its ability to recreate the exact 'reality' of the setting and experiences which athletes sense and perceive when they train and compete, physically is restricted. Further research on such features of VR technology would be welcomed across many sport-specific and other performance settings (in surgery, for example, where VR training has been used extensively to training and assess surgeons' psychomotor skills; Hofstad et al., 2013).

GLOBAL POSITIONING SYSTEM (GPS) TECHNOLOGY USE

Global positioning system technology has revolutionised the sport performance industry. This satellite supported system allows the movements of individuals and objects (such as cars) to be detected. GPS technology typically measures the velocity, direction and speed of performers, making it effective technology for team coaches, strength and conditioning, and medical personnel, who design the training programs of the athletes to have access to The Hard Yards (2017). It can also help them to make decisions regarding athlete selections and substitutions, even in real time during matches or competitions (Earley, 2020a). Most elite athletes and teams use some form of this GPS technology to assist them in their training. In 2020 many companies have been actively assisting athletes to train remotely using their devices (Earley, 2020b). These companies have designed fitness wearable performance devices (see below for more details on these) incorporating elements of GPS technology, to enable the athletes and their coaches to accurately track specific aspects of their training. See Dellaserra et al. (2013) and Earley, 2020a,b for a review of some of the uses of various integrated technologies in team sports, including GPS devices). Such technology has been found to be effective in its testing and recording of performance markers of strength, power and flexibility, all of which are important measures to have in regard to rehabilitation from injury and for performance enhancement potentially.

WEARABLE APPS – ACTIVITY LEVELS, SLEEP BEHAVIOURS, PSYCHOLOGICAL STATE MONITORING AND CALENDAR/SCHEDULING FEATURES

Using wearable devices to monitor physical activity levels, psychological states, heart rates, sleep, diet, and recovery has been an area of research interest for a number of years, likely due to the dramatic increase in the number of individuals employing them for such purposes in their training and daily

lives (Peake et al., 2018). The use of activity tracking apps to encourage beneficial levels of physical activity among elite and non-elite populations have been more extensively and scientifically studied in recent years also (Peake et al., 2018). This is a welcome development as initially most of the available research examining the strengths and limitations, even dangers perhaps, of such app use was somewhat questionable. This was, perhaps, due to such research often being commissioned by the companies developing and selling the apps. These companies would, understandably, wish for them to be viewed in a mainly positive and beneficial way. However, this can also result in potential conflicts of interest when interpreting the results from such studies (Peake et al., 2018). However, companies and researchers have improved their methods of research in recent years and the general public has also become better informed regarding the different available products and their limitations, as well as their strengths. For example, a positive application of such wearable devices is that they may help people to develop autonomy, self-efficacy, and accountability strategies for engaging in their own physical activities. However, negative outcomes of their use in regard to such constructs in some specific populations have also been reported. For example, Kerner and Goodyear (2017) examined the use of wearable health technologies (Fitbit) by adolescents, in the context of the behaviour change, self-determination, theory (SDT; Deci and Ryan, 1985, 2000, 2008). SDT strives “to explain human motivation and behaviour based on individual differences in motivational orientations, contextual influences on motivation, and interpersonal perceptions” (Hagger and Chatzisarantis, 2008, p. 80). SDT assumes that individuals seek out challenges and are intrinsically motivated, that is, they are growth-oriented, they seek out activities they are interested in and find inherently enjoyable (Standage et al., 2014). SDT proposes that the greatest well-being and performance benefits are reportedly experienced when individuals’ needs for relatedness (feelings of closeness and being connected with others as part of a community), autonomy (feeling in control of personal actions), and competence (feeling capable of being able to complete desired activities using available skills) are met. The young participants in Kerner and Goodyear’s (2017) study reported feelings of pressure to compete with their peers in the activity challenges set for them as part of the study, as well as feelings of guilt if those targets were not achieved. Their need satisfaction and autonomous motivation reduced as the 8-week study progressed while their amotivation increased.

In contrast to Kerner and Goodyear (2017) and Kononova et al. (2019) examined the use of activity tracker use among older adults, in varying stages of their use of the technology (non-use, short-term use, long-term use and abandoned use). They considered the older adults’ behaviours regarding their physical activity engagement, using the tracker-technology, in the context of a different behaviour change model, that of the transtheoretical model of behaviour change (TTM; Prochaska and DiClemente, 1983). This stage-like model regards behaviour change as happening gradually, over time, by progressing through a series of stages or processes labelled as: pre-contemplation, contemplation, preparation, action and maintenance. Additional

stages such as termination and relapse have also been considered as part of this model. Kononova et al. (2019) reported that intrinsic motivation and social support were important in determining the longer-term use of such tracking devices by older adults. They remarked that such beneficial technology is underused among these populations, that younger populations are often the target groups for such activity apps, despite the importance of physical activity in helping to prevent diseases more prevalent and associated with aging populations. This is an area for potentially exciting practical implications in the coming years.

During the pandemic, the activity tracking apps referred to above, that monitored individuals’ daily step allocation for example, appeared helpful to encourage people across many cohorts to stay fit and active, even when their usual travel and movements were severely restricted. As alluded to above, the social support communities that such activity apps can create and provide for users can be effective (Petersen et al., 2020). Some of the specific beneficial features of this technology can include the motivational and reminder messages the apps communicate to their users. However, the advice offered by such devices can also be somewhat arbitrary and, at times, meaningless and non-sensical. For example, why is 10,000 daily steps seen as a meaningful measure of health? Despite this metric being a widely reported and used target for health benefits and maintenance, research support for this activity target is surprisingly lacking (Hammond, 2019; Lee et al., 2019). Thus, the notes of caution for such device-use should also be acknowledged. Specifically, for example, within elite sport settings their use could result in some individuals feeling under pressure to engage in excessive levels of activity, if they become ‘too’ competitive with others in their social or competitive community, or even with themselves, if they aim to constantly ‘beat’ their daily personal bests (PBs). Such behaviours may then lead to injuries, burnout and psychological distress. Perhaps weekly activity ‘ranges’ or ‘zoned’ targets such individuals could be encouraged to reach may be a more positive strategy to apply in these contexts. Rest days, where a lower activity load is applied is factored into the activity schedules of athletes. This is important to enable the athletes’ bodies to recover from their high training loads. Recovery emphasis and individual tailoring of activity programs should be a focus of support staffs’ discussions with their athletes regarding activity tracker use, to help prevent the pressure of ‘having’ to be achieve constant PBs being experienced by the athletes. Kerner and Goodyear (2017) recommended that personalised health targets should be encouraged when aiming to support young people, athlete or not, to personally and critically engage in health-based activities. Kononova et al. (2019) also suggested that designers of these technologies apply a multi-factor approach (at an individual-level, interpersonal-level and community-level) to ensure varying populations maintain the recommended and generally regarded appropriate physical activity targets with the assistance of the available technology based activity trackers.

Similar to physical activity monitoring, sleep monitoring has become a feature of interest for many athletes to track also. While understandable as a feature of curiosity in their daily

lives, especially considering the comments above regarding the importance of adequate rest and recovery for such individuals, it can also be paradoxically unhelpful, for some people. If the recorded data on their app indicates they are not appearing to spend the recommended 7 h to 8 h 'asleep' or in certain recovery stages of their sleep cycle in order to obtain the best levels of recovery and performance in their activity-dominated lives, they may become distressed by this available data. There is much variation in the accuracy with which such devices can accurately record sleep patterns. For example, many are negatively impacted by how much an individual moves or turns from one side of the body to the other during sleep (Lee et al., 2018). Therefore, instead of such recorded data being helpful, it can become a source of pressure and psychological distress for some individuals, perhaps then leading to an ironic, further disruption of, and negative impact on, the individual's sleep patterns (Chen, 2019). App designers should attempt to refine their sleep monitoring features to address these limitations, or at a minimum, clearly state these limitations to their users, as many are not aware of them when they purchase the technology.

In addition to sleep monitoring, psychological state tracking, using various health-focused apps, has also become a feature of athlete screening in many sport settings in recent years, especially within elite domains. Some companies have incorporated health features into their wearable devices that provide stress level indicators to the user (such as sleep quality, exertion levels and sympathetic nervous system responses – including heart rate – for example). These indicators then provide the user with an overall 'stress management score' (Watters, 2020). These stress management indicators are then often followed by recommendations for sessions that users could engage in, using the same app, to help them positively adjust their mental states, and restore a degree of 'balance' to their physical and mental health levels, if deemed necessary. Fitbit, for example, has added a Stress Symphony musical feature to their health tracker offering to help wearers manage their stress levels (Fitbit Staff, 2020). In elite sport settings, support staff often ask athletes to rate their perceived fatigue levels pre-and-post training, their perceived effort after training, their mood state and their perceived pain levels, for example (in addition to such staff having access to GPS data that objectively measures some of the actual effort outputs of the athletes during the same training or competition sessions). Bush et al. (2019) reviewed some of the available literature on monitoring such psychological health features using various apps across various cohorts, considering specifically their use for self-management, supportive care, symptom tracking and skill training. They reported that while the benefits of these digital options include their ease of access and cost-effectiveness, empirical research regarding, for example, their more clinically targeted effectiveness is somewhat limited. However, that said, benefits for their use in the treatment of conditions such as depression (Watts et al., 2013), anxiety (Grassi et al., 2011), alcohol consumption (Fowler et al., 2016), and eating disorders (Juarascio et al., 2015) have been indicated. Smartphone technology has also been employed, for example, to assist in the detection of early warning signs regarding the onset of a manic

or depressive episode in individuals diagnosed with bipolar disorder (Puiatti et al., 2011). Therefore, such technologies' ability to assist in psychological screening on some level should not be dismissed outright. However, Bush et al. (2019) did also advise some notes of caution regarding their use, including the 'overselling' of their effectiveness by their designers (based upon insufficient clinical trials, for example), as well as data privacy and regulation issues.

Additional useful features of some smartphones and wearable devices are their abilities to record and present the amount of time individuals spend engaging in other online activities when using the devices (such as the amount of time spent emailing and using popular social media platforms for example, such as Instagram, Twitter, Facebook, and LinkedIn). These features can be beneficial for athletes to 'track' too, in order to help them remain aware of their schedules and see where they could be more productive in how they spend their time. During the pandemic, when typical social daily activities have been very limited, ways to fill daily schedules could be adapted and apps that could help the athletes and their support personnel to do this, such as by using calendars that synchronise across various online devices (i.e., smart phones, ipads, laptops, and desk-top computers) and among multiple-group-members were likely to have been useful.

In summary then regarding the above considered wearable health-related apps being used within sport settings, it is wise to remember that athletes by nature are typically competitive people, therefore, both they and their support personnel are advised to closely monitor the signs that they could be becoming pre-occupied with their app 'data.' Discussing openly the above cited potential dangers of such app use with them and giving honest advice regarding their beneficial use, as well as the limitations of such data monitoring features is advised (as outlined above). Once the users of such apps have the appropriate information regarding them they can then decide what data is helpful and unhelpful for them to have access to. They can also then aim to modify their behaviours accordingly where appropriate. For example, setting weekly and monthly targets that should not be exceeded, as recommended above, can be an appropriate way to ensure at-risk athletes do not engage in excessive levels of activity to the detriment of their health and well-being. Encouraging them to engage, and indeed schedule in appropriate recovery and rest periods or days into their routines can be a way to effectively manage such situations (see Peake et al., 2018).

A final note of caution regarding any of the above technology devices that have the above features 'build into them' is, again, their reliability and validity. How accurately they gather the 'correct' and best data for athletes to have, with regard to their specific training and lifestyles remains somewhat questionable, from an empirical research standpoint (FITPRO, 2017; Bush et al., 2019; Nelson et al., 2020). The technology should be seen in many cases as only capable of providing a 'guide' and should not lead to athletes ignoring signals from their own bodies that may be telling them to rest or not to feel guilty about engaging, or not, in some behaviours, such as social media communications, in a fun way, for example, if their wellbeing

could benefit from those activities (even if it does not seem like the most 'productive' way to spend their time according to others; The Drum, 2011).

ONLINE SPORT PSYCHOLOGY CONSULTING DURING THE PANDEMIC

Consulting online, prior to 2020, for many practitioners could have been the exception. However, in order to provide the necessary supports to athletes throughout the pandemic, 'the exception' became 'the rule.' This has not been unique for sport psychology practitioners, as cited earlier. Many other typically face-to-face service providers have had to make similar changes and adaptations to their practises (i.e., in settings such as general medicine, physiotherapy, coaching, and personal fitness training service delivery). For some practitioners, this was an easy transition because they were already offering some forms of online consulting prior to 2020. For others it has been a complete departure from their previous consultation practises. Such necessary changes may have generated great stress and unease for these individuals (Cotterill, 2020). For example, moving to an online service provision did not reduce the responsibility of such practitioners to maintain their professional and ethical standards. One worry for some service providers could have been the issue regarding online data or session information being accessed by unauthorised personnel. Such potential digital data security breaches are difficult to completely remove. Given the sensitive nature of some online psychology-based communications, such matters will likely remain a potential worry for practitioners, and their clients. This is often despite their best efforts to protect all parties involved by downloading various security and identification software features on the technology devices used to deliver such online services. For all of the above mentioned support service personnel, including sport psychologists, they have, despite these concerns, continued to provide people with much needed support services throughout the pandemic. Professional values have, hopefully, remained a priority in their online interactions with their patients and clients. For sport psychology practitioners specifically, based upon the regulations of their various societies [for example, the American Psychological Association (APA), the British Psychological Society (BPS), and the Psychological Society of Ireland (PSI)], they have endeavoured to keep in place their principles and values of: (i) beneficence ('do good' for their clients), (ii) cause no intentional harm to their clients, (iii) respect clients' individual autonomy and independence, (iv) be fair, objective, caring, compassionate, responsible, and accountable (Etzel and Watson, 2017). Maintaining such standards when unable to engage in face-to-face, in-person, consultation does present some challenges, but not ones that are unmanageable.

First, however, one important question should be asked when service provisions for athletes move predominantly online: is a consultant 'fit to practise' using such online modes of communication? New technologies have traditionally been embraced by younger generations (Cotterill, 2012; Hurley, 2018).

Being well-trained to provide any form of consultation service, both professionally and ethically, should be a key priority for all service providers. To their credit, organisations such as those cited above (BPS and PSI) have issued practitioners with guidelines and have held online training sessions to help their members 'upskill' in this regard (British Psychological Society [BPS], 2020; Psychological Society of Ireland [PSI], 2020). However, the primary responsibility lies with consultants, to allocate the time necessary to attend such training sessions and to attain the required skills in order to use the appropriate technologies professionally and correctly in their consulting practises. Assumptions regarding the digital skills and literacy of the athletes such professionals work with should also be considered in advance of using such online modes of consultation. To illustrate, when the pandemic brought about the closure of schools and colleges around the world, educators quickly had to adapt their teaching practises and 'flip' to an online mode of delivery (Mishra et al., 2020). There was a general assumption that the service providers (teachers and lecturers in this case) possessed all of the high-level technology skills in order to deliver the required material using this delivery mode, on such short-notice. Many people, such as the parents of children, and college students, not able to attend school or college physically during extended periods throughout 2020 due to various nations' efforts to stop the spread of the coronavirus, soon discovered that this was not necessarily the case (Devitt et al., 2020). Expectations need to be managed regarding such online delivery of services in the future. That a consultant or athlete is an expert in using or managing all aspects of the available technology to consult online should not be assumed. Once honest communication is in place where both parties can feel safe in acknowledging their skill-set, could help both parties to engage in meaningful communications without unfavourable judgements happening about either party if something 'goes wrong' with the technology used during any online session. So what can go wrong, and what, specifically, what are the benefits, and threats, when providing such consulting services online?

BENEFITS OF ONLINE CONSULTING

The obvious benefit of consulting online, or 'remotely,' is that it removes the location barriers that historically would have existed when athletes and their support staff could only interact if they were 'physically' in the same venue or location. Such remote communications throughout the pandemic, using technologies such as Zoom, Microsoft Teams, Skype, Facetime and Webex, have enabled those involved in such service provision professions to remain safe from the threat of the coronavirus, as was the immediate priority from a public health perspective, while still being able to 'do their job,' most often from their own homes. The ability to record aspects of some online meetings and sessions using the available technology could also have been a benefit in some consulting environments, if deemed appropriate. Of course, this should only be used when all of the ethical issues around transparency, privacy and consent have been addressed prior to any recordings being taken.

THREATS OF ONLINE CONSULTING

Online consulting for sport psychologists has also brought with it all of the challenges that technology-use typically presents in any setting, including any of the mobile-Health (mHealth) settings, as cited earlier. For example, under General Data Protection Regulation (GDPR) laws, challenges regarding privacy and confidentiality issues in the management of digital personal data may have arisen for many service providers, as alluded to earlier. Along with those considerations, satisfactory internet connectivity is necessary for both parties to be able to engage in such online consulting service communications. Internet connectivity is notorious for its instability. It can be disrupted or not as well established via the infrastructure in some areas across different parts of the world, especially in more rural or remote locations. Digital illiteracy and digital poverty can also exist for practitioners and athletes in the same way as has been identified for many members of the general population throughout 2020 (Seah, 2020), as alluded to above also. Not all individuals have the required resources to also be able to afford the often expensive technology equipment needed to engage efficiently with the online world and to avail of all of its service offerings. During the pandemic, some sponsorship and ambassador roles with some of technology companies, who have thrived during this time, may have helped some athletes to overcome these specific barriers (Earley, 2020b). However, such opportunities for athletes has generally been the exception rather than the rule. It is not immediately apparent how many athletes have been disadvantaged, or 'left behind,' because they have been unable to avail of appropriate services throughout 2020 for the above cited reasons. This is an area requiring future research and resources to identify and address some of these issues.

Also, the importance of effective communication skills when consulting cannot be overstated. Consultants should have good listening skills, as well as the ability to interpret body language, including facial expressions and posture cues. Cotterill (2014) commented that anything other than face-to-face conversations are a compromise. Based on the way technology consulting typically operates, this is a very valid point. Full-body positioning is often not visible when using online consulting, in the way it would be in a face-to-face exchange (Smith, 2019). Even when the camera feature is enabled so that both parties can 'see' each other on an online screen, this is something not all individuals are comfortable with (as alluded to above when discussing the use of video technology in training for athletes). The ability to see the 'full' person is also not typical during such communications, due to the relatively small sizes of most computer screens, the positioning of the individuals 'on-screen' and the type of technology each person may have access to. There is also the frequent difficulty of a 'time lag' that occurs in many online video communications (The Irish Times, 2020). This can lead to both parties frequently 'talking over' one another. This tends to happen much less in face-to-face physical conversations because better conversational turn-taking 'norms' typically apply in such exchanges. Distractions, such as 'outside' noises, if individuals are not wearing earphones during any online discussion can occur also. The wearing of such earphones can be uncomfortable for

many individuals if they are necessary for use over a lengthy period of time. This can be especially problematic if consulting is the fulltime position of the individual and if online sessions are held 'back-to-back' over several hours in a typical 'working day' (Cotterill, 2020). This can lead to specific health-related threats for online consulting and they are important consideration for all service providers when consulting online too. Regarding consultant availability, given that travel is typically not required for online sessions to take place if the consultant and client are both in their homes, there could be a mistaken view taken by the athletes, for example, that their consultants are available to 'meet' or chat with them online at any time. It is important to establish boundaries for availability, within certain daily work hours and to outline session length clearly in advance too. If not, the danger of sessions 'running over' and burnout or on-screen severe fatigue occurring is a definite possibility (Cotterill, 2020). Screen fatigue and 'technostress' (Brod, 1984; Brivio et al., 2018) is also a really danger for all individuals using online technology extensively throughout 2020, for work, education and training purposes. For example, headaches and eye strain can occur, as well as skeletal/orthopaedic issues (i.e., back pain resulting from long periods spent in a seated position, when forced to work from home). Some commercial opportunities for solutions to such issues have arisen as a positive outcome of these situations (Power, 2019). So, to conclude, as with any mode of service delivery, online sport psychology consulting has both benefits and challenges that the pandemic of 2020 has highlighted. However, sport psychology consultants must prioritise their own health and well-being first if they are to remain effective service providers for the individuals they seek to help, namely their athlete-clients (McCormack et al., 2015; Cotterill, 2020).

ONLINE DELIVERY OF PHYSICAL AND PSYCHOLOGICAL TRAINING PROGRAMS, INCLUDING REMOTE COACHING

The coaching of athletes has also had to adapt during the pandemic. Many forms of online coaching have been happening throughout 2020 (Callary et al., 2020; Sorbie et al., 2020), with some positive outcomes reported regarding coach-athlete relationships (Li et al., 2020). Educational webinars and podcasts have also become popular, with coaches using the 'lockdown' periods to enhance their own professional development, as well as providing assistance to the athletes they work with. The importance of high quality instruction and communications during such sessions, as well as the value of the social support these methods of interaction provide has been apparent (Bailey, 2020; Evans et al., 2020). Some management teams and sport organisations have also used the pandemic time productively and creatively to collaborate with others in their sport networks in order to establish new, beneficial and closer relationships, as well as to avail of coach education expertise that prior to 2020, and often due to timings, availability and busy schedules may not have

been possible (Bailey, 2020). Thus, the pandemic seems to have positively established a sense of ‘collaboration and community’ throughout those specific settings. The threat of the complete loss of positions and incomes within the world of sport for so many people has also been a possible ‘driver’ of these acts of collaboration (Lewis, 2020). Concerns over personal health, both physically and mentally, may have added to the burden many of these individuals have felt (Santi et al., 2020). They may have also been motivated to remain connected with more of the people from their own settings than before because they considered them perhaps better positioned to understand their worries, such as their concerns about their career trajectories and being less ‘essential’ during this time of great uncertainty (Taku and Arai, 2020). In many team sport settings, the importance of scheduling in time for online-team-coffee-meetups and devising team-building fun physical and mental challenges that could be globally bench-marked against others in their sport have been some other ways team members have endeavoured to maintain a form of connectivity with each other (McCarry, 2020; Whales et al., 2020). Social media use has also enabled such connections to remain in place throughout the pandemic.

Psychological interventions have also been delivered more frequently using various technologies over the past decade (Bush et al., 2019). Within sport settings, online interventions for self-talk (Latinjak et al., 2019), as well as imagery and goal setting (Lane et al., 2016) have been utilised with some success. Other commonly applied sport psychology strategies, for the enhancement of mental skills such as concentration and coping, have also been transferable to digital delivery modes, including diaphragmatic-breathing (Jerath et al., 2015); progressive muscle relaxation (Isa et al., 2013) and guided mindfulness meditations (Hoge et al., 2013).

In more clinically focused settings, technology-enhanced cognitive behavioural therapy has also been applied effectively to treat some mental health conditions across various populations (Twomey et al., 2013). Within sport settings specifically then, the online psychological intervention options, as referred to above, that have emerged in recent years could have been a welcomed option for athletes to utilise during the pandemic when in-person options of support from their sport science personnel were not available to many of them (Tayeche et al., 2020). The effectiveness of such online service provision throughout the pandemic are likely to be the focus of much peer reviewed publications within the coming years and will be a welcome addition to the sport cyberpsychology literature.

ATHLETES’ USE OF SOCIAL MEDIA DURING THE PANDEMIC

Williams and Chinn (2010) stated that social media is comprised of “tools, platforms and applications that enable consumers to connect, communicate and collaborate with others” (p. 422). This type of technology is rapidly evolving. It provides athletes and sport organisations with unique and beneficial ways to interact with each other and their fan base (Hurley, 2018). Athletes are typically some of the most ‘followed’ individuals across many

social media platforms. Indeed, during the 2020 pandemic, it has been widely reported that of the top three individuals most followed on social media platforms such as Instagram and Twitter, two are from the world of sport, namely, Cristiano Ronaldo (soccer) and Dwayne ‘The Rock’ Johnson (athlete, movie star and business man; with popstar, Ariana Grande, also in the 2020 ‘top-three’; Clement, 2020). The use of social media by athletes has been studied in some depth for approximately a decade and they have been found to utilise popular social media platforms and communities, such as Twitter, Instagram, Facebook, WhatsApp, and LinkedIn for a number of reasons, namely for: (i) personal communicating and socialising, (ii) fan engagement, (iii) professional networking, including brand management, ambassadorial roles and advertising opportunities, (vi) volunteering/charity work, and (v) political and societal influencing roles (Hambrick et al., 2010; Pegoraro, 2010; Hurley, 2018; Whales et al., 2020). From an elite perspective, knowing ‘best practise’ when using social media is important and sport organisation have also increased their training of their contracted athletes in this regard in recent years. They are now well aware, from past experiences in the world of sport, that any controversial communications online by their contracted athletes could be professionally and personally damaging for their club or organisation, as well as for the athlete and the sport concerned in general in the court of public opinion (Cotterill, 2019; ESPN, 2019; Express and Star, 2020). Public opinion has a high degree of power and athletes, when using the online, social media world should to be conscious of this, while also being encouraged to maintain a form of authenticity online, that is, of showing their ‘real’ selves in their online social media presentations. Authenticity and honesty in the online world is typically valued in a similar way as it is in the offline world (Francis and Hoefel, 2018). Research on the online representation individuals make of themselves in their online lives compared to their real, off-line lives typical shows that people, in general, opt to display themselves in a more favourable light online (Fullwood, 2015) and athletes are potentially no different in this regard (Hurley, 2018). Typically, their social media content displays activities from their sport and work/business lives. However, the pandemic has offered a unique opportunity for them to share more about areas of their lives outside of sport (Tayeche et al., 2020). Sharpe et al. (2020) noted a specific change in ‘tone’ of the social media posts of many elite athletes during the pandemic, from one of commercial to one of altruistic intent. Sharpe et al. categorised the social media posts of the high-profile athletes they studies into three main types: (i) social and civic responsibility messaging, (ii) fundraising and physical activity challenges and (iii) financial generosity. While some could argue that these activities could lead to later commercial gains for the athletes involved, and indeed their sport organisations and affiliated teams, the definite change in focus way from predominantly sport participation to more every-day life activities has enabled athletes to interact with their fan base on a more personal and relatable note, which should be welcomed.

When isolated and forced to spend more time alone during 2020, for some athletes the use of their social media accounts has helped them to communicate and stay connected with the

outside world – a positive employment of its use. Indeed, many athletes have the potential to be effective role-models during times of crisis (Leng and Phua, 2020). They have supported health-message campaigns during the pandemic via their social media posts, using their influence to engage with their fan-base and to help change behaviours, such as importance of the wearing of face coverings, hand washing and maintaining social distancing. Of course, social media also provided athletes with a platform to share their training schedules and training advice with their fellow athletes, support staff and the general public at-large (Tayech et al., 2020). This proactive and prosocial behaviour could have helped them to also maintain their own training motivation levels during a time when enthusiasm to keep training for competitions that were surrounded by uncertainty may have waned. However, other athletes may have opted to use the time during the pandemic to take some time away from their social media platforms in order to spend time with their families. They could focus on ‘nourishing’ themselves and their close relationships during this time (Schinke et al., 2020). They typically would not have been able to avail of such opportunities when working because, for many elite professional athletes especially, their roles require them to travel a lot and spend lengthy periods of time away from their homes and family environments. It would be interesting to complete some detailed, perhaps qualitative, research on the specific value of such increased ‘quality-time’ spent with family and friends that the pandemic has offered to many of these athletes and their support personnel. What positive changes the pandemic has brought about in such individuals’ lives, that they would like to see maintained into the future where possible when the pandemic has ended, could be a very worthwhile and interesting research undertaking (Whales et al., 2020).

SOME CONCLUSION AND FINAL THOUGHTS: FUTURE POSSIBILITIES MOVING FORWARD

How athletes and their support providers continue to be positive, progressive and solution-focused as they ‘move forward,’ given the likely landscape of continued social distancing and restrictions on mass-sport-gathering into 2021 will be a significant challenge. However, 2020 has also enabled many of these individuals to, by necessity, become more skilled at conducting their interactions online and to use novel, safe and socially distant measures to engage in their training/occupation activities. These skills have become part of their ‘new normal’ ways of interacting with each other throughout 2020. As the pandemic continues into the near future, the required application of all of these measures should begin to feel less daunting, less ‘strange’ and more comfortable for those involved, until sport competitions and training environments can return to the way they were before the pandemic began. It will be interesting to see what the implications of the extensive online communications from 2020 will be for the legacy of future communication preferences, especially within such sport settings. Will there be an increased demand for more remote consultation practises

in the years ahead? Could it become the preferred mode of consulting, the ‘new normal’? If anecdotal commentary is to be believed, online consulting is likely to continue alongside face-to-face sessions into the future, now that so many individuals working in these areas see the practical benefits such interactions offer, as another form of valuable service provision. However, the pandemic has also helped many athletes and their support team members realise the importance and tangible value of (i) ‘live’ sport events, with spectators present (Lewis, 2020), (ii) physical, social contact and (iii) in-person communications. Indeed, the human race cannot survive without people interacting in a real, physical way, nor can the economies of nations around the world survive in permanent restrictive, lockdown cycles, as has happened throughout 2020. ‘Living alongside covid-19,’ until an effective vaccine has been discovered, is the likely future for all populations. So while that is the case, to summarise in five main points, what specific avenues of novel research has 2020 potentially presented for individuals working specifically in the field of sport psychology?

First, as mentioned above, physical contact is one of the main things people have commonly reported missing the most throughout the pandemic (hand-shakes, hugging, and kissing, for example; McCluskey, 2020). Human beings are tactile and value physical interactions. Examining the impact of the necessary isolation periods on athletes and their support personnel, that may be somewhat different than those of the general public (Pietrabissa and Simpson, 2020), could be a fruitful research endeavour. Such explorations could help service providers to devise ways to ensure the mental and physical health of such individuals is prioritised in the months and years ahead. The restrictions currently in place in many countries mean that athletes can no longer to just ‘drop-in’ to see a service provider for such psychological support, or to stop for a chat in a corridor, for example. The physical social distancing requirement in many countries of two meters that helps individuals to be at a low-risk from contracting the coronavirus means that many individuals may not feel comfortable divulging personal difficulties they are experiencing when speaking to their service and support providers in the current ‘outdoor/apart’ settings because of the danger of others over-hearing their conversations. Such conversations would have been conducted in the past in a safe and private office space, for example. Continuing with online support services will help to overcome these issues in the short-term. However, more long-term supports and interventions are also likely to be needed to help many athletes and their support personnel exit the pandemic healthy and well, both mentally and physically.

Second, encouraging athletes to engage in education-based training programs as the pandemic continues and evaluating such activities could also be a worthwhile endeavour, based upon some early research implications (Clemente-Suárez et al., 2020). The potential for such training and activities to not only improve athletes’ preparations for their lives after they retire from elite sport, but also to help them manage the uncertainty of their competition situation and their varying emotions about that while the pandemic continues, could be beneficial. Such education based training programs could help athletes to focus

on other things inside of their control at this time and enhance their life skills, helping them to obtain other tangible gains in 2020 that, in more 'normal' times, may not have been possible due to their busy competition schedules (Clemente-Suárez et al., 2020; MacIntyre et al., 2020).

Third, evidence-based quantitative and qualitative research studies examining the detailed impact of the pandemic on the support providers working with athletes throughout this challenging time could be completed. More research is needed to objectively evaluate online consulting service provisions, including the technologies used to provide them. Such information could enable technologists and service providers to determine how such technology and services might be improved upon in the future. Research uncovering the specific stresses the pandemic has created for such service providers could also be

beneficial, in order to help devise effective interventions to enable them to navigate successfully through the pandemic in a healthy and productive way. Support personnel should also be mindful that different athletes have different needs and the impact of the pandemic has highlighted that even more than before perhaps. Not all athletes have the technology skills necessary to use advanced equipment in their training when alone. Coaches and sport organisations need to be aware of this and educate them in order to change that situation moving into the future also. More government and technology-based company funding for technology provisions could also be helpful in this regard. How best to support athletes and sport organisations that do not have a high degree of technology expertise at present is unclear. Funding to implement an upgrading of their skills and the infrastructure needed to do this is also warranted. The pandemic's more negative

TABLE 1 | Some main considerations when using technology in sport settings in the future.

Video analysis technology	Strengths: (i) Source of objective biomechanical feedback for athletes and their support staff (i.e., for motor skill execution/technique; behaviour modelling opportunities) (ii) Potential source of intrinsic motivation for athletes for future sessions (iii) Beneficial uses for assisting in the decision making process of officials such as referees Limitations/Notes of Caution: (i) Feelings of pressure and perfectionism tendencies that may arise from the constant recording of training and competition performances
Virtual reality technology	Strengths: (i) Potential beneficial use during injury rehabilitation and for some mental skills training strategies Limitations/Notes of Caution: (i) Access difficulties to the most sophisticated technologies (ii) Limitations regarding the haptic experiences created by even the most advanced VR immersive technologies
GPS technology	Strengths: (i) Objective recordings of performance efforts, including the extent and directionality of various motor movements Limitations/Notes of Caution: (i) Feelings of pressure that may arise from the constant recording of training and competition outputs
Wearable technologies	Strengths: (i) Useful 'measures' of physical activity levels, psychological states, and sympathetic nervous system activity (i.e., heart rate and temperature) and sleep (ii) Potential source of intrinsic motivation for athletes for future sessions (iii) Potential recovery aid Limitations/Notes of Caution: (i) Questionable reliability and validity issues of the technology to provide truly accurate data, as is often required within elite sport, and medical settings specifically
Online sport psychology consulting/Online coaching delivery	Strengths: (i) Removal of location barriers to service provision when athletes and their support staff cannot be in physical contact (ii) Ease of access to, and affordability of, the required technology (i.e., Zoom, Facetime, and Skype) on devices most individuals have access to (such as laptops and mobile phones) Limitations/Notes of Caution: (i) Requirement of sufficient internet access to avail of such service provision (ii) Training requirements needed to use the technology effectively for such service provision (iii) Maintaining appropriate access boundaries/managing service provider potential burnout if always digitally 'on-call' (iv) Privacy and GDPR issues (v) Managing the expectations of all parties using such technology for online service provision (i.e., only certain behaviours may be visible as body cues, potential connectivity and 'working from home' disruptions)
Social media use	Strengths: (i) Source of helpful information related to training advice and behaviour modelling opportunities (ii) Source of social support – with other athletes, family, friends, and fans (iii) Specific, beneficial, uses for fan engagement, professional networking – including brand management and advertising opportunities, ambassadorial roles – including charity work, political, technological, and societal influencing roles (seen as beneficial throughout the pandemic for promoting health-related positive behaviours, including health-benefiting technology use) Limitations/Notes of Caution: (i) Inappropriate use (impulse control skills/social media training needed to use such media effectively and for positive forms of communication) (ii) Exposure to potential negative behaviours (online bullying, for example)

potential impact on certain athlete groups, such as Paralympic athletes, who may have had less access to the necessary equipment and training facilities in order to maintain their typical training regimes may also need to be highlighted and examined further (Clemente-Suárez et al., 2020).

Forth, for coaches and sport organisations specifically, maintaining some of their high-quality online coach training initiatives and knowledge-sharing could help them to maintain not only their own professional development but also solidify and strengthen those now established new collaborations and friendships that the pandemic has enabled them to forge across their sport communities. Such moves could benefit their skill-set as well as their wellbeing into the future. Research evaluating the approaches currently in place in this regard in order to ensure how best to achieve these aims into the future would also be welcomed.

Fifth, advances in wearable technologies for performance tracking, as well as technology designed to enhance fan engagement and stadium experiences are areas that will likely continue to grow and evolve over the coming years (Low, 2020). Indeed, the inability of sport spectators around the world to physically attend sport events on mass, as could happen prior to the pandemic, makes this market and the demand for such technology even greater than before 2020. It can provide sport fans with some way to experience 'real-life' sport events when they are currently being mostly played 'behind closed-doors' and would likely be welcomed more than ever before by fans. This is a potential area for significant opportunity and investment by technology companies and researchers alike (Mayer, 2020; Miller, 2020). As discussed, wearable technologies have also been shown to be useful for mental skills training, as well as psychological state monitoring and the detection of early warning signs of psychological distress. Such technologies' ability to provide psychological screening into the future, across various different cohorts, in even more effective ways is an exciting potential avenue of research. Designers and psychologists working together on such projects are often well positioned to help create the most effective psychologically based apps (Ryan et al., 2020). However, as Bush et al. (2019)

also advised, for now, a cautious approach regarding their effectiveness is advised, with more clinical, controlled trials being needed to determine more definitively their best applications and practical uses.

To conclude, for so many people, when sport could not take place for the early months of 2020 especially, it highlighted the joy sport spectating and participation creates all over the world. It reinforced its important place in global society, as a priority, as efforts to 'move forward' despite the ongoing presence of the coronavirus. While the cyber world, and advanced technologies, will continue to evolve to the benefit, hopefully, of all athletes and their support personnel, no technology will replace the hard work, talent and determination of these individuals. The goal of technology and the cyber world to assist athletes in their preparations for their performances should always be athlete-welfare driven, with the very first principle being to 'do no harm.' **Table 1** below presents a summary of some considerations for athletes and their support staff when using various technologies in the future, based upon their strengths and limitations/notes of caution, as presented in the discussion points raised throughout this narrative review.

Over-burdening athletes with too much technology and data can result in increased stress and anxiety levels which their support team members should be cognisant of. Sometimes just relying on how athletes 'feel' after a training session, or competition can be more beneficial for their well-being than any data, especially in the midst of a pandemic. Ultimately technology, as a tool is neutral in essence, it is how people use it that determines if it is a positive or negative element in their lives. Time will tell how well the sport world uses technology for the good of all, as the COVID-19 pandemic continues, but hopefully comes to an end in the coming years when a safe and effect vaccine is produced and distributed.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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Sporting Resilience During COVID-19: What Is the Nature of This Adversity and How Are Competitive Elite Athletes Adapting?

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The COVID-19 pandemic is a global health issue which has severely disrupted and deferred several landmark international sporting competitions. Like the general population, athletes have faced direct psychological consequences from COVID-19 in addition to cancelation of events, loss of support, lack of training, loss of earnings, hypervigilance, and anxiety among others. The aim of the present research was to identify the adversity experiences of athletes caused by COVID-19 (study 1) and explore the process of resilience used by competitive elite athletes for positive adaptation (study 2). Research has indicated psychological resilience to be a protective factor against similar adversities in the sporting context. The study uses an across-cases qualitative design comparing the real-time lived experiences of athletes during COVID-19 using narrative analysis. Data were collected from 10 competitive elite athletes from various countries, as part of a larger doctoral dissertation study during the lockdown period, using in-depth experiential interviews. Study 1 presents detailed narratives on the loss and incongruence, which were the two major adversities experienced. Study 2 outlines the process of resilience as narrated by the participants through the emergent and minimal-impact resilience trajectories. We discuss recommendations for interventions and the role of sports psychologists, coaches, and sporting organizations in ensuring athletes' mental health and their rehabilitation into post-COVID sports life.

Keywords: COVID-19, sporting resilience, adaptation, elite sport, positive psychology, adversity

INTRODUCTION

The COVID-19 pandemic, classified as a global health emergency, is the most serious disease outbreak since the 1918 H1N1 influenza pandemic emergency (Casadevall and Pirofski, 2020). The confirmed cases globally stand at over 83 million, with over 1.8 million COVID-19-related deaths on January 5, 2021 (World Health Organization, 2021). The pandemic has caused industry closure, changed daily life patterns, caused financial loss and unemployment, and disrupted social and community support, all of which have a clear psychological impact (Ho et al., 2020). Preliminary findings indicate that social isolation and lockdowns equated to spending 20 + h per day at home, causing chronic exposure to stress, self-protective behaviors, elevated anxiety levels, and depressive symptoms (Altena et al., 2020; Li et al., 2020; Wang et al., 2020). Shear (2012) noted how closure and grief processes have been suspended in the face of rupture, interruption, and loss

of daily routine, death-triggering anger, helplessness, guilt, and shame. International tournaments such as Tokyo 2020 Olympic Games and UEFA Euro 2020 scheduled for multiple cities were postponed/canceled since travel is a major mode of transmission (Tian et al., 2020; Widdop et al., 2020). Health and safety considerations, intensified media scrutiny, and public perceptions have postponed/changed the format of sporting events (Ippolito et al., 2020; McCloskey et al., 2020). The substantial impact of COVID-19 on all levels of sport has been mediated through these rapid and irregular developments (Begović, 2020; Fullagar, 2020; Parnell et al., 2020).

Sporting organizations and its many stakeholders, most notably athletes and coaches, are faced with immediate impacts, i.e., health/infection, and longer-term threats, i.e., funding/talent development (Ngaluafé, 2020). There have been calls for thorough examinations of the influence of COVID-19-related changes in elite sport (Parnell et al., 2020). Long-term changes post-pandemic to redesign sport culture for greater accessibility, inclusivity, and safety have also been made (Leberman et al., 2020). Doherty et al. (2020) suggest a need for “leaning on evidence in turbulent times” while charting out directives for return to sport (p. 2). Schinke et al. (2020a) have cross-culturally evidenced the impact on high-performance athletes across three stages: before Olympic postponement, during Olympic postponement, and reset toward Tokyo 2021. Even before formal postponement, athlete life plans are in flux, causing stress responses. After postponement, athletes have had constructive and debilitating responses which range from intrinsic development to burnout syndrome, feelings of alienation, and poor coping compounded by social isolation (Schinke et al., 2020a,b). Similar evidence has also emerged from Japan (Taku and Arai, 2020) and Spain (Clemente-Suárez et al., 2020). Social isolation, conceptualized as an abrupt diversion in an athlete’s career, could also trigger dissociations from athlete identity and negatively impact mental health (Brewer et al., 1993, 2010). However, evidence-based psychological support is crucial because student-athletes who received more social support reported better mental health and well-being (Graupensperger et al., 2020).

Building upon the preliminary evidence provided, the present study offers insight into the lived experience of the adversity and the process of resilience adaptation in athletes. Violations of newly imposed health policy by athletes (cf. BBC, 2020; Ramsay, 2020; Trenaman, 2020) have also raised questions on whether professional athletes are held to a higher standard with expectations on them to be role models (Leng and Phua, 2020). In community sport, interdisciplinary collaboration has been noted to be a response route to the complex problems presented by COVID-19 to build a more resilient future (Doherty et al., 2020; Timpka, 2020). For elite athletes, Schinke et al. (2020a) also note the relevance of resilience in times of COVID-19, noting that “as for Olympians, they are and will continue to be forged in (and through) adversities” (p. 272).

“Resilience,” as a word, has seen widespread use by media and government officials, owing to its layperson meaning. It has been used as a way to facilitate adaptation despite the COVID-19 adversity. We conceptualize COVID-10 and the

consequent national lockdowns as an adversity since it is a “state of hardship or suffering associated with misfortune, trauma, distress, difficulty, or a tragic event” (Jackson et al., 2007, p. 3) and distinguish it from stressor and trauma as per clarifications posited by Howells et al. (2017). This conceptualization of adversity also fits in within the theoretical position, viewing the COVID-19 pandemic as a change event in a sporting career which is distressing, derailing, and difficult. Psychological resilience is “the role of mental processes and behavior in promoting personal assets and protecting an individual from the potential negative effect of stressors” (Fletcher and Sarkar, 2012, p. 675). Contextualized to the sports context, sporting resilience is “the environmentally adaptable, interaction dominant, dynamic-process trajectory that encompasses a sporting individual’s metacognitive–emotional–behavioral capacities to maintain a positive equilibrium and successfully adapt to a diverse range of sport-related adversities” (Gupta and McCarthy, in press). Academia has provided a more nuanced approach to how resilience is used/can be used in response to the disruption caused by COVID-19 (cf. Barton et al., 2020; Polizzi et al., 2020). Bonanno (2020) negated the equating of resilience to a panacea, stating “that no single factor determines resilience for a population” (p. 1).

Although literature has provided commentaries, theoretical frames, and perspectives, there is limited empirical evidence to lean on to understand resilience during COVID-19. However, the model of uncertainty distress tailored to COVID-19 psychosocial reality (Freeston et al., 2020) provides insight into the impact of adversities and adversities which are simultaneous. Resilience is a temporally stable but dynamic psychosocial process that unfolds over time (Fletcher and Sarkar, 2012; Bonanno and Diminich, 2013; Galli and Gonzalez, 2015; Bryan et al., 2017; Hill et al., 2018). Many of the established protective factors of resilience such as perceived/tangible social support (Fletcher and Sarkar, 2012; Morgan et al., 2013, 2015; Brown et al., 2015; Codonhato et al., 2018), sense of meaning/belonging (Hall, 2011; Meggs et al., 2016), and motivational climate (Machida et al., 2013; Chacón-Cuberos et al., 2019) have been severely disrupted. Athletes either cannot access them or do not have the quality of protective resources they used to. For example, mastery and a sense of control enable a resilient response in the face of adversity (cf. Galli and Vealey, 2008; Fletcher and Sarkar, 2012, 2016; Morgan et al., 2013), which has been severely compromised because of the COVID-19 pandemic. Howells et al. (2020) have also noted the cultural script prevalent in how societies should respond to adversity. However, it is beyond the scope of the study to operationalize post-adversity growth since athletes were engaged in resilience response since COVID-19 lockdowns were ongoing.

Most athletes are still engaged in their resilience process since the threat of the COVID-19 adversity to physical and mental health remains. This complexity of acute chronicity of the adversity and the non-normative psychosocial circumstances provides the rationale for an examination of the adversities faced and the process of resilience engaged in by athletes through their lived experiences in this study. This research will adopt a narrative analysis to capture the experience of COVID-19 adversities and the resilience process that competitive athletes

engaged in. Narrative analysis is an emerging research approach in sport psychology and will locate the dimensions of stories to best answer the research question (Smith and Sparkes, 2009; Smith, 2010). This technique peers into and examines the athlete's lived phenomenological experiences, allowing for exploration of the actions over time (Carless and Douglas, 2013; Smith, 2016). To best answer the research question, we divide this research into two studies. Study 1 explores the nature of adversities faced; study 2 explores the complexity of the process of resilient adaptation. Studies 1 and 2 are conjoined under the philosophical stance of narrative constructionism (Sparkes and Smith, 2008; Esin et al., 2014) but use different narrative techniques to answer two specific avenues of the research question, converging into a holistic discussion. The findings of the study provide insights into the lived phenomenological experience of adversity and resilience specifically linked to COVID-19. This provides applied practitioners with an insight into the lived experience, helping to guide one-on-one therapeutic interventions and how to promote psychologically informed online training and psychological support and guiding other support staff.

Research Question

This study aimed to explore the nature of adversities faced by competitive elite athletes during the global COVID-19 lockdowns and to understand the complexity of the process of resilient adaptation.

METHOD OVERALL

Research Paradigm and Methodological Congruence

Morse (1997, 1999) and Holt and Tamminen (2010) recommend "methodological coherence" (p. 419), which this study strived for by establishing consistency through ideation, research question, philosophical orientation, and theoretical perspective (Mayan, 2009). This study adopts a stance of ontological relativism (Creswell, 2013) and sits in an interpretivist–realist epistemology, concerned with understanding the reality of COVID-19 and resilience as engaged subjectively by athletes. The focus of analysis is on the unfolding of resilience in the lived experience of competitive elite athletes during COVID-19 lockdowns through their narratives. The hermeneutical differences and lived experiences of athletes were prized to secure authenticity to understand the nature of adversity and complexity of resilient adaptation during COVID-19 lockdowns. Narrative analysis was chosen to secure a detailed understanding at the individual level while retaining ecological validity since individual narratives are personal to them, but the structures that shaped them such as the lockdowns are not theirs alone (Riessman, 2008).

Recruitment

Purposive sampling was undertaken using the formalized classification of athletes (see Swann et al., 2015). Per the classification, competitive elite athletes are athletes who compete at the international level regularly and have had success.

Participants who were over 18 years and in countries with lockdowns were recruited. Both team and individual/team sports were included to provide a holistic idea about the nature of the adversity and the process of resilience in a time of isolation since there could be potential differences as per existing theory (Morgan et al., 2015, 2019). Competitive elite athletes were approached since they were likely to have resilient characteristics that enabled them to withstand stressors for achieving success in their sport (Hardy et al., 1996; Krane and Williams, 2006; Fletcher and Sarkar, 2012).

Potential participants were informed about the background of the study upon first contact. Phase I screening was conducted using the Brief Resilience Scale (Smith et al., 2008), in line with recommendations from Windle (2011) regarding its satisfactory reliability and validity. Participants self-reporting their resilience above normal threshold (i.e., 3) were invited for phase II interviews. Institutional Ethics Committee clearance was obtained prior to commencement. The participants were briefed on the aims, procedure, and outcomes, following which informed consent was obtained. The participants were told to inform the interviewer if they felt any discomfort in discussing COVID adversity due to its ongoing nature, in which case the interview would be terminated immediately without prejudice. The interviewee was a trainee psychologist and would suggest referrals to the participants should they require psychological support through this time.

Participants

In phase I, 15 competitive elite athletes ($M_{age} = 26.33$, $SD = 7.96$; male/female = 7/8) filled in the Brief Resilience Form (Smith et al., 2008). All athletes screened at phase I self-reported above-average resilience but were not informed about their psychometric scores until after the interview to reduce bias. Equal numbers of male and female athletes were chosen from countries around the world for representative results. Although attempts were made to secure a globally representative sample, major sporting nations such as the United States, Brazil, and Russia were excluded since they did not have an extended period of complete societal lockdown. All participants were contacted and invited for the interview. In phase II, 10 participants of equal gender representation participated in the interview ($M_{age} = 26.10$, $SD = 6.41$). Sample demographic details are illustrated in **Table 1**. The authors recognize a Eurocentric trend in the sample but highlight the narrative voices of competitive elite athletes from other societies. Although there are no fixed rubrics on sample size (Vasileiou et al., 2018), this study's sample was limited by pragmatic concerns such as lockdown, ending in unanswered forms and participants not responding to interview invites.

Procedure

The screened participants were invited for an online interview and were informed that the interviews would take approximately 45 min to 1 h of their time with no payment/incentive provided for participation. Microsoft Teams was used for a confidential and secure encrypted connection. In line with ethical research, to ensure participant confidentiality, anonymity, and safety (participant and researcher), the online interviews took place in

a private room. Following written and verbal consent, interviews were conducted and audio-recorded with a Dictaphone. After the interviews, data were anonymized, transcribed, and encrypted with AESCrypt. The researchers had sole access to data in line with general data protection regulation (Voigt and von dem Bussche, 2017), the Data Protection Act (2018) regulations, and the BPS-GDPR guidance for researchers (BPS, 2018). The first author conducted verbatim transcription of data. The transcripts were anonymized and provided with a participant ID and code name linked to their sport, balancing the protection of participant identity and data integrity (Saunders et al., 2015).

Data were collected using a semi-structured interview schedule, with probes and questions offering the space to discuss the experience of COVID-19-related adversity and how they engaged their resilience. The interview questions were open-ended, and the participants were told to be conversational. For example, “So you mentioned quarantine, which is the elephant in the room. How has that experience impacted you?” The interviewer encouraged all the participants to tell their own stories; however, they wanted to and took on the role of an “active listener” during the interview (Smith and Sparkes, 2005). Techniques from experiential interview scheme, such as reflecting on the lived situation, were implemented (Janz, 1982). Life story interview techniques were used to document the adversity experience over a period of time (Atkinson, 2007). This allowed exploration of adversity experiences and the process of resilient adaptation through the participants’ narratives. It was reiterated that there was no obligation to share narratives and that the participants could withdraw at any point. At the time of the interview, all participants were residing in countries with complete national lockdown.

Methodological Rigor

Methodological rigor was established by incorporating authentication strategies such as peer debriefing during the research process to ensure credibility, transferability, dependability, and confirmability (cf. Morse et al., 2002). Coding was done initially by the first author and independently checked by the second author and another critic friend. The results

which emerged were critically debated to ensure consistency in the framing of the lived experience through the narrative analysis. Quality control was adjudicated using what Sparkes and Smith (2014) term time-and-place contingent characteristics. The results were judged *via post hoc* evaluation (cf. Fletcher and Sarkar, 2012) by using quality criteria of contribution (i.e., a worthy topic of inquiry, credibility, and resonance) (Tracy, 2010). To briefly explain, we feel that our research is a timely and essential contribution since sport psychology is still figuring out the impact of COVID-19 on the psyche of everyone involved in sport. As such, the “practical level of truth” (Giacobbi et al., 2005, p. 22) uncovered by this study holds relevance for policy development, applied sport psychology practice, and coaches since it provides an insight into lived experience. Credibility was also ensured through triangulation, where interview transcripts and interpretations were checked with the participants where possible, which ensured that the rigor and data analysis were not biased. Finally, we hope that providing descriptive quotes in the article illuminates the narratives to the readers and resonates with the experience of all in the sporting context who are affected by COVID-19.

STUDY 1: METHOD

Data Analysis

Data were subjected to a narrative thematic analysis (Riessman, 2008). Specifically, the researchers read and re-read each transcript for familiarization and noted initial thoughts. Both the location of telling (subjective context) and the location of the story (macro context) were noted since the contexts shape the narrative and need to be explicitly considered in the analysis (cf. van Vuuren and Westerhof, 2015; Levitt et al., 2017). In line with recommendations, the focus was on what is said rather than for what purpose or how or to whom (Riessman, 2008). Blocks of text which represented a thought or meaningful point related to adversity experience were identified and labeled as a raw-data theme. Since the goal of thematic narrative analysis is to tell the “whole story” while preserving the sequencing of events, the themes reflect temporal elements of the experience of adversity caused by COVID-19 lockdowns. The themes noted below were reflected in all the participant narratives. Themes were compared and contrasted with each other and finally represented in a rich and layered narrative detail from multiple participant quotes.

STUDY 1: RESULTS AND DISCUSSION

The results are framed under two narrative themes which explored the nature of adversities faced by competitive elite athletes during the global COVID-19 lockdown. The themes outlined are idiosyncratic and ecologically valid since they were found universally across the narratives of all participants. The components of the narrative are in equal parts lived experiences during the lockdown and were caused by it.

TABLE 1 | Participant demographic information.

Pseudonym	Age/ gender	Participating sport	Representation	Experience
Frisbee	21/male	Frisbee	Australia	7 years
Natasha	26/female	Rugby	Scotland	5 years
Jack	24/male	Badminton	Team GB	20 years
Julia	30/female	Lacrosse	Scotland	17 years
Maria	19/female	Tennis	Scotland and Team GB	14 years
Bruce	22/male	Canoe Slalom	Ireland	9 years
Veronica	31/female	Netball and basketball	Gibraltar	23 years
Tessa	28/female	Curling	Team GB	17 years
Alex	40/male	Savant	Team GB	20 years
Rohan	42/male	Golf	India	34 years

Loss: Sport, Support, and Identity

Loss was a recurring part of the adversities faced by the athletes during COVID-19 lockdown. “Jack” summarized this succinctly when he exasperatedly stated, “I have *never* had 8 weeks where I have not stepped on a badminton court; so, it’s weird.” This feeling of losing a sense of normality is associated with the loss of their sport (i.e., ability to engage in sport, train, and compete was echoed by all participants). The narrative also encompassed adverse emotional reactions to this loss. As “Frisbee” recounts:

“For example, yesterday, I was waiting 3 days for a 10-min walk, which is what I get, and then I was told that I would be lucky to get a walk in 6 days and I would most likely not get a walk at all till I am out of here and in that moment I got really annoyed, put the mattress against the wall and started punching it. And I was in a really foul mood for about half an hour. And then I sat down why I was. . . like what was the switch, like I had an expectation that dropped, that could not happen, and I was getting annoyed and really upset and getting frustrated. I guess being cooped up is difficult for us athletes, more so than normal people, because being out and physical is what we do.”

“Jack” related his situation to this line of thought as well reflecting on his experience through the narrative of what all athletes must be going through, “Quite a lot obviously, for athletes, this part of time is quite difficult because obviously we can’t play, so I’ve gone from playing. . . like I have never had more than 2 weeks off from badminton, maybe 4 weeks due to injury or something like that.”

“Bruce” expressed frustration while noting how the pandemic and lockdowns have impacted training and his routine, “We have got a white-water course in ***** which is basically why I moved there, but that has been closed since well forever, well 9 weeks.” He also discussed how this has made sport and “training on my own less enjoyable,” a sentiment also expressed by all other participants.

Loss of sport and training was a major focus in the narrative of “Veronica.” Painting a detailed picture, she noted:

“We, like myself and other competitive athletes, I am used to training, every day, except for one. . . so we train 6 days a week. We have one rest day. . . Most of the time, it is on court. . . Because whether we’re doing conditioning or whether we’re doing tactics or when we’re just getting together to see some video analysis. . . like everything is done with your teammates and in an environment where you have the coach there. . . and now. We, we cannot be in an area. . . like the netball court. . . you cannot just go down and play. . . this has been a major difficulty. . . And it’s all specific, you know, to the sport, whereas now we haven’t had the opportunity because we cannot be in contact with other people. . . Training is usually 2 h long every day. And now I have nothing to do. . . So, that’s had a big, knock-on effect on our fitness. . . So, we have had to try and replicate as much as, as much as we can, but obviously honestly it’s not good enough.”

Loss of sport and training also had a tangible effect on the mental health and psychological side of sport, which was also lost. “Alex” noted how the “psychological environment is important. . . if you’re around people who are negative then it’s a factor, and now there are a lot of people who are

understandably negative.” The performance-oriented side of psychological preparation was also severely hampered with the loss of sport. “Tessa” notes: “But the thing I’ve struggled with is not being able to go to the gym. . . And I think I spoke earlier about having goals. . . right now, it is almost impossible to. My problem is I don’t really have any goals at the moment.” The narrative of “Julia” also highlighted similar adversity themes as she explained how “I have tried to, like, stay fit. I am doing, like, strength sessions and conditioning sessions still, but maybe not as many as I would be doing, like, normally, and there are some things that I just cannot cope with, like I just can’t cope with even thinking about the testing so I have just completely ignored that. . . like, for example, I used to have, like, this fear of God, of missing the testing, or something like that, but I just have not done any of the testing, and for me, you know, work has also been very challenging and stressful. . . so just yeah. . . things in my mind.”

Another major loss experienced by athletes has been the loss of support and “having a good sport system” (i.e., sport support systems). Linked closely to loss of sport as shown above, “Jack” noted how:

“For us, like, full-time professional athletes, we have got the coaches, the physios, the psychologists, and the sport performance lifestyle people. Like, having these people around, people you can, like, chat to, and have, like, honest conversations with, I think what the environment and the sport staff having a good environment rubs off on you and the players that you are training with. . . and it’s good to have that different areas of expertise, and this COVID-19 thing has prevented that.”

This major adversity has led to other difficulties for the athletes such as skill acquisition and talent development. “Frisbee” narrates a recent experience, “There is something I have been trying to do during quarantine, its fluid movement, so handstands, rolling into flips and what not, and I have tried to do it by myself, and it get stuck . . . And without someone showing me, I feel like I would not have to get anywhere.” “Veronica” also narrates how loss of support (technical, emotional, social) has also forced other forms of innovation during lockdown:

“We’ve had to adapt to different ways of training, how to do home workouts. You’ve had to be following and doing, like, fitness, personal trainers online. . . We’ve just had to adapt the way we’ve done ball skills. . . like, doing it individually or with a family member. . . which may not be as experienced. . . Because you have to try to teach them how to do the things you want them to do. And then the fitness, the fitness is not the same at all. like, home workouts we are doing for 1 h or 45 min.”

“Bruce” also noted that losing the direct support offered by coaches and others in the sport system has had adverse effects as well, “cause quite a lot of the things that athletes and coaches are struggling with at the cause if they have guided an athlete the whole way throughout their career, now they can’t because of the restrictions. . . and the athlete is sort of lost.”

Although not explicitly stated, the participants indicated a loss of identity caused by the prevailing psychosocial conditions. This is seen in the dialectic descriptions of the way the participants struggle to describe self away from the dominant sport-culture

performance narrative despite no actual sport participation and competition (Douglas and Carless, 2006). Interestingly, all participants followed this pattern identification of athlete role and hinted at a sense of reduced accomplishment due to the COVID-19 reality and the corresponding loss of cognitive and social utilizations of the athletic identity (Brewer et al., 1993). However, this evidence is not an inference on whether athletic identity is a Herculean muscle or an Achilles heel (cf. Brewer et al., 1993) but an acknowledgment that there is a sense of loss of a major aspect of self-identity for competitive elite athletes. Although there is no direct indication to this loss, this acknowledgment secures its rationale because narratives are the “sea of stories that seeps into our consciousness and our very identity” (Murray, 2003, p. 98). Therefore, its implied presentation by the participants can be taken as preliminary evidence of its operation in their phenomenological reality.

Incongruence

Analysis also confirmed incongruence in the narrative presented by the athletes. This incongruence represented a form of dissonance between the usual structured, goal-directed environment they are acclimatized to which the relatively aimless COVID-19 isolation situation brought. This incongruence manifested in feelings of impotence because of the psychosocial reality *versus* a need for mastery which elite athletes are acclimatized to. This incongruence has surged into psychological distress, ruminations, negative emotions, and loss of motivation, constituting a major adversity. As “Julia” narrates in relation to collaborating with rugby players for training:

“I just can’t add anything like that to my mind right now so I have kind of ignored and muted all those messages right now. . . so yeah, I’m not, like, I think I have just tried to protect myself from stress, so I don’t know if that is knowing my limits and, like, making a decision, like, I know I can’t cope with that, and I don’t know if that’s me not being resilient, I’m not sure. . .”

All participants also noted a corresponding impact of this incongruence on their athletic identity general worldview. “Tessa” recounts how the incongruence and unstable COVID-19 situation has led to “So I really struggled with aiming toward something. . . And I got a bit out of the habit of doing or giving my full effort to some of my workouts because I really was struggling my motivation, because I kind of felt *what’s the point?*”

“Jack” also pointed to several factors of the situation as leading to this incongruence, which better illustrates the nature of adversities faced by competitive elite athletes, illustrating that:

“It’s hard to . . . it’s hard to motivate yourself when you feel like there is nothing to work toward ‘cause you don’t know if tournaments are gonna happen again, and when we are going to get back to training, like, it’s so up in the air, so it’s really hard, and you really have to be resilient because you cannot focus on looking at the longer-term goals. . . and maybe. . . 3 months from now we could be back on a court and being focused enough to make that our goal, and we need to be in a good shape when that happens and it comes to that. . .”

“Maria” also noted the negative impact of losing control over sport as losing control over her coping, stating that “I have also

been going through some personal things off the court, with boyfriends and things like that, uhm. . . so I have really struggled actually this past week to try and draw upon my resilience. . .” The sense of impotence shared by the athletes is best captured in the narrative of “Tessa”:

“I think being an athlete is a bit of a roller coaster sometimes. Obviously, there’s going to be very high highs. But there’s always lows, and I think anyone can go through their career without having lows, and you’ll have multiple, multiple every year. . . and we kept having lows this year didn’t we?”

Another aspect of this incongruence experienced by athletes was the struggle to be “perfect” athletes and normal “victim” human beings. This is reflected not only in the narrative throughout as the participants noted their struggles but also by the fact that they have to keep being athletes and do all that is expected of them. “Julia” narrates the difficulty of managing this incongruence:

“Cause it’s been very hard, like, the mixed messages that are coming through is a major reason for that, some people are, like, this is a totally unprecedented time, you shouldn’t be pressured and things, but then people are also, like, if you’re not training, other people will still be training, and they will have come out of this having lost less fitness than you have. . . umm. . . and then we have got our strength and conditioning coach who keeps firing out programs for us to do and like testing and stuff.”

This incongruence is also reflected through the attempts made by the participants to continue being elite athletes despite the COVID-19 reality and losing access to all sporting facilities. “Veronica” describes what it has been like:

“So it’s been a lot of frustration because, like, you’re, you’re used to, like, training with teammates for the same level and ability of you and you’re doing movements they know everything. . . You don’t have to go through it, right? like, if you’re dealing with a family member, they might not even be able to pass or catch as well or know your movements. . . so it’s very frustrating to try and keep your training up. . .”

All the participants were frank and discussed feeling the need to live up to ideal perception of what an elite *should* be and their struggles with it. “Perfect” and “should” came up multiple times in every participant’s narrative. “Maria” noted that, at times, she has tried to maintain a routine and “control the controllable, so I trying to control the things that are in my control and all the little things that I do, I can’t say I am a perfect example because I have definitely struggled as well ‘cause it has not been easy not having those distractions in your life, like, playing, that is my passion.” Despite the far-reaching nature of this incongruence, a majority of the participants explicitly displayed a tendency reframing and undergoing challenge appraisal (Fletcher and Sarkar, 2012). “Natasha” framed this eloquently by describing how “I have been going, like, things are changing, we are all learning and we are all on the same page and it’s a bit of a rubbish situation, just let’s get on with it.” “Tessa” also echoes this sentiment, saying:

“I’ll be honest I’ve struggled completely honest many times. . . so we have been switched to, we’re quite fortunate because the curling season had finished, our competition season had finished. . . And,

yes, we missed some training, but the on-ice training, we didn't miss . . . it is the best part of the season to miss 'cause it's after the championship."

"Rohan" also looked beyond onto the larger psychosocial reality that he was a part of by stating: "been a bad effect not only on sports but also on the economy and many other things." It is logically postulated that the process of reframing the adversity faced and engaging in challenge appraisal by all participants to mitigate the psychological impact of COVID-19 is because all participants self-reported high resilience scores. It needs to be highlighted that the themes of loss and incongruence prominently featured in the narrative are not mutually exclusive but rather two sides of the same coin of the COVID-19 psychosocial reality for competitive elite athletes.

STUDY 2: METHOD

Data Analysis

Narrative structural–quest analysis was chosen since resilience unfolds primarily at the individual level and can be traced much like a character arc in a narrative. It is suitable since it focuses on how the resilient adaptation narrative functions rather than the context of the analysis, i.e., COVID-19 adversity which has been explored in depth by study 1. Riessman (2008) outlines the six parts of a narrative structure: abstract, introduction, complication, evaluation, resolution, and coda. This congruently fits with adopted theoretical perspective of resilience (cf. Bonanno and Diminich, 2013; Gupta and McCarthy, in press) and provides study 2 with methodological coherence. The quest narrative has a plot structure story in which the person meets suffering head on, accepts the disability, seeks to use it, and commits by developing uncertainly (Smith and Sparkes, 2009). This is like the structure of resilience adaptation outlined in theory, i.e., the individual meets adversity which is major and exceeds available resources, which causes a disruption, then a depletion, followed by a metacognitive learning process, and finally a rebound with new learning and resources into positive adaptation (cf. Bonanno and Diminich, 2013; Gupta and McCarthy, in press).

The structural analysis teases out the resilient narrative of the individuals and helps understand the thoughts, actions, hopes, emotions, and psychological complexity (Smith and Sparkes, 2005, 2008). The focus of analysis was not on the performance narrative (Douglas and Carless, 2006) but on the resilience narrative as it was unfolding for positive adaptation during COVID-19 adversities.

STUDY 2: RESULTS AND DISCUSSION

Analysis of data was built upon the findings of study 1, which explored the tangible COVID-19 adversities in the lived experience of the athletes. Narrative quest analysis of the data is framed in extant theory (cf. Bonanno and Diminich, 2013; Gupta and McCarthy, in press) to best report the complexity of the process of resilience and positive adaptation undertaken

by athletes (see **Figure 1**). The results were synthesized from a detailed analysis of specific individual narratives, each of which was interestingly found to have a high degree of similarity in their plot, suggesting a relative cross-cultural uniformity in the resilience process. In line with recommendations, whole narrative quests are not framed in theory; rather, a complete account of everything the participants conveyed is provided to provide an informative process description through lived experiences (Wong and Breheny, 2018).

After COVID-19, the participants experience a wide range of sporting and non-sporting adversities (see study 1) and drew upon their resilience. "Natasha" placed great emphasis and notes: "Oh yea, *totally*."

All participants engaged in a positive reframing and challenge appraisal which signaled the start of their facilitative resilience response (Fletcher and Sarkar, 2012). Bonanno and Diminich (2013) theorized two potential pathways depending on the magnitude and relevance of the adversity in question. Because of the acute, unprecedented nature of the COVID-19 adversity, no participant reported progression of resilience response along the "minimal impact resilience" pathway (p. 380). The novel nature of the pandemic and the global lockdown were not previously experienced or even heard of by the participants. Therefore, identified resources could not be used to engage in a resilience response and maintain well-being throughout this extended adversity.

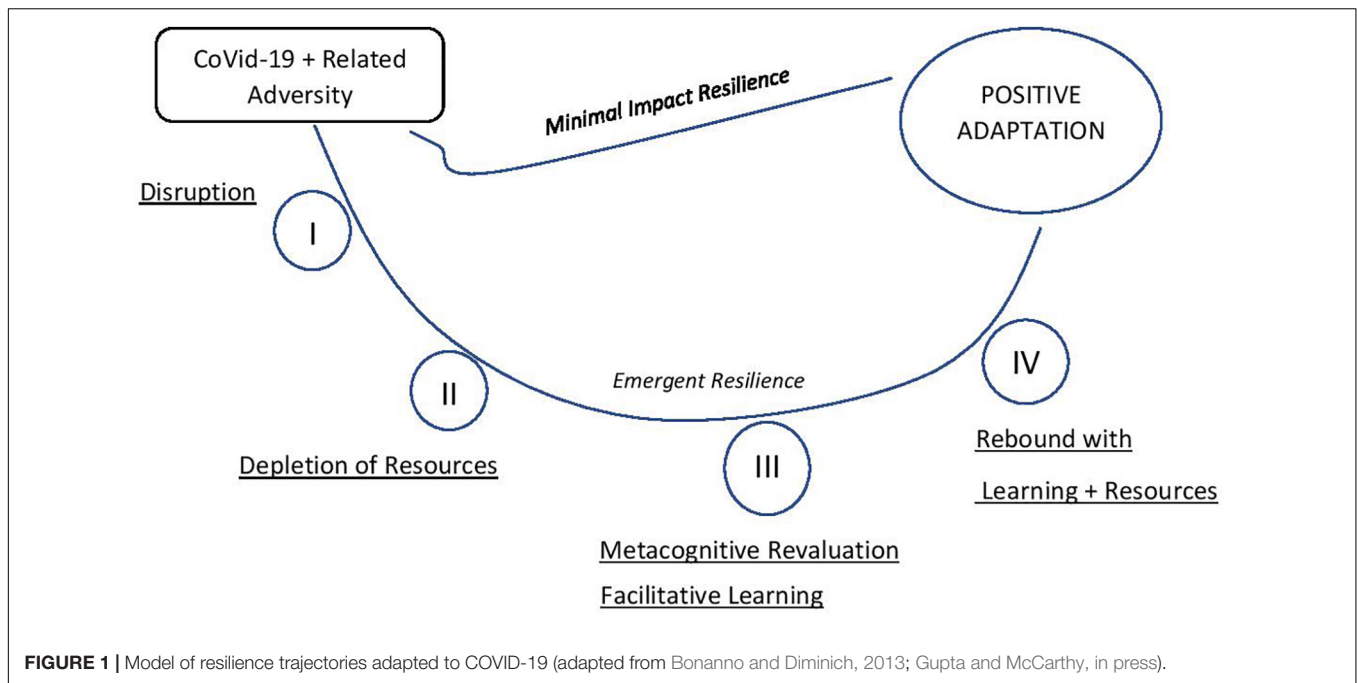
All the participants reported engaging in the "emergent resilience" process trajectory (Bonanno and Diminich, 2013, p. 379). The resilience responses progressed along stages but often oscillated back and forth based on time and situational factors in their psychosocial reality (Gupta and McCarthy, in press). Stage I—"disruption" was a recurring feature in the narrative, linked to the loss brought about by the adversity (see study 1). "Natasha" notes how "It's been such a fast-evolving thing and everything is changing every shift you are coming in at and you have just got to go with it since you can't not go with it. . . and I have been going like things are changing, we are all learning and we are all on the same page and it's a bit of a rubbish situation, just let's get on with it. . ."

"Rohan" reiterates this view by adding: "We are all through a bad time. . . sport has stopped. . . and that has been unusual. . . I am so used to getting up early and going to the course, but not now."

However, all the participants' narratives reflected an acceptance of the reality and a corresponding resilience response as they moved into stage 2—"depletion of resources." The nature of adversity itself included loss of several components and resources as well (see study 1). "Alex" explicitly recounted how "Coronavirus says to me, 'training in person isn't going to work,' what do you do?"

"Natasha" noted:

"We (team) have kept in contact even though we can't train, we are communicating, but it's a very real loss even though we are in isolation we have been doing fitness challenges, and that's been really motivational not just to keep moving but also the realization that this is not forever; one day we will be back to play together again."



“Jack” experienced an added adversity as he injured his knee running in lockdown. His narrative prominently featured the reverse oscillation of events which initiated another disruption–depletion process trajectory. He notes:

“For me, like, I got injured 2 weeks ago out running, I slipped and slid, like, a freak accident and I hurt my knee, and, like, it’s been tough to go from at least I was training and now I cannot really train ‘cause my knee is real sore, and it’s kind of been, like, this different side to my resilience that I have had to use again, and, like, I picked myself up and had to go through rehab, go through not being able to train, go through like a walk everyday.”

This acceptance of the unnatural reality and the various adversities it presented allowed all participants to engage in a metacognitive challenge appraisal and learning. This metacognitive appraisal included looking beyond individual adversity and looking at the larger world since the COVID-19 pandemic is a planetary phenomenon. This indicates a resilient response since adversity anxiety usually prompts rumination and tunnel vision thinking (Brooks et al., 2017). “Rohan” eloquently describes:

“We are all through a bad time. . . and my resilience has allowed me to have that positive perspective to think that it’s not just me, it’s the whole world who is facing this. . . and I know that, over the next few months, we will recover from this, and there has been a bad effect not only on sports but also on the economy and many other things. . . and if we think into the negative we will go deeper into the negative and things are getting better as well. . . if you see that medicines are coming out and all of that, so yeah. . . things are slowly opening and all of that. . . but yes.”

“Rugby” also highlighted the importance of learning to use social support in an innovative manner to overcome the various

adversities faced, noting how her past sporting experience has been a major facilitative factor:

“I work in a team at work (as a nurse), so you know keeping the positivity and feedback since it’s been such a fast-evolving thing and everything is changing. . . every shift you are coming in at and you have just got to go with it since you can’t not go with it. . . and I have been going like things are changing, we are all learning and we are all on the same page and it’s a bit of a rubbish situation, just let’s get on with it. . . I think if I hadn’t played sports before I would have found it very challenging, the constant change, the fast-paced environment, not knowing what was going on. . . like. . . And keeping the positivity, ‘cause there is a lot of stuff that I take from the team that I am in and the people that I play with into work and taken my attitude and being the positive person into work and kept that going. . . Em. yeah. . . I don’t think I’d be okay if I did not have that team sports to fall back on and through this time as well we have kept in contact, even though we can’t train, we are all on WhatsApp groups, we are all communicating, we are building each other up, and have the realization that this is not forever; one day, we will be back to play together again. . .”

“Rohan” also states how learning and taking action and gaining a sense of mastery in the pandemic times was indicative of his resilience:

“See, I have interacted with many golfers and other sport players as well, but whenever I have talked to them, and even among normal people involved in sport and from my own experience, I think that without sporting resilience you can’t survive in any sport, and in times like these, I have used it a lot to, you know, try to be in control and stay ahead.”

“Veronica” confirms this, stating that:

“The whole journey you take. . . I think it builds character and personality and it makes you stronger mentally and

physically...because if you're thinking about yourself, like, not achieving certain results. You obviously only see, like, think of yourself and go 'I need to, I need to make myself better', and then have a positive mindset, or develop positive habits within exercising or eating or anything you're doing... so... I think having good resilience will make you a better athlete because, if you don't have that, you're gonna have... You're gonna put yourself down in a lot of the times where you could still achieve... So, I think it definitely builds personality and experience, will help a lot to build resilience in you, but yeah, I think it had a positive effect to help me get through this."

"Jack" illustrates a shift in perception as a major metacognitive re-evaluation and learning process which has directly led to his resilience response. He narrates:

"I feel like we are all going to come out of this with different perspectives on how much we rely on the sport to happen and on our sport to keep ourselves going. I think it's gonna be a good thing by the end of it, but it's gonna be hard work between now and then... Yeah, I feel like I could have easily been, like, really pissed off and angry that I had this accident (injury) and then because of it I cannot train; it would have been really easy to completely go off the rails! cause I can't train and do anything but I am actually a lot relaxed about it, to be honest, and am thinking of it like it's an accident and how these things sometimes happen, and maybe 5 years ago I would have been really pissed off about it... but now, it is kind of, like, it happens, nothing I can do about it. I just need to focus on getting back to full fitness; so, in that way, it's been good 'cause it's given an almost refocus because of this, and it's much easier for me to do my training, do my rehab, simply because I have a focus, and it's no longer just about maintaining fitness level till we are back on the court, but now it's like I am down a bit, and I really need to work back up, and it's all sort of added up to become a good thing. I want to say, cause "I feel like I had absolutely improved to refocus to training and stuff; it's not ideal but there is nothing coming up that I am really needing to deal with, but rather like it's another step on the road really."

GENERAL DISCUSSION

The general discussion infers findings through theory and lived observation/practice experience to help the readers glean the maximum possible information for research and applied practice to contribute to the development of supportive, inclusive, and adaptive practices (Ryba and Wright, 2010). Competitive elite athletes regularly experience acute stressors of various forms (see, for a review, Sarkar and Fletcher, 2014) and often have a strong athletic identity and sense of self derived from participation in sport (Sparkes, 1998). Upon retirement and the removal of the sporting platform, athletes lose access to resources, support networks, and their sport, which leads to coping difficulties and mental health threats (Jewett et al., 2019). Findings suggest that the COVID-19 pandemic and the lockdowns have ensured that athletes experience an obligatory hiatus that is very similar in onset, experience, and reality to a forced retirement (Park et al., 2013; Jewett et al., 2019). Therefore, supporting athletes using career transition support

and/or chronic injury psychological rehabilitation literature is one potential intervention.

Study 1 indicates that there are tangible losses and a sense of incongruence felt by competitive elite athletes because of the COVID-19 lockdown and pandemic. Clinical psychology research has provided evidence that prospection (i.e., simulation of future events allows individuals to generate embodied predictions of the emotional effects of events before the occurrence of the event) (Gilbert and Wilson, 2007). Findings provide preliminary evidence that the resilience responses to COVID-19 adversity by competitive elite athletes follow the risk-as-feeling hypothesis (Loewenstein et al., 2001). Anticipatory emotions and consequences lead to choices and behaviors that differ from the usually "optimal" behavior expected of elite athletes. Athletes have an active incongruence between being a "perfect athlete vs normal victim," which serves to maximize personal psychological protectiveness and minimize harm.

Lack of cure/vaccines and no population immunity have increased feelings of danger and uncertainty in this health crisis. This uncertainty, combined with a lack of control, has become a source of psychophysiological variations of sympathetic activation, releasing unstable levels of catecholamines and cortisol. This further predisposes psychopathologies, such as anxiety, heightened stress response, and depression (Clemente-Suárez et al., 2020). The current COVID-19 crisis has uncertainty, unpredictability, and uncontrollability, all of which have been linked to anxiety (Grupe and Nitschke, 2013). The adversity experienced and the consequent resilient response by competitive elite athletes can thus be classified as non-normative. It is non-normative for core reasons: First, there is no experience involved, which is a core component of generating a sense of mastery key to resilience (Galli and Vealey, 2008; Fletcher and Sarkar, 2012, 2016; Morgan et al., 2013; Zurita-Ortega et al., 2018). Second, many usual resources accessed to enable a resilient response such as perceived/tangible social support (Holt and Dunn, 2004; Mummery et al., 2004; Galli and Vealey, 2008; Hall, 2011; Fletcher and Sarkar, 2012; Morgan et al., 2013, 2015, 2019; Brown et al., 2015; Lu et al., 2016; Yamada et al., 2017), motivational climate (Machida et al., 2013; Codonhato et al., 2018; Chacón-Cuberos et al., 2019), facilitative environment (Fletcher and Sarkar, 2016; Galli, 2016; Wagstaff et al., 2016), and identity (Cowden and Meyer-Weitz, 2016) are lost. Loss of training and sport also constitutes a loss of an adaptive coping mechanism often used by athletes (Park, 2000). Resilient athletes diverged from the general adaptive tendency, which involves avoidance of situations involving threat uncertainty and feared potential adverse emotional impact (Paulus and Stein, 2006; Lovibond et al., 2009; Grupe and Nitschke, 2013). They rather engaged with the adversity threat and sustained the disruption and depletion to engage in a metacognitive revaluation and learning process, i.e., the emergent resilience process trajectory (Bonanno and Diminich, 2013).

The findings appear congruent to the Model of Uncertainty Distress in the Context of Coronavirus recently proposed by Freeston et al. (2020). Athletes' experiences of adversities and

uncertainties were simultaneously actual and perceived, which has led to the complicated nature and consequences of the lived experience post-adversity (see study 1). The resilience responses undertaken with the emergent resilience pathway are one example of an uncertainty-reducing thought-action which has, to some extent, mediated the relationship between perceived uncertainty and the intolerance of uncertainty. However, we connect these preliminary notes cognizant of the fact that the resilience processes part of the participants' narratives is still ongoing. The COVID-19 pandemic and its associated uncertainty and threats are still ongoing, ensuring constant anticipatory anxiety since there are no environmental safety signals reliably indicating the threat as over (Seligman et al., 1971; Butler and Mathews, 1987). The resilience of the athletes has played a role in "promoting personal assets and protecting an individual from the potential negative effect of stressors" (Fletcher and Sarkar, 2012, p. 675). However, resilience constitutes of "dynamic processes by which biopsychosocial system returns to the previous level of functioning following a perturbation caused by a stressor" (Hill et al., 2018, p. 367). Therefore, it would be precipitous to infer that the participants of the study have used their resilience for positive adaptation since the adversity they are to adapt to is still ongoing.

Implications

The results provide narrative evidence support to the conceptual model of Samuel et al. (2020) of the coronavirus pandemic as a change event in a sporting career. Study 1, capturing adversity experiences, fits squarely within coronavirus stage A, and the findings of study 2 showing the complex process of resilient adaptation reflect coronavirus stage B (cf. Samuel et al., 2020). A helpful parable to understand the COVID-19 adversity and resilience is to liken it to other similar acute, long-term, restrictive adversities and uncertain, non-controlled change events. Faced with these unexpected changes, elite athletes have to considerably change their sport engagement (Samuel et al., 2015). A textbook example is a sudden long-term injury or other complex experiences. Both in COVID-19 and long-term injury, the endpoint to return to "normal" sport is unknown, but athletes still have to process and continue with their career preparation. COVID-19 is a novel psychosocial threat to health, life, and livelihood. One strategy for applied practitioners to support athletes is to engage them in a metacognitive challenge appraisal by drawing evidence from experiences of overcoming similar types of adversity in their sporting careers, for example, reflecting on strengths and experience of overcoming a chronic adversity such as injury and how those same capabilities can combat COVID-19 adversity.

This study holds relevance since it provides coaches, sports psychologists, and sporting organizations with the lived reality of adversity and resilience as experienced by athletes. It is not a general assumption, but it is a demonstration of the depth and breadth of the experience. This richness will help better understand and therefore better direct support. The insight into the resilience process that highly resilient athletes are engaging in demonstrates an emphasis on acceptance and constant relearning as key. We recommend that an applicable practice philosophy

or intervention theoretical frame would be to move away from fixed mindset to a growth mindset which improves resilience (Brady and Alleyne, 2017). This would allow better resilient adaptation to new sport protocols such as quarantine, testing (MacInnes, 2020), and re-entering a changing financial market which might alter career trajectories (Transfer Market, 2020). We concur with Schinke et al. (2020b) who advocated the need to develop an organic approach (i.e., placing the focus on the person behind the athlete). This study gives the raw narrative experiences, allowing practitioners to get an understanding from the athletes' perspective and guide intervention design with that cognizance.

We are cognizant of the fact that we conducted the study during uncompromising lockdowns, but we are now moving forward in changed circumstances. Sport and the athlete's sporting careers are continuing on in different ways, such as lack of formalized training or rehabilitation support, bubbles, and/or closed-door competition. There is also a possibility of various forms of lockdown should outbreaks occur. Therefore, the results and the topics of the study hold importance as a navigational marker for sports psychologists, coaches, and sporting organizations. Should sport psychologists have to support clients who have returned to local lockdown because of outbreaks or a positive test, this study provides an idea of what athletes faced, giving them a perspective of their clients. Therefore, we recommend that psychological support should be focused on the maintenance of mental health and the development of psychological coping skills for self-care rather than performance indices. For work with adolescent and early collegiate athletes, introducing psychoeducational life skill training in addition to psychotherapeutic support is a holistic approach for intervention (cf. models Hodge et al., 2013; Sudhesh et al., 2020). Another recommended intervention strategy is to facilitate the development of self-regulation behavior in athletes, which is an important protective factor of resilience among youth at risk of social exclusion and in sport (cf. Artuch-Garde et al., 2017; Gupta and Sudhesh, 2019). This would also promote a sense of control and environmental mastery, which promotes resilience (Sarkar and Fletcher, 2014). Practitioners should ensure digital upskills to be effective in the online modality of support while keeping service delivery considerations of accessibility, working alliance, confidentiality, disinhibition, verbal/non-verbal cues, time delay, and technological issues in mind (cf. further open-access reading, Price et al., 2020).

The findings constitute the lived experiences where the athletes are coming from and can serve as a map of the psychological terrain that the new-normal sport is heading toward. There has been a very real impact on the athletic lives because of the COVID-19 adversity, and athletes are still engaging in their individual resilience trajectories. This study shines a light on some aspects of the impact, but it is as yet unknown what its long-term impact on psychological fitness is. For instance, a limitation of the study is the collection of data at a single point of time rather than at multiple temporal points. We need further research to establish a timeline of COVID-19 adversity experiences.

CONCLUSION

This article presents the nature of adversity experienced by competitive elite athletes during COVID-19 lockdowns (study 1) and the corresponding process of resilient adaptation (study 2). The dynamic and longitudinal nature suggests that, for the foreseeable future, athletes will continue to engage in their resilience process since the adversity is ongoing, not a bygone *ex post* fact of the past. This article uses a narrative technique to give a feel of the lived experience of athletes during an unprecedented time. Essentially, it is trying to explain what we did not know framed within the existing scientific theory that we know. The study is not a sweeping future prediction but an insight into the lived experiences, providing a thorough evidence of the psychological position athletes are coming from, to facilitate research and applied practice on where they go. The article is also a guide should this phenomenological reality of lockdown returns, although the authors sincerely hope that it does not.

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DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the PSWAHS Research Ethics Committee of Glasgow Caledonian University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

Both authors were involved in the research design analysis and manuscript preparation. SG conducted the interviews.

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The Importance of Nature Exposure and Physical Activity for Psychological Health and Stress Perception: Evidence From the First Lockdown Period During the Coronavirus Pandemic 2020 in France and Germany

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Objective: This cross-sectional questionnaire-based study aims to compare physical activity and nature exposure levels between people living in France and Germany during the lockdown. Furthermore, the secondary aim is to observe the relationship between perceived stress, psychological health, physical activity, and nature exposure in Germany and France during the coronavirus disease 2019 (COVID-19)-related lockdown of April/May 2020.

Methods: The study includes 419 participants who have completed the Perceived Stress Scale 10, the World Health Organization Quality of Life-BREF, the Godin-Shepherd Leisure-Time Physical Activity Questionnaire, the modified Nature Exposure Scale, and complementary questions related to the lockdown period from April 19 to May 11, 2020. Multiple regression models were constructed to evaluate the relationship of nature exposure and physical exercise with overall stress perception and psychological health in France and Germany when considering a broad range of covariates.

Results: Exposure to nature during the lockdown ($\eta p^2 = 0.034$, $p < 0.001$), amount of physical activity ($\eta p^2 = 0.014$, $p < 0.001$), and psychological health ($\eta p^2 = 0.041$, $p < 0.001$) were greater in German compared with French participants. Godin Index and Nature Exposure Scale total score were both inversely correlated to stress perception and positively correlated to psychological health. The stress and psychological health regression models explained 10% of the results' variance. Physical activity (Godin Index) was a significant for both models. Nature Exposure Scale total score was a significant predictor only for psychological health. When including all significant

covariates, the regression models explained 30.7% for the perceived stress and 42.1% for the psychological health total overall variance.

Conclusion: Physical activity and nature exposure are significant predictors of psychological health. Even though both variables are associated with stress perception, only physical activity is a significant predictor of stress perception. Our results suggest that physical activity and nature exposure were key factors to go through the lockdown period in France and Germany.

Keywords: physical activity, nature, coronavirus disease 2019, stress, psychological health

INTRODUCTION

The global spread of coronavirus disease 2019 (COVID-19), potentially leading when contracted to an acute respiratory distress syndrome (ARDS; Li et al., 2020), pushed governments from the whole world to take exceptional decisions to limit the impact of this pandemic and the saturation of world's health systems. In order to limit the spread of infection, some European countries imposed strict isolation quarantine rules upon their citizens. Depending on the government policies, infection levels, and the saturation of health systems, the measures taken by countries varied (World Medical Association, 2020). Between March 17 and May 11, the French government imposed full confinement for its citizens. This required the population to stay at home, non-essential shops were closed, and people had to fill out a very restrictive derogative travel certificate to go outside from their residency (Ministère de l'intérieur français, 2020). In these conditions, the practice of physical activity outside from home had to be individual, not more than 1 h daily, and within a 1-km radius from residency (Ministère de l'intérieur français, 2020). On the contrary, the German government was less restrictive. Indeed, people who lived in Germany during this period were allowed to leave their households to exercise or to merely enjoy some fresh air, but only alone or with one other person.

Physical activity and physical exercise have been used for decades to improve mood and chronic stress regulation in humans of all ages, genders, ethnicities, and cultures (Gladwell et al., 2013; Sjøgaard et al., 2016; Saraulli et al., 2017; Laird et al., 2018). Acute physical activity and exercise have been demonstrated to improve mood and induce adaptive stress resistance through an increase in neuroactive molecules such as serotonin, epinephrine, brain-derived neurotrophic factor, and oxytocin (Strüder and Weicker, 2001; Lafenetre et al., 2011). Chronic physical activity, in particular physical exercise training, leads to metabolic adaptations like decreased cortisol levels (Huang et al., 2013), decreased inflammation (Koliymitra et al., 2019; Małkiewicz et al., 2019), reduced central kynurenine pathway activity (Agudelo et al., 2014; Metcalfe et al., 2018), improved immune function (Phillips and Fahimi, 2018; Rumpf et al., 2021), and decreased permeability of the blood-brain barrier (Małkiewicz et al., 2019). Furthermore, these metabolic changes due to physical activity and exercise offer some benefits on mental health for both clinical and nonclinical populations (Laporte et al., 1985; Deslandes et al., 2009; Javelle et al., 2020; Oberste et al., 2020).

Nature exposure is another parameter suggested to alleviate mood and reduce stress (stress reduction theory and attention restoration theory) (Ulrich, 1981; Kaplan, 1995). Several functional magnetic resonance imaging studies suggest that these restorative effects might be associated with an increased activation of the cuneus, precuneus, and posterior cingulate cortex (Tang et al., 2017; Chang et al., 2021). These brain regions play a key role in dose-dependent stress responses, potentially through extensive connections to the prefrontal and hippocampal regions, which, in turn, project toward the neuroendocrine system (Chang et al., 2021). Pretty and colleagues have observed that nature-related health benefits can be primed when associated with exercise (Pretty et al., 2003, 2005; Barton and Pretty, 2010; Rogerson et al., 2016). To describe potential synergistic health benefits that occur when exercising in nature, the term "green exercise" was endorsed by Pretty et al. in 2003. In a later multi-study analysis, green exercise has been demonstrated to increase moderately mood ($d = 0.54$) and self-esteem ($d = 0.46$) (Barton and Pretty, 2010). Furthermore, Gladwell et al. (2013) have reported in their literature review that green exercise leads to lower levels of perceived exertion, altering physiological functioning including stress reduction, restoring mental fatigue, and improving mood, self-esteem, and perceived health.

Against this backdrop, this questionnaire-based study aims to compare physical activity and nature exposure levels between people living in France and Germany during the lockdown. It was hypothesized that German people would have a greater exercise time and nature exposure than French people. Therefore, German people would have greater psychological health and a lower stress level score than French people. Furthermore, this study aims to quantify the association between physical activity, nature exposure, and stress perception along with psychological health in Germany and France during the lockdown period 2020 (April–May 2020) when controlling for a broad range of covariates.

Materials and Methods

All procedures were in accordance with the Declaration of Helsinki and were approved by the University Institutional Review Board before data were collected. The corresponding author can provide the full dataset.

Experimental Design

Participants were recruited through online advertising on the German Sport University website, on social networks (i.e.,

Facebook and Twitter), and per email in France and Germany using personal and professional networks. No rewards were provided to the participants. Participants completed an online informed consent before engaging in study procedures.

The Perceived Stress Scale (PSS)-10 (Cohen, 1988), the World Health Organization Quality of Life (WHOQoL)-BREF (Harper et al., 1998), the Godin-Shephard Leisure-Time Physical Activity Index (Godin, 2011), the modified Nature Exposure Scale (Wood et al., 2019), and complementary questions related to the lockdown period were administered *via* the online platform Qualtrics from April 19 to May 11 2020. The survey was available in German and French languages. The inclusion criteria were to be either living in France (and to speak fluently French) or living in Germany (and to speak fluently German) at the time of the survey. To be able to properly assess the situation during the lockdown without having much difference between weeks, participants were asked to consider the past 3 weeks when completing all scales and subsequently did not have to take into account before or the very first lockdown days in their answers. Other control variables (e.g., habits change) recorded for explorative purposes are not presented in this paper because of a lack of space and focus but can be found in **Supplementary Material A**.

Sample Size

A priori sample size calculations were estimated using the software G*Power (version 3.1.9.2). Based on the difference in governmental regulations during the pandemic 2020, at least a small-to-moderate group difference ($\eta^2 = 0.045$) when controlling for two covariates on an ANCOVA was expected for the primary outcomes (physical activity levels and nature exposure between France and Germany). A full sample size of 369 participants was required to meet this purpose. *A priori* calculation for linear multiple regressions, two-tailed, with five predictors (country, Godin Index, Nature Exposure Scale total score, age, and gender) explaining 10% of the general variance ($r^2 = 0.100$) required 184 participants.

Our recruitment met power requirements with 419 participants included in the analysis.

Sample Characteristics

Out of 434 participants, nine who answered one or both catch items incorrectly, and six who brought insufficient care to their answers (*Catch Items and Careless Answers* section) were excluded from the analysis. Missing rate was inferior to 3.5% over all questions in the German and French surveys. Out of the 419 participants included in the final analysis, 13 (10 for Germany and three for France) were non-native speakers but were fluent with the language used and so included in the analysis. Based on the reported zip codes, the majority of participants were located in Rhône-Alpes and North Rhine Westphalia compared with all other regions in France and Germany (**Supplementary Material A**).

Descriptive characteristics of participants per country are reported in **Table 1**. Data from 145 French and 274 German participants who completed the battery of questionnaires were

TABLE 1 | Descriptive characteristics of the French and German samples.

Groups		French version (n = 145)	German version (n = 274)
Categorical variables			
Gender	Females	88 (60.7%)	181 (66.1%)
	Males	57 (39.3%)	92 (33.6%)
	Diverse	0 (0%)	1 (0.4%)
Professional status	Students	29 (20%)	112 (40.9%)
	Retired	11 (7.6%)	6 (2.2%)
	Active	102 (70.3%)	148 (54%)
Chronic disease	Non-active	3 (2.1%)	8 (2.9%)
	Yes	17 (11.7%)	36 (13.1%)
Psychological disorder	No	128 (88.3%)	236 (86.9%)
	Yes	1 (0.7%)	2 (0.7%)
Tutoring	No	144 (99.3%)	273 (99.3%)
	Yes	52 (35.9%)	58 (21.2%)
COVID-19	No	93 (64.1%)	216 (78.8%)
	Suspected	9 (8.3%)	15 (5.4%)
Working habits	Diagnosed	3 (2.1%)	1 (0.4%)
	Change	88 (60.7%)	196 (71.5%)
	No change	18 (12.4%)	46 (16.8%)
	No more work	34 (24.4%)	31 (11.3%)
Living location	n/a	5 (3.4%)	0 (0%)
	Village	70 (48.3%)	47 (17.2%)
	Small city	34 (23.4%)	47 (17.2%)
	Big city	41 (28.3%)	180 (65.7%)
Physical activity during the lockdown	Yes	135 (93.3%)	263 (96%)
	No	10 (6.7%)	11 (4%)
Continuous variables			
Age (years)		40.7 ± 17.0	32.5 ± 11.9
Minutes per week of physical activity during the lockdown		303.2 ± 211.8	389.2 ± 268.1
Godin Index		38.1 ± 24.4	43.6 ± 24.6

Note. When the missing rate (n/a) is not listed, it is equal to 0. Results for continuous variables are presented as mean (±standard deviation).

COVID-19, coronavirus disease 2019.

available for the analysis. The German sample included 33.6% of males [vs. 48.7% in the global population in 2019 (Statista, 2020a)]. The French sample included 39.3% of males [vs. 48.3% in the global population in 2019 (INSEE, 2020c)]. One German participant reported being diverse and was withdrawn from gender comparison as alone in its category. The French sample included fewer students and more active persons than did the German sample (20–70.3 vs. 40.9–54%; **Table 1**, *Complementary Questions* section). France reported a greater number of participants living in a village than did Germany (48.3 vs. 17.2%, *Complementary Questions* section, **Table 1**). The average age was 40.7 years old in the French sample [41.3 in the global population in 2017 (INSEE, 2020a)] and 32.5 years old in the German sample [44.5 in the global population in 2019

(Statista, 2020b)]. The age was significantly different between French and German answers ($p < 0.010$, Table 1).

Perceived Stress Scale-10 (Cohen, 1988)

The PSS is the most widely used psychological instrument for measuring stress perception (Cohen et al., 1983). It is a measure of the degree to which situations in one's life are appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives (Cohen et al., 1983). The PSS-10 was preferred over the PSS-14 for better reliability, poor loading of four additional items (5, 6, 12, and 13) existing in the PSS-14, and an equivalent validity (Cohen, 1988; Lee, 2012). Participants were asked to respond to all items on a Likert scale (ranging from 1 "never" to 5 "very often"). The validated French and German versions were used (Rolland, 1991; Klein et al., 2016). Overall Cronbach's alpha was .858 (French version, .840; German version, .867).

World Health Organization Quality of Life-BREF (Harper et al., 1998)

The WHOQoL-BREF instrument is a valid and reliable reduced version of WHOQoL-100, which is more convenient for use in large research studies. It comprises 26 items, which measure the following broad domains: physical health, psychological health, social relationships, and environment (Harper et al., 1998). The validated French and German versions were used (Baumann et al., 2010; Burfeind, 2011). Responses to each item are coded from 1 to 5 and averaged per domain. Overall Cronbach's alpha was .847 (French version, .798; German version, .823).

Godin-Shephard Leisure-Time Physical Activity Index (Godin, 2011) and Physical Activity-Related Questions

Participants were asked to judge their average physical activity frequency per week and time per session within the 3 weeks before the questionnaire completion (i.e., during the lockdown period).

The Godin-Shephard Leisure-Time Physical Activity Index is obtained using the following formula: (frequency per week of mild exercise training $\times 3$) + (frequency per week of moderate exercise training $\times 5$) + (frequency per week of strenuous exercise training $\times 9$) (Godin, 2011). The intended cut-point values for the classification scoring are based on the North American public health physical activity guidelines, which are defined as follows: individuals reporting moderate-to-strenuous Leisure Score Index ≥ 24 are classified as active, whereas individuals reporting moderate-to-strenuous Leisure Score Index ≤ 23 are classified as insufficiently active (estimated energy expenditure < 14 kcal/kg/week) (Godin, 2011).

The Modified Nature Exposure Scale (Wood et al., 2019)

The modified Nature Exposure Scale is a five-item scale designed to assess direct physical and/or sensory contact with the natural environment (Wood et al., 2019). This version was preferred to

the four-item scale created by Francis (unpublished) in reason of its better model fit. One item is designed to assess exposure to nature in everyday life, two items to assess exposure outside of everyday environments, and two items assessing nature exposure during physical exercise. Each question on the scale is scored on a 5-point Likert scale (ranging from 1 "high/a great deal" to 5 "low/not much"), with higher scores reflecting greater exposure to nature. A total score was computed as the average of the five items.

French and German versions were translated by the authors and evaluated via confirmatory factor analysis (CFA) before using their results (German and French versions and a short summary from the CFA are available in **Supplementary Materials B, C**, respectively). Both German and French versions got an acceptable fit (one-factor structure) but should be retested independently from the lockdown period. Overall Cronbach's alpha was .811 (French version, .847; German version, .811).

Complementary Questions

Several questions were added to the previously mentioned questionnaires to relate to the current pandemic and assess potential covariates of stress and psychological health that could influence our results.

Participants were asked their age, gender [i.e., male, female, and diverse), and status (i.e., student, retired, active, and non-active—based on the definitions of the French National Institute of Statistics and Economics (INSEE, 2020b)]. They were asked to report if they had any other persons under their responsibility (e.g., children and elders) at home; if their work habits changed; if they were living in a village, a small city, or a large city; and the zip code of their residency during the lockdown period.

Participants were asked to report if they were suffering from any chronic diseases and, if so, what specific type. These open-ended responses were then categorized as psychological or physical disorders by the experimenters. Participants had to report if they had been suspected and/or diagnosed to be suffering from COVID-19. These participants were kept in the analysis, but this variable was considered as a potential covariate. This variable was considered binary (suspected or diagnosed vs. healthy) and on three levels (suspected vs. diagnosed vs. healthy).

Finally, the day of questionnaire completion was recorded to control for the duration of the lockdown period within the 3 weeks where our questionnaire was offered online.

Catch Items and Careless Answers

Two catch items were strategically placed along the questionnaire. These catch items (please select "I agree") were presented as being catch items ("Checking for random answers") to avoid that attentive responders consider these items as mistakes or parts of the psychological assessment. They were later used to identify and exclude random answers. Methods explained by Meade and colleagues to reduce, identify, and remove careless response were also applied to this questionnaire (Meade and Craig, 2012). First names, acronyms, or pseudonyms (participants' choice) were used to interact with participants. At the end of the questionnaire, participants had to evaluate the level of care they brought to their answers on a scale going from

1 (almost no care) to 5 (full care). Participants reporting a level of care below 3 (moderated care) were excluded from the analysis. Participants were also asked if they were considering the quality of their answers sufficient to enter in our analysis. Participants answering no were excluded from the analysis.

Statistics

Generals

Statistical analyses were conducted using SPSS software, version 23.0 (IBM, Armonk, New York) and R, version 1.2.1335. Data were first winsorized at 1% and 99% (± 2.58 standard deviations) for both countries independently. Based on the central limit theorem applied to large numbers, our samples' sampling distribution was normal. Nevertheless, all variables were checked for linearity (*via* quantile–quantile plot, and histogram of standardized residuals), skewness, and kurtosis. If these assumptions were not met, data were corrected with the appropriated transformation. Thus, times of exercise before and during the lockdown period were square root corrected and then met the linearity assumptions. Descriptive characteristics were compared between countries using *t*-tests. Questionnaire results considering potential covariates were compared between countries using analysis of covariance, ANCOVA. “Professional status,” “age,” and “living location” were the most differently distributed variables between our samples. “Tutoring” and “working habits” distributions also moderately differed between our samples. This is very likely due to a large overlap with the previously mentioned variables. Subsequently, “professional status,” “age,” and “living location” were considered as covariates in the univariate analyses. Relationships between variables of the full dataset were evaluated with bivariate correlations and regression models (*Multiple Linear Regression Models* section). Bonferroni alpha correction was applied family-wise for comparison and correlation analyses. So physical exercise indices (time of exercise and Godin Index) were considered significant at $p < 0.025$.

Multiple Linear Regression Models

A correlational table and a categorical analysis were constructed to introduce potential links between dependent variables and covariates. Only the significant covariates detected were then used to construct the multiple regression models (**Supplementary Material A**).

The outcome values from multiple regression models were always continuous (PSS-10 and WHOQoL-BREF psychological health levels), and the main predictor for each model was either binary or continuous (Field, 2013). All predictors were tested for multicollinearity (variance inflation factor and tolerance values—values accepted were respectively < 2 , and > 0.2), independence (Durbin Watson test—results accepted were between 1 and 3), and linearity (graphically *via* quantile–quantile plot, scatterplot, and histogram of studentized residuals) (Bowerman and O'Connell, 1990). Predictors and models met all the previously mentioned assumptions.

Model 1. Differences in perceived stress levels between France and Germany were the first interest, so the variable “country” was chosen as the main predictor. Other independent predictors were

selected based on literature and then on results from univariate analysis. Godin Index scores are supposed to be better fitness indices than simple exercise durations and thus were selected as exercise predictor. Nature Exposure Scale total score, age, gender, and professional status were also included to the model to account for differences in the sampling distribution from each survey.

Model 2. A more complete model applied to all participants was created to better understand participants' stress levels independently from the country of provenance. Additional variables potentially impacting stress levels were added to the model, while the variable “country” was withdrawn. All predictors were still independent (e.g., chronic disease could not have been included as a predictor because it was already represented by the continuum scores existing within the physical health domain). All domains from the WHOQoL-BREF (apart from psychological health), professional status, age, gender, Godin Index, and Nature Exposure Scale total score were considered as potential covariates.

Model 3. Differences in psychological health levels between France and Germany were the second interest, so the variable “country” was chosen as main predictor for the initial model. Godin Index, Nature Exposure total score, professional status, and gender were the other predictors.

Model 4. A more complete model was created to better understand participants' psychological health levels independently from the country of provenance. Additional variables potentially impacting psychological health were added to the model, while the variable “country” was withdrawn. All predictors were still independent. All the other domains from the WHOQoL-BREF, professional status, gender, Godin Index, and Nature Exposure Scale total score were considered as potential covariates.

RESULTS

When accounted for the effects of age, professional status, and living location, participants from Germany reported doing more physical exercise ($\eta^2 = 0.014$, $p < 0.05$) during the lockdown than participants living in France. Godin Index scores were not different between countries ($\eta^2 = 0.002$, $p = 0.335$). The average Godin Index scores for both countries were largely above the cutoff score of 24 to be considered as being active (40.0 vs. 42.7).

Questionnaire Result

The differences between groups from each questionnaire are presented in **Table 2**. When controlled for age, professional status, and living location, participants from Germany had significantly greater stress perception levels ($\eta^2 = 0.014$, $p < 0.050$). WHOQoL-BREF psychological health domain was significantly greater for the participants from Germany ($\eta^2 = 0.041$, $p < 0.001$). The Nature Exposure total score was greater for participants from Germany when controlled for the place participants were living in ($\eta^2 = 0.034$, $p < 0.001$).

Exercise time during the pandemic and Godin Index scores were inversely correlated to PSS-10 levels (r 's > -0.136 , p 's < 0.01), showing a negative association between physical activity

TABLE 2 | Comparisons between France and Germany in questionnaire results accounting for the effect of age, professional status, and living location.

Questionnaire	Significant covariates	Effect size (ηp^2), p value	Adjusted means $\pm$ Std. error	
			France	Germany
PSS-10	Age	0.014, $p < 0.050$	2.51 $\pm$ 0.06	2.68 $\pm$ 0.04
Nature exposure total score	Age	0.034, $p < 0.001$	3.32 $\pm$ 0.08	3.71 $\pm$ 0.06
	Living location			
WHOQoL-BREF	Physical health	Age	12.18 $\pm$ 0.16	12.59 $\pm$ 0.11
	Psychological health	–	13.34 $\pm$ 0.22	14.42 $\pm$ 0.15
	Social relationships	–	14.34 $\pm$ 0.29	14.37 $\pm$ 0.20
	Environment	–	15.86 $\pm$ 0.17	16.01 $\pm$ 0.12

Note. PSS-10, Perceived Stress Scale 10; WHOQoL, World Health Organization Quality of Life.

TABLE 3 | Correlations table between physical activity indices, Nature Exposure Scale total scores, and questionnaire results.

	DOM1	DOM2	DOM3	DOM4	Exercise time	Godin Index	Nature	Age	Completion date
PSS-10—	–0.471***	–0.578***	–0.341***	–0.350***	–0.140**	–0.136**	–0.128**	–0.204***	0.000
Perceived stress	0.000	0.000	0.000	0.000	0.005	0.007	0.009	0.000	0.997
DOM1—		0.551***	0.336***	0.469***	0.140**	0.164**	0.165*	0.158***	0.000
Physical health		0.000	0.000	0.000	0.005	0.001	0.001	0.001	0.992
DOM2—			0.427***	0.439***	0.180***	0.192***	0.195***	0.024	–0.073
Psychological health			0.000	0.000	0.000	0.000	0.000	0.623	0.135
DOM3—				0.302**	0.053	0.050	0.075	0.070	0.010
Social relationship				0.000	0.293	0.323	0.128	0.151	0.838
DOM4—					0.120*	0.193***	0.202***	0.042	–0.043
Environment					0.017	0.000	0.000	0.395	0.382
Exercise time during the pandemic						0.749***	0.268***	–0.012	–0.113*
						0.000	0.000	0.809	0.024
Godin Index							0.199***	–0.209***	–0.139**
							0.000	0.000	0.005
Nature Exposure Score								0.199***	–0.047
								0.000	0.344
Age									0.220***
									0.000

Note. PSS-10, Perceived Stress Scale 10.

* $p < 0.050$; ** $p < 0.010$; *** $p < 0.001$.

and perceived stress levels (Table 3). Moreover, the nature exposure score also negatively correlated to stress levels ($r = -0.128$, $p < 0.010$). Positive correlations were observed between psychological health and physical activity indices as well as nature exposure score (r 's > 0.180 , p 's < 0.001).

The completion date was inversely correlated to the time of exercise during the lockdown and the Godin Index (r 's > -0.113 , p 's < 0.050) and positively correlated to age ($r = 0.220$, $p < 0.001$) but did not show any association with perceived stress and psychological health.

Univariate analysis of the impact of each categorical covariate of PSS-10 and psychological health levels was as well-realized (Supplementary Material A). Only gender and professional status reached significance (Supplementary Material A).

Multiple Linear Regression Models

Multiple linear regression models results are reported in Table 4.

PSS-10—Perceived Stress Levels

Model 1. Out of the six predictors, Nature Exposure Scale total score ($\beta = -0.041$, $p = 0.245$), professional status ($\beta = -0.033$, $p = 0.163$), and gender (women compared with men, $\beta = -0.029$, $p = 0.659$) were not significant. The model explained 9.9% ($p < 0.001$) of the overall variance where country (Germany compared with France, $\beta = -0.187$, $p < 0.010$), Godin Index ($\beta = -0.005$, $p < 0.001$), and age ($\beta = -0.008$, $p < 0.010$) were all negatively associated with stress levels.

Model 2. The regression model applied to the full sample explained 30.7% ($p < 0.001$) of the overall variance. Nevertheless,

TABLE 4 | Multiple linear regression model results table.

Model	R^2 — p value	Variable	Estimate (β)	Std. error	p value
1	Multi. $R^2 = 11.3\%$ Adj. $R^2 = 9.9\%$ $p < 0.001$	Intercept	3.00	0.207	$p < 0.001$
		Country	0.187	0.071	$p < 0.010$
		Gender	0.029	0.066	$p = 0.659$
		Godin Index	−0.005	0.001	$p < 0.001$
		Nature Exposure	−0.041	0.035	$p = 0.245$
		Status	−0.033	0.024	$p = 0.163$
2	Multi. $R^2 = 32.1\%$ Adj. $R^2 = 30.7\%$ $p < 0.001$	Age	−0.008	0.002	$p < 0.010$
		Intercept	5.687	0.79	$p < 0.001$
		DOM1	−0.106	0.019	$p < 0.001$
		DOM3	−0.038	0.009	$p < 0.001$
		DOM4	−0.056	0.017	$p < 0.010$
		Nature Exposure	0.010	0.031	$p = 0.740$
		Godin Index	−0.003	0.001	$p < 0.050$
		Gender	0.055	0.056	$p = 0.330$
		Status	−0.024	0.021	$p = 0.264$
3	Multi. $R^2 = 11.2\%$ Adj. $R^2 = 10.1\%$ $p < 0.001$	Age	−0.007	0.002	$p < 0.010$
		Intercept	10.998	0.562	$p < 0.001$
		Country	1.004	0.262	$p < 0.001$
		Gender	−0.482	0.246	$p = 0.051$
		Godin Index	0.018	0.005	$p < 0.001$
		Nature Exposure	0.409	0.129	$p < 0.010$
4	Multi. $R^2 = 43.2\%$ Adj. $R^2 = 42.1\%$ $p < 0.001$	Status	0.171	0.083	$p < 0.050$
		Intercept	0.622	0.956	$p = 0.669$
		DOM1	0.504	0.064	$p < 0.001$
		DOM3	0.196	0.032	$p < 0.001$
		DOM4	0.232	0.060	$p < 0.001$
		Nature Exposure	0.197	0.104	$p < 0.050$
		Godin Index	0.009	0.004	$p < 0.050$
		Gender	−0.164	0.193	$p = 0.395$
		Status	0.023	0.066	$p = 0.730$

Multi., Multiple; Adj., Adjusted.

professional status ($\beta = -0.024$, $p = 0.264$), gender (women compared with men, $\beta = 0.055$, $p = 0.330$), and Nature Exposure Scale total score ($\beta = 0.010$, $p = 0.740$) were not significant predictors. Physical health (DOM1, $\beta = -0.106$, $p < 0.001$), social relationships (DOM3, $\beta = -0.038$, $p < 0.001$), environment (DOM4, $\beta = -0.056$, $p < 0.010$), Godin Index ($\beta = -0.003$, $p < 0.050$), and age ($\beta = -0.007$, $p < 0.010$) were associated with stress levels. The relation between stress perception, nature exposure, and Godin Index is illustrated in **Figure 1**.

World Health Organization Quality of Life—BREF—Psychological Health

Model 3. Out of the five predictors, only gender (women compared with men, $\beta = -0.482$, $p = 0.051$) was not significant. This model explained 10.1% ($p < 0.001$) of the overall variance where country (Germany compared with France, $\beta = -1.005$, $p < 0.001$), Godin Index ($\beta = 0.018$, $p < 0.001$), nature exposure

($\beta = 0.409$, $p < 0.010$), and professional status ($\beta = 0.170$, $p < 0.050$) were all positively associated with psychological health.

Model 4. The resulting model explained 42.1% ($p < 0.001$) of the overall variance. Nevertheless, professional status ($\beta = 0.023$, $p = 0.730$) and gender (women compared with men, $\beta = -0.164$, $p = 0.395$) were not significant predictors. Physical health ($\beta = 0.504$, $p < 0.001$), social relationship ($\beta = 0.196$, $p < 0.001$), environment ($\beta = 0.232$, $p < 0.001$), Godin Index ($\beta = 0.009$, $p < 0.050$), and Nature Exposure Scale total score ($\beta = 0.197$, $p < 0.050$) were positively associated with psychological health. The relation between psychological health, nature exposure, and Godin Index is illustrated in **Figure 2**.

DISCUSSION

This questionnaire-based study aimed to compare physical activity and nature exposure levels along with stress perception and psychological health in German and French samples during the lockdown period (April–May 2020). Furthermore,

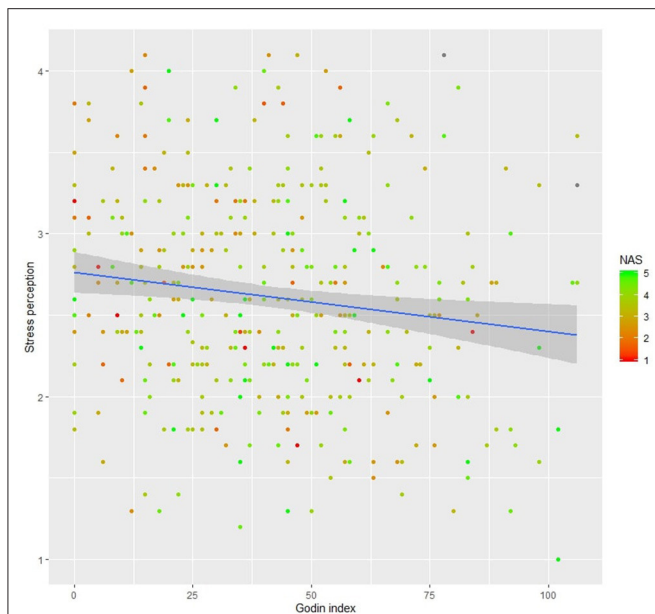


FIGURE 1 | Perceived Stress Scale 10 (PSS-10) multiple regression illustration with only two predictors: Godin Index and Nature Exposure total Score (NAS). Missing values in the NAS are visualized in gray. The regression line (in blue) is presented with 95% of confidence interval (gray area).

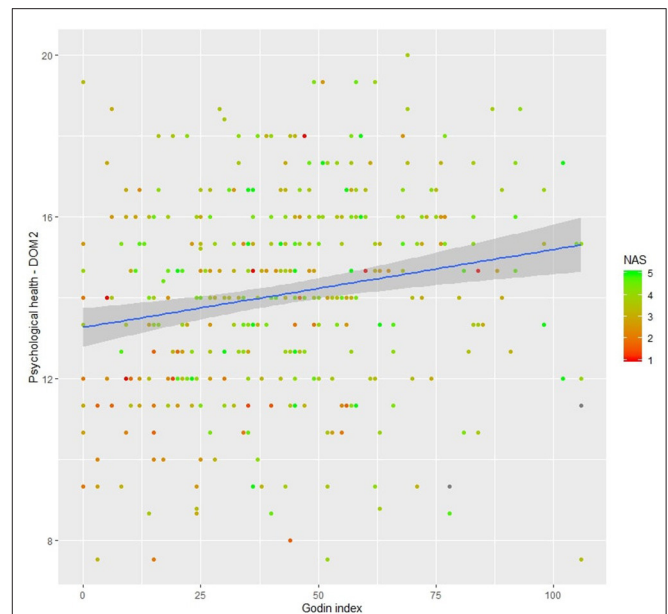


FIGURE 2 | Psychological health multiple regression illustration with only two predictors: Godin Index and Nature Exposure total Score (NAS). Missing values in the NAS are visualized in gray. The regression line (in blue) is presented with 95% of confidence interval (gray area).

the association of physical activity and nature exposure with stress perception and psychological health was evaluated through multiple linear regression models.

Participants from Germany reported doing significantly more physical activity during the lockdown period than participants from France (**Table 1**) and consequently had a higher Godin Index score that was, nonetheless, not significant after controlling for the effect of age, professional status, and living location. The effect of the French complete lockdown on outdoor activities appeared even more clearly when considering Nature Exposure Scale total scores. Even after controlling for living location, Nature Exposure Scale total scores were higher in German participants (small-to-moderate effect size; **Table 2**). These results confirmed our hypothesis. During the lockdown, the German sample was more outside and did more physical activity than the French sample. Considering the reduced amount of time allowed outside (i.e., 1 h per day), the additional effort to go outdoors do some activities (i.e., to always have a derogative travel certificate) vs. no limitation of time but of escort in Germany, these results appeared logical. Furthermore, differences of psychological health levels in favor of the German participants (small-to-moderate effect size) were detected. Nonetheless, German participants also reported higher perceived stress than French participants did (small effect size).

Going further in our analysis, we have tested the detected differences in regression models. Together with the variable “country,” physical activity and nature exposure were significant predictors of psychological health levels and responsible for a small-to-moderate part of the total variance (10%). The

positive relationship displayed in the regression model (and in the correlations table) between psychological health, physical activity, and nature exposure is in line with the scientific literature already showing convincing evidence from numerous studies (Plante and Rodin, 1990; Atlantis et al., 2004). The interaction between physical exercise and mental health results from multiple factors (Plante and Rodin, 1990). For example, increased neurotransmission of norepinephrine, serotonin, and dopamine following exercise has been shown to improve mood, muscle potential, and tension release and to give a sense of mastery control and self-sufficiency (Plante and Rodin, 1990). Furthermore, chronic exercise has been shown to improve immune functions as well as kynurenine pathway regulation that are indirect regulators of mood and psychological health (Won and Kim, 2016; Metcalfe et al., 2018; Małkiewicz et al., 2019). When considering exposure to nature (physical and/or sensory contact with the natural environment), previous studies have shown that the latter can improve mental well-being, attention, and mood. Indeed, nature health-related benefits have been acknowledged for a very long time (Hartig and Marcus, 2006). When including significant covariates, and applied to the full sample (without countries comparison), the regression model created for psychological health explained more than 40% of the overall variance. Nature Exposure Scale total score and Godin Index were determined as being significant predictors of psychological health, alongside with physical health (DOM1), environment (DOM3), and social relationships (DOM4). For decades, the scientific community has recognized the association between physical and psychological health (Plante and Rodin, 1990). Nevertheless, our results are

also among the first to show that nature deficiency mostly exists in inactive people and psychological health (**Figure 2**; Godin Index < 25—DOM2 $\leq$ 14).

When considering stress perception, the regression model also explained a small-to-moderate part of the total variance (10%). Nevertheless, only country provenance, Godin Index, and age were significant predictors. After including covariates and when applied to the full sample (without countries comparison), the regression model explained 30% of the overall variance. In line with the literature, physical health (DOM1), environment (DOM3), social relationships (DOM4), Godin Index, and age were determined as significant predictors. These results not only confirm already acknowledged ties (Plante and Rodin, 1990; Talley et al., 2012; Campos et al., 2014) but also show that physical activity is a direct predictor of perceived stress level (**Figure 1**). Indeed, a number of randomized controlled trials have shown that exercise training is an effective method for improving stress symptoms and quality of life (Weyerer and Kupfer, 1994; Atlantis et al., 2004; Imayama et al., 2011). Exercise blocks the effect of psychological stress on cardiac reactivity (Hamer et al., 2006) and dampens stressor-evoked increases in stress hormones (Stults-Kolehmainen and Sinha, 2014). Even though negatively correlated to stress perception, Nature Exposure Scale total score did not appear as a significant predictor of PSS-10 scores. Our results suggest that nature exposure is a more consistent predictor for psychological health than for stress perception.

Despite its novelty and strengths, several limitations exist. Firstly, the initial difference suggesting that German participants may have been more stressed than French (small effect size) was unexpected. This is especially surprising considering the higher levels of physical activity and nature exposure in the German survey. Regardless, univariate analyses were controlled for variables that were differently distributed between our samples (i.e., age, living location, and professional status). It is possible that other parameters may have affected our results. An explanation for this difference could be given by uncontrolled covariates, like dominant personality traits [e.g., neuroticism is associated with stress reactivity (Lahey, 2009)], that were not evaluated given the trade-off between questionnaire length and sample size aims. Secondly, the recruitment in Germany was partly conducted at the German Sport University campus hosting many sport students, whereas no professional sport sciences network was used in France. This may have affected the overall physical activity indices of the German sample and could be another explanation of the difference in physical exercise time during the lockdown period between the German and French samples. Thirdly, small effect size results in the univariate analyses' (i.e., stress perception and physical activity time during the lockdown) lack of power (46%, post hoc sensitivity analysis for ANCOVA with three covariates and $\eta^2 = 0.014$). The power may have been even more reduced because of the unbalance of the German and French samples leading to unequal variances. Nevertheless, this was not detected by Levene's tests. Fourthly, even though the best methods to extract representative values data were used, home-based questionnaires are, still, less accurate than interviews or more direct physical exercise measurements (e.g., tracking device and actigraphy). Finally, in this context, it is

important to consider in the interpretation of the present study that not all physical activities (e.g., house work) correlate with good health (Lawlor et al., 2002). Nevertheless, these activities may be performed in a health-enhancing manner, like physical exercise, if relevant muscle groups are involved, with sufficient intensity and appropriate recovery.

CONCLUSIONS

In conclusion, the results of this study captured the impact of the lockdown decisions on physical activity, nature exposure, and consequently on psychological health and perceived stress levels. Regression models showed that nature exposure and physical activity are both predictors of psychological health. Physical activity was a predictor of perceived stress levels as well. Our results suggest that physical activity and nature exposure have represented a key factor to go through the lockdown period in France and Germany. Considering previous literature and these new findings, nature exposure and physical activity should be considered more systematically as moderators of psychological health and potentially as complements or alternatives to pharmacological treatments for mood-related disorders and syndromes.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

This study involving human participants was reviewed and approved by German Sport University Institutional Review Board. The participants provided an online informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

FJ, TH, SL, and PZ did the conceptualization of the study. FJ did the project administration. FJ did the data curation. FJ did the data analysis. FJ, TH, AM, SL, and PZ wrote, reviewed, and edited the manuscript. AM proofread the manuscript. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

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Mood Responses and Regulation Strategies Used During COVID-19 Among Boxers and Coaches

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The COVID-19 pandemic brought unprecedented changes to daily life and in the first wave in the UK, it led to a societal shutdown including playing sport and concern was placed for the mental health of athletes. Identifying mood states experienced in lockdown and self-regulating strategies is useful for the development of interventions to help mood management. Whilst this can be done on a general level, examination of sport-specific effects and the experience of athletes and coaches can help develop interventions grounded in real world experiences. The present study investigated perceived differences in mood states of boxers before and during COVID-19 isolation in the first lockdown among boxers. Boxing is an individual and high-contact sport where training tends to form a key aspect of their identity. Boxers develop close relationships with their coach and boxing. Hence boxers were vulnerable to experiencing negative mood, and support via the coach was potentially unavailable. Participants were 58 experienced participants (44 boxers, male $n = 33$, female $n = 11$; 14 boxing coaches, male $n = 11$, female $n = 3$). Boxers completed the Brunel Mood Scale to assess mood before COVID-19 using a retrospective approach and during COVID-19 using a “right now” time frame. Boxers responded to open-ended questions to capture mood regulation strategies used. Coaches responded to open ended questions to capture how they helped regulate boxer's mood. MANOVA results indicated a large significant increase in the intensity of unpleasant moods (anger, confusion, depression, fatigue, and tension) and reduction in vigor during COVID-19 ($d = 0.93$). Using Lane and Terry (2000) conceptual framework, results showed participants reporting depressed mood also reported an extremely negative mood profile as hypothesized. Qualitative data indicated that effective mood-regulation strategies used included maintaining close coach-athlete contact and helping create a sense of making progress in training. When seen collectively, findings illustrate that mood state responses to COVID-19 were severe. It is suggested that that active self-regulation and self-care should be a feature of training programmes to aid coaches and boxers in regulating mood when faced with severe situational changes.

Keywords: mental toughness, emotional intelligence, mood regulation, coach-athlete relationship, COVID-19

INTRODUCTION

The Coronavirus pandemic has resulted in over 2 million deaths worldwide by January 2021 (World Health Organisation, 2020). In the UK, from March 2020 restrictions on movements and social interaction, called a lockdown, were employed to reduce infection rates (Chatterjee and Chauhan, 2020), and as part of this strategy sporting events were canceled. In enforcing a lockdown, many experts using data from other pandemics predicted an increase in negative mental health (Brooks et al., 2020). Initial research in the UK indicated that an increase in negative mood as indicated by people reporting to feel stressed, scared and less happy once lockdown started (YouGov, 2020). Mood data collected online at the start of the COVID pandemic from 1,062 participants, where the location of participants was not identified, reflected an inverse iceberg profile. An iceberg profile is characterized by significantly elevated scores for tension, depression, anger, fatigue, and confusion, and below average scores for vigor; a profile associated with increased risk of mental health issues (Terry et al., 2020). Hence, there is growing evidence showing people experience negative mood during lockdown.

At the start of the lockdown in the UK (March 23rd, 2020), it was suggested that support staff should anticipate a greater demand for mental health provision for athletes during the ensuing months (Brooks et al., 2020; Chatterjee and Chauhan, 2020). A key issue is how this might be provided. On one hand, there is an argument for using common principles of self-care, and within the UK, one example of this was advising people to take 1 h of exercise daily amidst the general advice of staying at home (Brooks et al., 2020). Whilst such advice might help the general population, it is likely to be received differently by participants from specific sports. In sports such as boxing, which rely on equipment, coaches to organize and run sessions, this decision effectively closed formal training. The present study focuses on a single sport, namely boxing, a sport where there is a dearth research and where the effects of lockdown could be hard.

As COVID should associate with mood disturbance, available evidence suggests that boxers experience negative mood when training (Lane and Terry, 1996; Hall and Lane, 2001). Research has shown that mood states associated with performance in boxing (Lane and Lane, 2008) and that boxers experienced intense unpleasant mood (Hall and Lane, 2001). Professional boxing consultancy has reported using mood management to help identify positive adaptation to training in boxers (Lane, 2006). Whereby it was suggested that the coach was important in the management of mood among boxers (Lane, 2006).

Mood is defined as “a set of feelings, ephemeral in nature, varying in intensity and duration, and usually involving more than one emotion” (Lane and Terry, 2000). The Profile of Mood States model has been used for assessing mood, a tool that has been found to be useful for researchers and practitioners alike (McNair et al., 1971; Morgan, 1980; Lane and Terry, 2000). Mood profiling became popular following the claim that champion athletes tended to report an *iceberg* shaped profile (Morgan, 1980; Terry and Lane, 2000). However, a meta-analysis concluded that mood profiles may not predict champion athletes but can predict performance variations (Beedie et al., 2000). Mood profiling has

utility beyond the realm of performance prediction. It can help monitor the effects of environmental changes (Lane et al., 2004). Mood profiling has been used to screen for potential clinical issues (Van Wijk et al., 2013) and monitoring the progress of cardiac rehabilitation patients in Brazil (Sties et al., 2014). The utility of mood to relate to performance and help detect poor mental health in a range of different areas of application as suggested above suggests it could be useful to assess in a context such as COVID-19, where athletes and coaches might have concerns over sport participation and performance, and where participation in sport is used to regulate their mood.

Recent research has identified new mood profiles and these have been also explored during COVID-19 (Terry et al., 2020). These are labeled the Inverse Everest, Shark Fin, Submerged, and Surface profiles (Parsons-Smith et al., 2017; Quartiroli et al., 2018; Han et al., 2020). The Inverse Everest profile is characterized by low vigor scores, high scores for tension and fatigue, and very high scores for depression, anger, and confusion. The Shark Fin profile is characterized by below average scores for tension, depression, anger, vigor, and confusion, combined with a high score for fatigue. The Submerged profile is characterized by below average scores for all six mood dimensions. The Surface profile is characterized by average scores for all six mood dimensions. It is believed that the identification of new profiles is helpful and will drive theoretical development on the interaction between mood states and help guide practitioners, however, the authors also suggest that some extra attention is given to the concept of depressed mood. The focus on depressed mood in a COVID-19 context seems particularly important given the dual effect of poor mental health and reduction in training and so potentially reduced fitness. Therefore, whilst such profiling techniques are useful, they might not consider or suitably emphasize certain mood states such as depression. The Inverse Everest profile is arguably the most concerning from a mental health perspective. Linked to this model is Lane and Terry's conceptual mood which identifies depressed mood as an important mood state that influences the whole mood profile. Lane and Terry found that a small indicator of depressed mood associated with much larger scores in anger, confusion, fatigue and tension. This profile is different to the inverse iceberg model as depression scores are much lower. Arguably, identifying depressed mood at the earliest stage is desirable from an intervention perspective.

It should be noted that Lane and Terry referred to a depressed mood or emotional state rather than inferring a clinical condition. A key aspect of Lane and Terry's theory is that a small indicator of depression, that is, a score of greater than zero using the Brunel Mood Scale (BRUMS) is all that is required (Lane and Terry, 2000). When seen collectively, there are good reasons to examine and assess mood states in a COVID-19 crisis and whilst it is expected that an inverse iceberg profile will be dominant, albeit one which is displayed with small amount of depression. A key aspect of research in the COVID-19 crisis should be on how people regulate their moods and how successfully they can do will influence their mental health.

In general life, in specific sports and in the COVID-19 pandemic, emotion regulation is an important concept. Emotion regulation is the automatic or deliberate use of

strategies to initiate, maintain, modify or display emotions (Gross and Thompson, 2007; Ford and Gross, 2019). Emotion regulation is proposed to be part of a self-regulatory process in which individuals consciously or non-consciously monitor the intensity of emotions and develop strategies to increase, reduce or maintain the intensity of emotions to desirable levels (Lane et al., 2012).

In terms of how people regulate their feelings, studies indicate that people organically use conscious and non-conscious strategies to regulate their emotions with over 400 strategies identified (Lane and Terry, 2005). Examples of strategies include activities such as talking to people, watching television, going out for meals, playing sport, and listening to music. These are all tasks that people identify with as part of day-to-day living and unlikely to be consciously identified and used as mood regulation strategies until prompted to reflect on how they aid emotional well-being. In sport, research has identified that feelings are also regulated by athletes using psychological skills such as imagery, goal-setting and self-talk (Lane et al., 2012, 2016c). Psychological skills are typically used to manage performance, but where performance and emotional control are inter-related, they serve a dual goal. The close connection between strategies used to manage performance, such as how well training had gone and feeling physically prepared were evidenced in a recent study in running (Han et al., 2020). People are aware of their own mood states and can recognize the mood states of others and moreover, recognize that there are many benefits in having optimal mood states in goal striving settings (Lane et al., 2012).

When considering how athletes might regulate their mood states during training, it is important to identify what strategies are available due to lockdown restrictions. In sport, training will be affected and the extent to which it can help maintain mental health could worsen if the athlete cannot participate in their sport due to lack of availability of equipment or a place to train. A recent study offered general advice on the principles of conditioning for athletes and coaches to follow (Andreato et al., 2020). At a sport-specific level, in sports which require equipment, the extent to which these principles could be examined warrants further investigation.

In lockdown, the role of the coach in trying to encourage athletes to maintain training is important and clearly, with facilities closed, they will need to use online methods. With mood management influenced by training, identifying what strategies can be done is useful. A gap in the literature on mood regulation in general is on how coaches try to enhance the mood states of their athletes is under-examined (Friesen et al., 2013). The coach-athlete relationship seems particularly important in boxing. Interviews from nine professional boxers examining training experience found social support from other people was an important strategy (Simpson and Wrisberg, 2013). Gym partners were an integral role in this by providing advice, bonding and rivalry. Fun and humor was another dimension to this support dynamic. Research has tended to focus on self-regulation of mood rather than focusing on contextual factors and particularly how active agents such as coaches, parents or friends play a role or contribute to the mood regulation of others. An examination of an individual's perception of self-regulation

and the perception of what significant others in that context would give a broader understanding of how to help people self-regulate mood. Few studies have sought to assess coach and athlete and how they might regulate mood, something that seems particularly relevant in COVID-19, when options to regulate mood are limited.

When seen collectively, the aims of the present study are 2-fold: firstly, to investigate the mood states and explore self-regulation strategies of boxers during COVID-19, and second, to investigate how boxers and coaches adapted training methods, and sought to provide support for mood management during COVID-19.

MATERIALS AND METHODS

Design

A mixed method design was used. The rationale for this approach was that the BRUMS is a highly validated mood measure that has been used to assess changes in mood across a number of different contexts and used successfully in the COVID-19 crisis (Lane et al., 2004; Van Wijk et al., 2013; Sties et al., 2014; Terry et al., 2020) and therefore it is possible to identify mood profiles. In contrast, the use of self-regulation strategies in the context of boxing requires open-ended questioning. Strategies to regulate emotions and adapt training in training required using an open-ended method as suitable standardized scales do not exist. A recent study in running (Stanley et al., 2012), using an open-ended questionnaire illustrated the vast array of different strategies that people use. As the present study was interested in capturing unique participants perspectives, open-ended methods are suitable. Further, via data from participants it would be possible to develop interventions grounded in participants' experiences.

Participants

Participants comprised 44 boxers (age: 19.4 ± 4.6 years; weight: 63.7 ± 12.9 kg; experience: 4.7 ± 3.3 years; $n = 33$ male; $n = 11$ female). In terms of level of competition, 22 boxers were competing at club level, defined as participated in arranged interclub bouts. 2 boxers competed at regional level, defined as having competed in or won a regional final. 15 boxers competed at national level, defined as having participated in or won a national final. 1 boxer had competed at international level and 5 participants were professional boxers. All boxers were currently in training for a contest or competition, prior to COVID-19 lockdown. All boxers and coaches were affiliated to either England Boxing or the British Boxing Board of Control.

The second group consisted of 14 boxing coaches ($n = 11$ male; $n = 3$ female, number of years coaching 5.6 ± 5.4 years; 10 club level and 4 national level coaches). Club level defined as a coach who had coached boxers to have participated in or won a regional final. National level coaches defined as a someone who had coached previous national champions or was currently coaching a national programme.

Due to authors extended relationships with boxing clubs in the Midlands region, questionnaire invitations were sent to boxers

and coaches of 6 boxing clubs within this region. Though, to supplement openness in question answers all participants names and clubs were kept anonymous. This meant individual coach-athlete dyadic relationships were not investigated.

Measure of Mood

The BRUMS questionnaire was used to assess feelings before and during COVID-19. The BRUMS is a 24-item scale which has been through an extensive validation process including demonstrating factorial validity, criterion validity, predictive validity, and used in many applied contexts (Terry and Lane, 2010). It has been successfully used to assess mood in combat sports including Mixed Martial Arts (Brandt et al., 2018) and Boxing (Hall and Lane, 2001). The BRUMS has 24 mood items that assess six factors: anger, confusion, depression, fatigue, tension and vigor. Example of items for each factor can be found in **Table 1**. For each item, participants select a number from a 5-point scale where 0 = “not at all,” 1 = “A Little,” 2 = “Moderately,” 3 = “Quite A Bit,” and “4 = Extremely.” When the mood items for each subscale are summed, a score from 0 to 16 is obtained (Terry and Lane, 2010).

In the present study, a standard response timeframe of “How do you feel right now?” was used to assess mood during the COVID-19 lockdown. To assess mood before lockdown, a retrospective response time frame was used. The use of retrospective approaches has been criticized in the literature (Lane et al., 2011), but this was mainly for use in performance prediction. Retrospective measures have been criticized for being limited by the accuracy of memory, and the effect of mood at the time of recall; good accuracy has been found for using retrospective for intense moods, that is, if a person was very angry, they remember this experience and can recall it well against measures taken in real time (Winkielman et al., 1998; Terry et al., 2005). Mood measures assessed over a long period of time are more likely to assess traits or typical mood states than a response to situational factors. In the present study, mood before lockdown was not necessarily a period connected with intense mood, although, of course, there could have been situational factors that elevated mood. In addition, retrospective measures suffer lack of accuracy due to mood at the time of recall. Evidence shows that if a person is experiencing an intense, this colors their memory. And so, if you are angry at the time of completion, then recall incidents of anger much easier.

If you accept that a retrospective measure of mood is providing more of a trait measure, then this a better starting point when considering how to interpret scores (Terry et al., 2005). If the purpose of the study is to capture memories

of mood, and the effect of current mood is considered, then retrospective measures become extremely useful tools as they allow capturing assessments of mood in environments where a “right now” measure is not possible. In the present study, participants completed a retrospective measure of mood before COVID started, and a measure of mood during COVID. By having the 2 completions at the same time, participants could accurately identify rate whether their mood had deteriorated. Hence, retrospective approach is not claiming to be an accurate assessment of mood before lockdown, but by taking 2 measures of mood, perceived differences could be established.

Procedure

Following ethical approval from the University of Wolverhampton, participant recruitment and data collection was undertaken over a 2-week period from the beginning of April 2020. Firstly, a poster was developed to advertise and encourage participation in the project. It was placed on various social media platforms and invited participants to complete an online survey via GoogleForms. When this link was clicked, both boxers and coaches were required to first read through the participant information sheet and sign the consent form. Only once this was complete could they continue to their respective sections. The use of online surveys is a credible methodology which has advantages to both researchers and participants which was recently well discussed (Braun et al., 2020). This study discusses the opportunity for a wide angle lens to capture broad perspectives on potentially sensitive topics, participants feel online surveys are unobtrusive, less burdensome and gives them a sense of control. Moreover, researchers find the data analysis less demanding than interviews and gives opportunity to explore topics where access to face-to-face research is unavailable (Braun et al., 2017)—such as during the COVID-19 pandemic.

The boxer questionnaire consisted of 3 sections including 2 BRUMS questionnaires (first BRUMS answered retrospectively before COVID-19, second in relation to emotions right now during COVID-19). Boxers were instructed to select only one number to represent the intensity of 24 emotion items before and during COVID-19. Following this, an open question section was completed regarding impacts of COVID-19, strategies used to regulate mood during COVID-19 with a focus on exploring behaviors from their coach. One question example being “What have you done to regulate your mood to deal with canceled bouts/championships and boxing sessions?” A preliminary check was undertaken to establish the subjective importance of boxing training to regulate boxer’s mood from a boxer and coaches’ perspective at the start of the open-ended question section. Asking “How would you rate the importance of boxing training toward controlling your own/your boxers’ mood and mental health?”. This was rated on a 1–5 scale where 1 = not important at all, to 5 = very important.

Coaches responded to open questions which sought to gather information on their concerns during COVID-19, methods to support boxers training, mental health and mood regulation. One example being “What are you doing to regulate your boxer’s mood during this gym closure period?”. Both boxers and coaches were instructed to answer open questionnaires

TABLE 1 | BRUMS question items for subscale scores.

Subscale	Items
Tension	Panicky, anxious, worried, nervous (items 1, 13, 14, 18)
Depression	Depressed, downhearted, unhappy, miserable (items 5, 6, 12, 16)
Anger	Annoyed, bitter, angry, bad tempered (items 7, 11, 19, 22)
Vigor	Lively, energetic, active, alert (items 2, 15, 20, 23)
Fatigue	Worn out, exhausted, sleepy, tired (items 4, 8, 10, 21)
Confusion	Confused, mixed up, muddled, uncertain (items 3, 9, 17, 24)

as honestly and thoroughly as possible. Open questions were developed within the lens of appropriateness, clarity, unbiased and unambiguousness in question wording (Yaddanapudi and Yaddanapudi, 2019). To facilitate direct questioning toward the specific scenario of the COVID-19 pandemic, subsequent need for training modifications and the boxing participant base, it was considered relevant to include open questioning over a standardized mood regulation questionnaire. Though, questioning for both boxers and coaches were developed through considerations of interpersonal mood regulation strategies used in sport (Friesen et al., 2013) within the context of constraints presented by COVID-19.

Data Analysis

To examine mood state changes, scoring for the 6 subscales (Terry and Lane, 2010) was undertaken on BRUMS responses before and during COVID-19. This was undertaken only on boxers in the sample, coaches did not complete a BRUMS questionnaire. Mean $\pm$ SD data calculated for the preliminary check of importance of boxing training toward controlling mood. Using IBM SPSS Statistics 24 package, a repeated measures MANOVA was used to compare mood states before and during COVID-19 and to examine the extent to which depressed mood exacerbated increases in unpleasant mood. Significance level set at $p < 0.05$ for the omnibus result from the MANOVA. Effect sizes (d) were defined as small (0.2), medium (0.5), or large (0.8) in concordance with traditional effect size principles (Cohen, 1988).

For qualitative data, a conventional content analysis was used (Hsieh and Shannon, 2005). Initial analysis by authors sought to familiarize themselves with the data by reading both boxer and coach responses in a general manner. Generating themes individually that encapsulate underlying theory. Further to this, questionnaire responses were split into boxer only responses and coach only responses for further analysis. This was indicated in the introduction to the questionnaire which asked if the person completing was a boxer or a coach. If a response to a question had multiple strands, it was split down into appropriate codes (if longer answer) or single most appropriate (if shorter answer). Individual author boxer and coach coding were discussed then amendments to both General Dimensions and Themes undertaken. Though, initial analysis was generally agreed between authors due to majority of responses being single sentence responses rather than large bulks of text. The main discussion between authors were regarding the appropriate naming of themes to encapsulate the narrative of the study (e.g., “Adaptive Strategies” to “Promoting Positive Mood;” “Self Determination” to “Focus on Goals;” “Motivation Model of Coach-Athlete Relationship” to “Boxer-Coach Communication”). To enhance trustworthiness of the analysis, two sufficient verbatim tables of raw data examples have been provided in Tables 4, 5.

RESULTS

Quantitative

A preliminary check on how important boxing was in terms of the participants’ sense of identity revealed boxing training as

especially important for mental health and maintaining positive mood (boxer = 4.50 ± 0.90 and coach = 4.00 ± 0.78).

In terms of mood state changes from before to during COVID-19 for boxers, results indicated significantly ($p < 0.01$) higher scores for anger, confusion, depression, fatigue, tension, and lower vigor scores during COVID-19 (Table 2). However, when depressed mood was considered, it accounts for a large variance in the increase of unpleasant mood states, particularly anger, and confusion. It should be noted that depressed mood scores among boxers increased significantly during COVID-19.

MANOVA results (Table 3) to examine the interaction effect for changes in mood before and during COVID-19 by depressed mood group showed no interaction effect (Wilks lambda 8, 42 = 0.94, $p = 0.44$, partial Eta² = 0.06). Significant main effects were found for worsening of mood during COVID-19 (Wilks lambda 8, 42 = 0.72, $p < 0.0001$, partial Eta² = 0.29) and a significant effect for depressed mood (Wilks lambda 8, 42 = 0.65, $p < 0.0001$, partial Eta² = 0.35).

Qualitative

In line with the qualitative analysis, individual responses were split into Coach questionnaire responses (Table 4) and Boxer questionnaire responses (Table 5). As Tables 4, 5 indicate, results are presented with examples of raw data, Themes, and General Dimensions. As Table 4 indicates, coach data could be described in 3 General Dimensions of COVID-19 Impact (Coach Perspective), Coach Concerns and Coaches Strategies for Regulating Boxers Mood. While boxer qualitative data could be described in 3 General Dimensions of COVID-19 Impact (Boxers Perspective), Boxer Perceived Coach Supportive Behaviors and Regulatory Strategies used by Boxers.

As Table 4 indicates, the first General Dimension COVID-19 impact (Coach Perspective) encompassed 3 themes labeled Competition and Bout Cancellation, Financial Impact and Training Disruption. Coach Concerns consisted of themes relating to Boxer Mental Health, Boxer Retention post COVID-19, Loss of Fitness or Skill and Weight Gain. Whereas Strategies to regulate boxer’s mood consisted of Adapting Training Mechanisms and maintaining Boxer-Coach Communication.

As Table 5 indicates, COVID-19 (Boxer Perspective) encompassed 2 themes relating to Competition Cancellation and Training Disruption. Boxer Perceived Coach Supportiveness could be described into 2 themes of Feelings of Togetherness and Maintaining Relationships. Whereas Regulatory Strategies used by

TABLE 2 | Mood states scores for boxers retrospectively before and during COVID-19.

Subsection	Pre COVID-19	During COVID-19	F	Cohen d
Anger	2.02 $\pm$ 2.16	5.29 $\pm$ 3.84	32.62	0.44
Confusion	1.43 $\pm$ 2.31	6.61 $\pm$ 4.01	57.53	0.56
Depression	1.04 $\pm$ 1.81	4.47 $\pm$ 3.90	45.11	0.49
Fatigue	2.52 $\pm$ 2.37	3.63 $\pm$ 3.24	5.93	0.11
Tension	1.27 $\pm$ 1.78	3.20 $\pm$ 3.12	23.51	0.35
Vigor	10.64 $\pm$ 3.44	7.81 $\pm$ 3.91	30.87	0.41

TABLE 3 | Univariate results for boxers mood states by depression v no-depression during COVID-19.

Subsection	Pre-during			Depression			Pre-during × Depression		
	F	P	Partial Eta	F	P	Partial Eta	F	P	Partial Eta
Anger	3.25	0.06	0.037	38.068	0.000	0.31	1.74	0.191	0.02
Confusion	18.35	0.000	0.180	31.552	0.000	0.27	4.49	0.037	0.05
Fatigue	0.05	0.82	0.001	14.237	0.000	0.145	0.34	0.564	0.004
Tension	2.30	0.13	0.027	9.299	0.003	0.100	1.16	0.280	0.01
Vigor	5.76	0.02	0.064	2.553	0.114	0.029	0.001	0.970	0.00

Boxers had 3 themes of *Positive Mood Strategies*, *Negative Mood Strategies* and *Focus on Goals*.

Coaches Strategies for Regulating Boxer's Mood

Qualitative results for data collected from coaches indicated that at the outset of the pandemic, coaches began to work online to help guide training (see **Table 4**). The theme *Boxer-Coach Communication* was split to further themes including *Autonomy Supportive Behaviors*, *Coaches Involvement* and *Instilling Structure*. Setting of group challenges to promote internal competition, online check ins (e.g., via zoom) and weekly support in training group chats (e.g., WhatsApp) were key strategies coaches used to regulate boxers.

Boxer Perceived Coach Supportiveness

Boxer perceived Coach Supportiveness comprised of statements of boxer feelings of *Closeness* with coaches through regular contact. This closeness was personified when one boxer stated, “without my coaches I’d be totally lost.” In contrast, some boxers reported that coaches offered limited/no supportive guidance or advice during COVID-19 (**Table 5**). Whereas *Commitment* shown by coaches toward adapting training structure and guiding toward future success was recognized by boxers. With one example being “they (coaches) have sent video coaching and feedback to each individual to ensure good progress is made through this uncertain time”.

Regulatory Strategies Used by Boxers

Positive mood strategies

Positive Mood Strategies comprised 3 themes. Firstly, *seeing COVID-19 as an opportunity*. This consisted of responses relating to extended time to make weight, train and work on weaknesses, for example, “I have told myself this is just a way to give me more time to prepare.” Secondly, *General Positivity*, for example, “I feel as though my boxing training is going well considering the situation.” Thirdly, *Self-Reassurance*, whereby boxers reassured themselves with affirmations about the future (e.g., “I have reassured myself that bad times don’t last”). Reassurance was extended toward future competitions, for example, “I have thought about how I’ll be even better and stronger for when I participate in championships next year.”

Exercising and Training for Mood Enhancement. For many boxers, the training week was a key strategy to regulate mood within itself for their physical and mental wellbeing. With a boxer reporting “I run every day, it’s my escape from the house.” While

others reported they stayed in a similar routine to their usual training days and times (**Table 5**).

Negative mood strategies

Negative Mood Strategies widely consisted of *Negative thoughts* toward struggles with mental health and frustration with training modification. This was further unpacked by boxers who indicated it was caused by limitations in space, necessary equipment to train optimally, lack of face-to-face professional guidance and limited social interactions with teammates (**Table 5**). These circumstances were acknowledged by one boxing coach who reported “Boxers are struggling emotionally and to be driven and focused on training without the teamwork element.”

Suppression related responses consisted of not acknowledging current feelings toward COVID-19 and engaging with a narrative that avoided acknowledging the situation, for example, “Nothing just keep plodding on and get on with it.” A small sample of boxers described attempting to regulate mood through *Eating/Drinking* during COVID-19.

Focus on goals

During COVID-19 the focus on goals set for the season lacked focus and not surprisingly, with no identified date for when sport would return, many expressed a lack of motivation to maintain training (see **Table 5**), for example, “With no fight date, so find yourself going into a tick over mode.” Although, trying to focus on potential future success was a strategy used by some boxers to ensure they continued training during the pandemic. One boxer responded by saying; “I’m still highly motivated knowing I’ll be boxing for titles soon keeps me focused on the big goals.”

DISCUSSION

The present study investigated mood states and self-regulation strategies of boxers and mood regulation strategies used by coaches at the start of the COVID-19 outbreak and first month of UK lockdown. The study makes a valuable contribution to the literature as it details mood states and regulation strategies used by boxers and coaches during the first COVID lockdown in the UK, which itself represents a unique set of circumstances. The authors argue that an effective method to examine this issue was via a combined use of mixed method using self-report data via responses to a standardized scale along with using Open ended questions to capture mood regulation strategies (Friesen et al., 2013). Results indicated that the restrictions and changes

TABLE 4 | Analysis of Coach responses on the impact of COVID-19 on training and competition, coach concerns and strategies to regulate boxers mood.

Raw data example	Themes	General dimension
“Club closed completely. Financial impact of no member subs paid” “Real impact is on boxers and coaching staff, especially given huge efforts to prep boxers for London regional and English elite championships. One of our boxers was also on his way to Olympic qualifiers” “We have some real solid schoolboy/girls who was really motivated for championships and performing now won’t be able to enter schools as start in April” “We have been hit financially but boxer’s parents have been making donations instead of subs” “Financial loss with not getting the income from weekly boxing sessions” “Club closed completely. Financial impact of no member subs paid” “Boxer not being able to keep training on a regular basis and having the correct support in place to keep them constantly challenged” “Boxers are struggling emotionally and to be driven and focused on training without the team-work element” “Financials are important long term however the importance for me lies with the benefits training has on mental health” “Boxers becoming unfit and some boxing struggling with mental illness” “My biggest concern is the mental health of boxer during the gym is closed” “Boxers continued support after this” “Boxer retention during a lengthy lay-off/rest period” “Losing the team ‘togetherness” “Having to start again with fitness/weight loss/skill” “Boxers falling back into or generating bad habits” “Lack of enthusiasm by boxers, weight gain” “Boxers weight management” “Engaging with social media to provide workouts” “Uploading social media and encourage them to be positive” “Homework set, and the best videos are uploaded to social media” <i>Videos on social media (n = 3, 21.4%)</i> “The club have done a lot of running comps and released home workouts” “Just a variety of workouts with no equipment” <i>Providing of home workouts (n = 6, 42.8%)</i> “A league table for 5 km runs and 100 burpees” “The club have done a lot of running comps” <i>Challenges and leaderboards (n = 3, 21.4%)</i> “Personalized training plan” “Online sessions as well as a training program” <i>Individual training programmes (n = 2, 14.2%)</i> “Constant reinforcement of basic boxing drills and their importance in competitive success” (e.g., “Footwork drills and shadow boxing are important because.” <i>(Autonomy supported behavior n = 4, 28.5%)</i> “Trying to keep in touch with them as much as possible. Set up a group running challenge between all boxers” “Offer support as much as I can, give advice” <i>(Coach involvement n = 7, 50.0%)</i> “Coaches are putting together regular videos with different boxing drills to do for all levels of boxer” “Weekly meetings with them. Personalized plan. Running competitions” <i>(Structure instilled n = 3, 21.4%)</i>	Competition and bout cancelations <i>(n = 9, 64.2%)</i> Financial <i>(n = 7, 50.0%)</i> Training disruption <i>(n = 2, 14.3%)</i> Boxer mental health <i>(n = 6, 42.8%)</i> Boxer retention <i>(n = 4, 28.5%)</i> Loss of fitness or skill <i>(n = 4, n = 28.5%)</i> Weight gain <i>(n = 3, n = 21.4%)</i> Adapting training mechanisms <i>n = 14, 100%)</i> Boxer-coach communication <i>(n = 14, 100%)</i>	COVID-19 impact (coaches perspective) Coach concerns Strategies to regulate boxers mood

that accompanied COVID-19 were associated with a substantial increase in unpleasant emotions. Findings are consistent with recent research that has used the BRUMS during COVID-19 (Richardson et al., 2020; Terry et al., 2020). Using recent mood profiles, mood during lockdown resembled an inverse iceberg

profile. In the present study, it unpacked unpleasant mood by the influence of depression using Lane and Terry's (2000) model. Our combined findings show mood disturbance occurred. Results show boxers and coaches were actively seeking to manage mood. A key aspect of our study is also to focus on boxing, a sport that

TABLE 5 | Analysis of boxer responses on the impact of COVID-19 on training and competition, boxer perceived coach supportive behaviors and strategies for regulating their own during COVID-19.

Raw data example	Themes	General dimension
"I was meant to be boxing in the semi-finals of juniors, but they have been postponed to September" (<i>National championships</i> $n = 15$, 34.1%) "Wasn't able to fight for my midlands eliminator so that's set my midlands title back to God knows when" (<i>Professional shows</i> $n = 3$, 6.8%) "Enjoying and getting into competitive bouts but now I feel like I will need to retrain to be able to get to that level" (<i>Club bouts</i> $n = 5$, 11.4%) "Nationals have been canceled along with box cups I was due to enter" (<i>Boxcups</i> $n = 5$, 11.4%)	Competition cancellation ($n = 24$, 63.6%)	COVID-19 impact (boxers perspective)
"I cannot train how I would usually train like before the outbreak" (<i>Changes in structure</i> $n = 15$, 34.9%) "It has affected my training because I haven't been training around other boxers or been coached by professionals" (<i>Lack of coach guidance</i> $n = 4$, 9.1%) "I miss being around the other boxers of my gym" (<i>Social element</i> $n = 3$, 6.8%) "It has impacted my sparring, pad work with my coach" (<i>Lack of pad work or sparring</i>, $n = 3$, 6.8%)	Training disruption ($n = 25$, 56.8%)	
"Coach has set up online virtual conference call training sessions" "My coach has set up an online session every Tuesday for us all to join on zoom whilst we are at home" (<i>Online live training</i> $n = 12$, 27.2%) "Group what's app to share ideas" "Group chat started to give workout ideas and plans" "Yes via messenger and what's app. Sent links to video work outs Done video work outs" "Group chat started to give workout ideas, plans and live home sessions" (<i>Group chats</i>, $n = 8$, 18.2%) "Sent videos and received advice back" "Lots of encouragement has been given to us all to continue with training and techniques they have sent video coaching and feedback to each individual to ensure good progress is made through this uncertain time" (<i>Training feedback</i> $n = 6$, 13.6%)	Feelings of togetherness ($n = 26$, 59.1%)	Boxer perceived coach supportiveness
Regular WhatsApp and phone conversations' "The club group chat is active daily which is a nice reminder that we're all in this together" "Personal talks with the coaches have helped me stay focused" (<i>Closeness</i>, $n = 20$, 45.4%) "Yes, my coaches through Social media have presented numerous different training methods through this time. Different shadow boxing drills, footwork drills and running methods" "they have sent video coaching and feedback to each individual to ensure good progress is made through this uncertain time" "Yes, gave a variety of drills to do on my own" (<i>Commitment</i> $n = 18$, 40.9%)	Maintaining relationships ($n = 38$, 86.3%)	
"I think it's helped me, I can focus on boxing skill and training rather than weight training in a gym" "it's making me more excited to box again" "Increased motivation and desire to compete" (<i>Seeing COVID-19 as an opportunity</i> $n = 10$, 35.7%) "Tried to keep motivated by training on the hope that the season will start again" "Just think everything happens for a reason so we see when covid-19 calms down and get back to normal" (<i>General positivity</i> $n = 12$, 46.2%)	Positive mood strategies ($n = 26$, 59.1%)	
"It has been affected positively as the championships have been delayed giving me time to make weight so I can now compete, I feel I'll have a massive edge now going into them" "I have thought about how I'll be even better and stronger for when I participate in championships next year" "I have reassured myself that bad times do not last meaning that eventually this will blow over and I will be back training and fighting" (<i>Self-reassurance</i> $n = 6$, 23.1%) "Just continued training throughout it all to stay ready for when it's time to go back" "I run every day, it's my escape from the house" "Cracked on with more training" "And I've just kept myself busy exercising all day to keep my mind off not going the gym"	Exercise and training for mood regulation ($n = 18$, 40.1%)	
"Has made me feel very frustrated and annoyed because I am not actively fighting at the minute" "It's a real pain not being able to train down the boxing gym and I miss sparring" "I've found coping with it very difficult after suffering with mental health issues for some time. Boxing sessions are a place to escape and really relax" (<i>Negative thoughts</i> $n = 10$, 22.7%) "Nothing just keep plodding on and get on with it" "Not thinking about it and keeping fit" (<i>Suppression</i>, $n = 6$, 13.6%) "I've ate more unfortunately" (<i>Eating or drinking</i> $n = 2$, 4.5%)	Negative mood strategies ($n = 18$, 32.1%)	
"I'm still highly motivated knowing I'll be boxing for titles soon keeps me focused on the big goals" "Makes me more hungry, I see it as an opportunity" "No fights coming up but still putting the work in to be a better version of myself" (<i>Intrinsic motivation</i> $n = 15$, 34.1%) "Motivation dampened, enjoy training with a team much more" "A great deal, the motivation comes and goes frequently" "There is only so much you can do training alone and it's a little harder to get motivated without a fight date so you're not putting as much in" (<i>Amotivation</i> $n = 19$, 43.2%). "There is nothing to prepare myself for, it is a lot harder to get mentally prepared for training" (<i>External regulation</i> $n = 4$, 9.1%)	Focus on goals ($n = 44$, 75.8%)	

is under-reported in the literature. Arguably, the mood states of boxers in training and how they regulate mood represents a novel line of research.

Using Lane and Terry's (2000) conceptual model to investigate mood states by the presence and absence of depression, where the notion is that depressed mood associates with an overall negative mood state, the present study found 70.4% of boxers reported depressive symptoms during COVID-19, a figure that is substantially greater than the mode reported in a review of the model (Lane and Terry, 2016). In a study of 44,742 participants, depressed symptoms were present in only 25% of participants (Lane et al., 2017) suggesting the effects of COVID-19 were substantial, as expected. The results demonstrate the expected effects of COVID-19 where mental health concerns are predicted (Winkielman et al., 1998). Our findings are consistent with previous tests of Lane and Terry's model which show symptoms of depressed mood corresponds with a general negative mood profile (Lane et al., 2017). Recent work that has developed new mood profiles could illustrates new approaches to interpreting mood. To date, researchers have not investigated cluster profiles by depression group (Parsons-Smith et al., 2017; Quartiroli et al., 2018; Han et al., 2020). The submerged and surface mood profiles (Parsons-Smith et al., 2017; Quartiroli et al., 2018; Han et al., 2020) both report low depression scores and we suggest that there is a need to explore mood profiles when participants report zero for no-depression, especially as Lane and Terry (2000) suggested and previous research has supported the notion that anger and tension can have motivational effects.

As these results were expected, qualitative data provides a useful insight into why mood states worsened, what strategies boxers sought to manage their own mood (Table 4) and how coaches supported the mood states of their athletes (Table 5). The use of mixed methods for obtaining mood scores from a frequently used scale (Terry and Lane, 2010) and open-ended questions facilitate assessing the magnitude of mood state changes and then identifying strategies used to see how coach and athlete sought to manage mood. It is important to acknowledge that significant changes to boxers' routines occurred at the outset of the COVID-19 lockdown. The effects were broad and substantial including periods of inactivity, largely connected to the initial uncertainty from the unexpected lockdown (e.g., "Elite championships canceled ruined my season" "as there is nothing to prepare myself for, it is a lot harder to get mentally prepared for training").

The sudden withdrawal of the place where boxers train and the people they train with coupled with mass media messaging to stay at home (Flanagan et al., 2020). Consequently, there were substantial changes in the social networks of boxers and so coach support was adapted, with fewer and different social interactions, with clear physical distancing from the athletic community (e.g., "Motivation dampened, enjoy training with a team much more"). An intriguing aspect of findings from the present study is the extent to which they could be specific to boxing and might not apply to other sports than possibly other combat sports. Boxing is a sport that combines the intensity of 1-2-1 competition alongside a need to maintain tight control over body weight, a feature shared by combat sports. It is possible

that training helps maintain a positive body image, which has been found to correlate with self-esteem (Franchini et al., 2012) and mood (Lane, 2006). Qualitative data (see Table 5) shows boxers held serious concerns on how they could maintain fitness without access to specific equipment (e.g., "My training has been effected very much. Can't train much because I don't have the correct equipment at home" "Could not train at a higher standard as usual due to not having necessary boxing equipment also cannot go outside as frequently"). This view is not entirely unsurprising as boxers would have considerable routines connected with training and none of these became possible to use during lockdown. Further, coaches expressed concerns that detraining would occur and sedentary behavior was likely during the initial lockdown period. A consequence of de-training is that weight could increase with muscle mass reducing (Paoli and Musumeci, 2020). Potentially contributing to boxers' intense negative mood via reduced body image.

Qualitative data suggests that intensely unpleasant moods during COVID-19 (Table 2) were attributable toward changes in training structure, daily routine, social isolation, and the competition landscape being extremely uncertain. Further, limited boxing specific training equipment and space was a recurring theme (e.g., "Can't train much because I don't have the correct equipment at home" "I have little to no boxing equipment"). Frustration stemming from difficulties in training clearly associated with unpleasant mood and the authors suggest that this stress response was unhelpful. Stress can impede one's effort to maintain physical activity and can have a biopsychosocial influence on fatigue (Stults-Kolehmainen and Sinha, 2013). In the presence study, participants reported significantly higher fatigue (Table 3) when it coupled with depressed mood, it suggests that the negative self-schema associated with depressed mood influenced perceptions of available energy. De-coupling fatigue from depression is important theoretically and practically and one reason the authors do not argue for calculating a total mood disturbance score, which is derived from taking vigor from the sub of anger, confusion, depression, fatigue, and tension scores. High fatigue could be explained by intense training, and so a boxer who sought to regulate mood by training harder, might experience intense fatigue but not depression. By contrast, a boxer who feels depressed, disengages with training, and reports a general sense of lethargy and report a high score of fatigue. By investigating fatigue separately from depression, this facilitates examination of how mood states could possibly interact (Lane and Terry, 2000).

It should be noted that vigor reduced during COVID-19 in the present study (Table 2) and this occurred independently of depressed mood. It could be that lockdown measures, which restricted the availability of several mood regulation activities coupled with the curtailing of ambitions to achieve seasons goals could have been relevant. It is important to remember some boxers were concluding training for the upcoming National Amateur Boxing Association Championships – a key tournament on the national circuit and as results indicate, boxing was an important aspect of personal self-worth. As qualitative data indicates, boxers held goals in respect of the forthcoming national championships, and therefore, the timing of the lockdown was

particularly poor for boxers (e.g., “It has been affected because I can’t participate this year in nationals and I was mentally prepared for them”). Whilst a lockdown is always likely to be difficult, if one happened at the end of the boxing season, around the month of May, then the effects could have been less severe. However, it is worth noting that mental health in athletes has been reported to be fragile and even in usual training circumstances, 34% of elite athletes had depression and anxiety symptoms (Gouttebauge et al., 2019).

It is noteworthy some boxers responded more positively to the restrictions, adapting training and creating a more positive attitude (Table 5). For example, quotations such as “I think it’s helped me, I can focus on boxing skill and training rather than weight training in a gym” illustrate a shift in goal and moving focus to goals that are attainable in the current context, that is without equipment. Moreover, some boxers were not in optimal condition prior to lockdown, so the outlook was positive. This is encapsulated by one response “It has been delayed giving me time to make weight so I can now compete, I feel I’ll have a massive edge now going into them (national championships).” At the time, this boxer held positive beliefs that the championships would occur later in the year, and evidence shows that expecting positive future events is an effective mood regulating strategy (Restubog et al., 2020).

The present study investigated how coaches responded to managing their boxers training environment and mood states. Results show that coaches went to great lengths to modify training and maintain relationships. Such a finding is consistent with the notion that boxing coaches typically have a close personal relationship with their boxers (Simpson and Wrisberg, 2013). A great deal of boxing coaching has 1-2-1 interactions such as pad work. Further, the coach provides a critical role preparing a boxer for competition when they experience intense pre-competition emotions and continues to provide meaningful support when providing feedback to boxers between rounds in competition (Lane, 2006; Simpson and Wrisberg, 2013). Furthermore, intense bout and corner experiences will enhance the closeness, something that is conceivably a key support mechanism for boxer’s mental health in their usual training circumstances. This could explain the high subjective importance of participation in boxing training for managing boxer’s mood and mental health.

Whilst a positive relationship between coach and athlete can have many benefits (Davis et al., 2019; Trigueros et al., 2019) the speed of changes during COVID-19 represented a massive and unexpected disruption. What has emerged during the COVID-19 crisis is the development of online resources to support coach-boxer relationships (Tjonndal, 2020). However, these were not in place at the start with face-to-face being the common method of interaction. Therefore, this perceived closeness was still unable to prevent the negative mental impacts of COVID-19 which was likely to be outweighed by factors including altered training regime, training environment, sleep patterns, social isolation, poor mechanisms of support and general uncertainty (Brooks et al., 2020; Terry et al., 2020).

It should be noted that the role of supporting boxer’s mood states is one that coaches typically do specifically in relation to boxing. Results of the present study show that

performance management strategies play an important role in mood management and so when exploring how boxers regulate mood, it is important to assess perceptions of training status. The present study offers this data from boxer and coaches perspective, although an acknowledged limitation is that coach-athletes data is not dyadic. Boxers results have relevance to boxing coaches in general as there is no reason to suspect that such findings would not be representative. In terms of the challenge to boxers and coaches, at the start of the lockdown, they were asked to work online, and so in an unfamiliar environment. The data captured in this study represents dynamic changes as coaches and boxers sought to create new ways of working but maintain COVID-19 specific restrictions. It should not be surprising that coaches did not have a toolkit of strategies to call upon for use. However, qualitative data suggests that they began to explore ways to help motivate their boxers that would have been modified via practice (Table 4).

Both qualitative and quantitative results of the study show how challenging boxers found regulating mood states during COVID-19. Despite coaches clearly evidencing their support and understanding toward the importance of training for boxer’s mental health, 32.1% of boxers adopted negative mood strategies during COVID-19 (Table 5). It is possible that these responses could have been driven by the mental health implications of home confinement and unrelenting flow of virus media coverage, often fueled by information and misinformation from social media networks, with panic derived from social media believed to travel faster than the outbreak itself (Depoux et al., 2020). Furthermore, 15.9% of boxers reported receiving no coach support or guidance over COVID-19, with the absence of this support mechanism potentially leveraging use of negative mood strategies.

The present study had limitations that should be considered. The participant base was solely from Midlands based boxing clubs. Exploring other regions of the UK could have enhanced generalizability of the findings. However, the authors had no reason to suspect geographical differences would have changed the results. This might change if the crisis was going into winter where weather might restrict opportunities to exercise outdoors. Second, there were more males than females, however, findings reflect the proportion of males and females in boxing, and it should be noted that there are very few female coaches in boxing. Third, participants completed their initial BRUMS questionnaire retrospectively to describe their mood states prior to COVID-19. Potential factors that influence recall include tiredness, personality traits and mood at time of reflection influences emotion recalling (Winkelman et al., 1998; Terry et al., 2005). It has also been indicated measures that summarize mood over time can be heavily influenced by the mood at the time of recall (Lane et al., 2011). They also indicated that retrospective measures are better understood as the perception of mood over that period rather than an accurate record of mood. Finally, the structure of the questionnaire meant all participants names and clubs were kept anonymous meaning individual coach-athlete dyadic relationships were not investigated. Though, this was justified by the authors to maintain openness and honesty from boxers and coaches on what could be conceived as a sensitive topic.

Implications for Practice

Findings from the present study show the importance of identifying mood states and how people regulate their mood. The first implication for practice is to encourage regular monitoring of mood which is something that is possible via online platforms such as In the Mood¹ which offers immediate assessment and has self-help pointers for mood regulation. Mood identification and monitoring can have meaningful effects on performance as highlighted in a study which monitored emotional state changes during Karate competition (Friesen et al., 2017). This study suggested that coaches' ability to accurately detect the emotions of competitors help them perform better. In the present study, and in respect to contexts where negative mood might be predicted, coaches could play a meaningful role in early detection of negative mood as therefore could help prevent poor mental health developing. The present study suggests that daily mood monitoring would be useful beyond the COVID crisis.

Second, findings suggest that boxing coach education should focus on helping coaches maintain good mental health. In the lockdown, positive steps have been made to promote coach education online. Knowledge that progress in training affects mood is relevant and coaches should seek to gain an understanding how well they can identify the mood states of their athletes (Friesen et al., 2017). It is suggested that such skills would be useful for boxing coaches outside of COVID-19 due to the influence of mood states on performance.

A third suggestion is to continue to develop online communities that encourage a community of practice. A combined package of a website and use of social media to hold discussion on a range of issues from sport psychology to nutrition issues and has allowed coaches to interact.²³ The lockdown accelerated the development of the online community and given restrictions, people had the opportunity and availability to attend. Further, former professional boxers⁴ have begun encouraging boxing to be mindful of mental health and via sharing such experiences, could help boxers use self-regulation strategies more purposefully. The authors argue that such development offers a good starting point for a training programme that could be accessed online, which if there are to be further lockdowns boxing coaches would have peer-group expertise to help support their boxers.

A fourth suggestion to help mood management is to encourage boxers to use self-regulation skills. The connection between using psychological skills and mood management represents a good starting point as there is a wealth of information available offering basic guidance on using psychological skills (Karageorghis and Terry, 2010) and previous research has shown that people can learn these online (Lane et al., 2016c). We suggest, therefore, that one option available to help mental health of boxers could be to promote the use of mental skills training, which as the results of the present show, many boxers use a version of psychological skills

to help mood management (Lane et al., 2012, 2016a; Stanley et al., 2012). Recent research has suggested that athletes and coaches should learn to use psychological skills, suggesting that such knowledge is analogous to knowing about good training habits, nutritional practice, and knowing these skills is helpful. When an athlete or coach needs to use the skills, they are at a more advanced stage to solve a particular issue so they are less likely to be inhibited by learning issues. As suggested recently, and evidenced, it is possible to learn psychological skills in a brief format and investigate their effectiveness with a view to develop further learning and usage (Lane et al., 2016a,b,c). Psychological skills such as imagery, relaxation, self-talk and attentional control are worth learning as they can be applied to many different contexts (Lane et al., 2012). Mental skills offer an opportunity to work through a demanding situation and so enable the person to be better prepared when or if they meet it for real. The authors suggest that mental training should be taught as routine practice, just as an athlete should have good knowledge of factors such as training theory and nutrition so that they can make informed decisions on how to engage in self-regulation. The present study indicated how concerns for diet, reductions in fitness and changes in training contributed to negative mood. This point seems particularly apt as the implications of COVID-19 are that there is a second wave which has just started at the time of submission (October 2020). Helping boxers and coaches develop mental strength seems particularly important as they are predominantly from socially deprived backgrounds, and this makes them more vulnerable to mental health problems (Reiss et al., 2019).

The strategies learned from a coach's psychological skills programme could be structured into current training by coaches via online mechanisms, which have continued to grow throughout COVID-19. With the amateur boxing competition landscape unknown, developing psychological skills and improving mental health for future seasons, could be fruitful endeavors. Further, and when COVID-19 restrictions pass, integrated online mechanisms could make boxers, parents and coaches more reachable. This would create a sense of community and belonging that should outlast the current crisis and help protect people during the second wave if a boxer/coach must self-isolate due to COVID-19. During these extremely uncertain times and the mental impacts of COVID-19 likely to outlast the physical illness (Paoli and Musumeci, 2020), these practices could be more crucial than ever.

CONCLUSION

To conclude, results suggest COVID-19 had a significant negative impact on boxers' mood state, a profile that was significantly more unpleasantly if participants reported symptoms of depression. Qualitative data indicated boxers were affected by changes in training, a finding that suggests how closely boxing training plays in mood regulation. Qualitative data from coaches showed a similar trend, recognizing that training is likely to affect mood. It is suggested that future research should help boxers

¹<https://www.moodprofiling.com/testRP-S.php>

²<https://twitter.com/boxgathering>

³https://www.youtube.com/channel/UC_Hz9bo30cUIW5NHBaViozg

⁴<https://billyschwer.com/>

self-regulate mood and coach identify mood state changes in boxers, and moves to provide online support for boxers and coaches that emerged are positive developments that should continue post pandemic.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the University of Wolverhampton. The

patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RR responsible for data collection process (inputting mood scores, depression scores criteria using Lane and Terry Model, inputting qual data), completion of qualitative data analysis, parts of the SPSS data analysis (mood scores pre and during COVID), manuscript write up of results and completion of tables. Contributions to initial write up of introduction, method and discussion. AL responsible for quantitative data analysis (MANOVA), refining and amending introduction, method, results and discussion write up sections. Both authors contributed to the article and approved the submitted version.

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How Does a Sport Psychological Intervention Help Professional Cyclists to Cope With Their Mental Health During the COVID-19 Lockdown?

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All around the world in March, due to COVID-19, competitive sport calendars were suddenly canceled, jeopardizing the training programs of athletes. Moreover, in Italy, the government banned all non-essential travel across the entire country from the beginning of March. Consequently, Italian cyclists were banned from leaving their homes and therefore unable to perform their ordinary training activities. The Italian Association of Professional Cyclists (ACCP) early on during that period noticed that several cyclists were experiencing a worrying decrease in their mental well-being and asked the authors to set up an online Sport Psychology Intervention (SPI) during lockdown to enhance the athletes' mental health. Through a number of unprecedented events and considerations, the aim of the current investigation was to assess the Italian cyclists' mental health during the lockdown and its changes after the SPI. We validated the Italian version of the Sport Mental Health Continuum Short Form (Sport MHC-SF)—presented in Study 1—and then applied it to a sample of Italian professional cyclists—presented in Study 2—prior to and after the SPI. To achieve these objectives, the reliability and construct validity of the Italian version of the Sport MHC-SF were tested in Study 1. RM-MANOVA tests were run to evaluate the effect of SPI on cyclists in Study 2. A total of 185 Italian athletes were involved in the validation of the MHC in Study 1 and 38 professional cyclists in Study 2. Results from Study 1 suggested a three-factor higher order model of Sport MHC-SF [Model fit: $\chi^2(df) = 471.252(252)$, $p < 0.000$; CFI = 0.951; RMSEA = 0.049; RMR = 0.048]. MCFA showed that the default model kept invariance among groups of athletes (i.e., female, male, individual, and team sports). Results from Study 2 highlighted that professional cyclists who followed the SPI were able to cope better with psychological stressors, showing improved well-being compared to the athletes that did not. No significant differences were found for emotional and social well-being. The

present multi-study paper contributes to the theoretical field with a validated measure of Sport MHC-SF translated in the Italian language and culture. It also provides practical implications related to cases of reduced mental health due to injury, illness, or similar situations of home confinement in the future.

Keywords: sport psychology, mental health, cycling, well-being, performance, professional athletes, elite athletes, coronavirus

INTRODUCTION

Early in March 2020, Italy became the first country in Europe to enter nationwide lockdown due to the spread of the COVID-19. As a result of emergency legislation by the Italian government, officials closed schools, museums, and theaters and stopped religious and sporting events. All competitive calendars were suddenly canceled, jeopardizing athletes' training preparation. Moreover, the Italian Prime Minister banned all nonessential travels across the entire country from March 10 onwards (DPCM, 2020). Italian athletes had to terminate their training sessions immediately. Cyclists in the same way were banned from leaving their home environment and were also unable to perform their ordinary training activity and volume. Asian athletes had already experienced this outbreak some weeks before, and many other athletes in Europe and other continents followed suit, coping with the effect of the COVID-19 pandemic and having to reorganize their training volume and intensity. Training volume of male professional cyclists (for elite athletes with a professional status) ranges from 16 to 28 h per week for road cyclists and from 14 to 18 h per week for mountain bikers (Sassi et al., 2008). Training volume data of female professional cyclists are still lacking in the literature. However, according to data reported by Sanders et al. (2019) ($\sim 18,000$ km cycled per year at a mean speed of 28 km h^{-1}), weekly volume can be estimated at around 12–16 h for female road professionals. Both men and women cyclists usually compensate on any restrictions to train outdoors due to inclement weather (e.g., due to snow, storm, hail) by using Cycling Indoor Training Equipment (CITE) like stationary ergometers, turbo trainers, and rollers. However, CITE is an option normally utilized for no more than a few consecutive days with cyclists resuming their ordinary outdoor training at the earliest opportunity. Of note, differences in terms of biomechanics (Duc et al., 2006; Bertucci et al., 2007), thermoregulation (Brown and Banister, 1985), skin temperature, and heart rate (Mieras et al., 2014) exist between cycling in outdoor conditions and cycling using CITE. Consequently, cyclists cannot perform all their training regimes on CITE since a large volume is required to achieve an elite level in cycling (Jeukendrup et al., 2000). Due to the aforementioned limitations, training sessions on CITE usually last no more than 2 h and are not commonly employed to perform the same workouts that are performed outdoors. Indeed, training specificity is advocated to optimize training adaptation (Millet et al., 2011), and in professional cycling, both high intensity and high volume of training have been shown to be crucial for improving specific peripheral adaptations (Bishop et al., 2014), which have been associated with high-level endurance performance (Jacobs et al.,

2011). In this way, to the best of our knowledge, professional cyclists do not adopt CITE as their standard routine of training.

During lockdown, Italian professional cyclists started training on CITE into their houses due to the ban on outdoor training. They were the first cyclists to face the lockdown while their foreign rivals and teammates were still freely training outdoors in their home countries. Moreover, the lockdown affected their ordinary lifestyle, which is characterized by traveling continuously both along short (e.g., going to a cyclist's masseur, to bicycle mechanics, to perform fitness testing, to get a medical examination) and long distances (e.g., participation in their team training camps, travels to test race courses, and eventually going to the competitions). As a consequence, Italian professional cyclists started to experience gradually the adverse effects of lockdown on their mood and mental health. The Italian government started easing the lockdown from May 4 when people were allowed to travel outside of their municipality limits—using also bicycles—but continuing to respect social distancing. Thus, even though collective workouts were still banned, cyclists could start training following individual sessions on the road/off road. Overall, Italian cyclists spent 55 days confined in their homes.

Issues relating to lack of communication with partners and teammates, feelings of isolation, and limited or no access to appropriate contextualized training were taking their toll (Schinke et al., 2020). Specifically, the COVID-19 crisis increased athletes' perceived stress and dysfunctional psychobiosocial states, while decreasing functional psychobiosocial states. Women reported higher perceived stress and dysfunctional states scores than men (di Fronso et al., 2020). Moreover, athletes with higher Athletic Identity tend to ruminate and to catastrophize more, and for this reason, professional athletes may benefit from psychological support provided by sport psychologists in interventions related to cognitive-emotional regulation strategies (Costa et al., 2020). Despite the positive mental health benefits of sport, a number of elite athletes experienced mental health issues during the COVID-19 pandemic mainly due to isolation (Seçkin et al., 2020). This is a new challenge for psychological services and “personal feelings of alienation and poor coping responses, in this case, compounded by social isolation, have resulted for some in compromised mental health” (Schinke et al., 2020, p. 271). For instance, in their scoping review, Kuettel and Larsen highlighted that adverse life events can be mental health risk factors for athletes (Kuettel and Larsen, 2019).

During the COVID-19 pandemic, those risk factors that were related to athletes' personal domain under *normal* circumstances became environmental risk factors potentially able to overthrow protective mechanisms such as feelings of autonomy. Athletes'

mental health issues started to become a prominent matter in the sport medicine and sport psychology literature even before the COVID-19 pandemic. Recent pandemic as a “new reality” has created an additional challenge for sporting people. Indeed, sport participation has many benefits, but “the very nature of competition can provoke, augment, or expose psychological issues in athletes” (Chang et al., 2020, p. 91). The mental health of athletes, coaches, and staff is an important component of high performance in sports. According to Poucher and colleagues, the definition of mental health presented by the World Health Organization as “a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community” (Poucher et al., 2019). Indeed, mental health not only is the absence of mental illness but also includes the presence of positive feelings (emotional well-being) and positive functioning in individual life (psychological well-being) and community life (social well-being).

High-performance sport environment can help to promote mental health, to destigmatize mental health challenges, to normalize seeking care, and to help with the early identification of a mental health disorder. However, various high-performance sport contexts consist of a unique range of stressors such as competitive factors (e.g., performance expectation) and organizational (e.g., travel) and personal stressors (e.g., family issues) that potentially increase athletes’ risk for mental illness (Sarkar and Fletcher, 2014; Rice et al., 2016). Unique stressors associated with sport participation in elite athletes include overtraining, pressure to perform, poor athletic performances, coach–athlete or teammate–athlete relational tensions, injury, and stressors related to retirement (Noblet et al., 2003; Bruner et al., 2008).

Many elite athletes experience depression, anxiety, and other psychological disorders, and they do not seek specialized and efficient treatment (e.g., Schinke and Stambulova, 2017; Moesch et al., 2018). Lack of time, limited knowledge around mental health, and negative help-seeking experiences in the past (Gulliver et al., 2012) are important barriers for seeking help for a mental disorder. The primary barrier perceived by the athletes is the stigma associated to mental health issues (Bird et al., 2018).

During most of the twentieth century, the concept of mental health has been largely undefined and related to the existence or absence of mental illness (Smith, 1959). However, following the appreciation that significant “dimensions of psychological well-being are intra-reflections of an individual’s adjustment to and outlook on their life,” Keyes (2002, p. 209) suggested that caring for mental health promotion rather than treating mental illness is the key priority on mental health. He proposed 13 dimensions of flourishing mental health that have been seminal in defining and measuring mental health even today (Keyes, 2007).

Keyes’ suggestions on what he referred to as the “Mental Health Continuum,” currently denoted as the Mental Health Continuum—Long Form (MHC-LF), comprises a comprehensive measurement instrument encompassing all three dimensions of well-being (subjective, psychological, and social) (Keyes, 2002). The measure consists of 40 items (7 items

measuring subjective well-being and positive affect, six 3-item subscales measuring the six dimensions of psychological well-being, and five 3-item subscales measuring the five dimensions of social well-being). Well-being and mental health are relevant factors to maintain peak performance in athletes as mental health is not only the absence of illness or dysfunction but also the presence of subjective well-being. Based on this concept, “mental health is a continuum, not a discreet fixed state of mind or mood where an athlete spends his entire life (Lardon and Fitzgerald, 2013, p. 133).”

The above—original—Keyes’ scale has been contracted into a short form (MHC-SF) with its psychometric properties later evaluated by Lamers et al. (2011). With the purpose of adopting the MHC-SF in the sporting context, Foster and Chow (2018) created a sport-specific form of the MHC-SF (Sport MHC-SF), which is composed of 14 items and three subscales (i.e., psychological well-being, social well-being, and subjective well-being). The Sport MHC-SF is a sport-specific instrument, which has been demonstrated to be a valid and reliable measure of sport well-being through Confirmatory Factor Analysis (CFA), internal consistency, and discriminant validity analyses (Foster and Chow, 2018). However, an Italian version of the Sport MHC-SF is not yet available.

Early on during the COVID-19 lockdown, the Managing Council of the Italian Association of Professional Cyclists (ACCP) reported that several cyclists were experiencing a worrying decrease in their mental well-being and asked to set up an online Sport Psychological Intervention (SPI) during the lockdown to enhance the athletes’ mental health. The SPI was supervised and led by the first author with the collaboration of four psychologists with strong expertise in the sport field. All collaborators are psychotherapists and addressed to the Italian professional cyclists after the first 3 weeks of lockdown.

Based on the abovementioned urgencies and necessities, the aim of the current study was to assess the Italian cyclists’ mental health (in terms of subjective well-being) during the lockdown and its changes after the SPI. In Study 1, we created and validated the Italian version of the Sport MHC-SF, and then in Study 2, we applied it to a sample of Italian professional cyclists prior to and after the SPI.

STUDY 1

The purpose of Study 1 was to culturally adapt and validate the Sport MHC-SF (Foster and Chow, 2018) in the Italian language and context. Before lockdown, between September and December 2019, the authors collected the data to validate the instrument that have potential in clinical practice. Following that period, it has been beneficial in the assessment phase of the professional cyclists involved in our study during lockdown.

Methods

Participants

A total of 185 Italian athletes (89 men, 96 women) who ranged in age from 18 to 52 years ($M = 26.95$; $SD = 8.40$) agreed to participate in this study. The sample size is sufficient to ensure a person-to-item ratio of 10:1 (Cabrera-Nguyen, 2010).

Participants were involved in individual ($N = 93$) and team sports ($N = 92$), such as climbing ($n = 1$), kite surfing ($n = 1$), combat sports ($n = 3$), fencing (3), gymnastics ($n = 3$), triathlon ($n = 5$), boxing ($n = 4$), water polo ($n = 5$), softball ($n = 6$), powerlifting ($n = 6$), skiing ($n = 8$), tennis ($n = 9$), swimming ($n = 9$), basketball ($n = 11$), futsal ($n = 13$), martial arts ($n = 16$), soccer ($n = 21$), cycling ($n = 25$), and volleyball ($n = 36$). They reported participating in 3 to 10 training session per week. Four levels of sport participation were reported, namely, local ($n = 20$), regional ($n = 60$), national ($n = 65$), and international ($n = 40$) level.

Materials and Instruments

The *Sport Mental Health Continuum—Short Form* (Sport MHC-SF; Foster and Chow, 2018). The Sport MHC-SF represents the adaptation of the Mental Health Continuum—Short Form (MHC-SF; Keyes et al., 2008) in the sport domain. The Sport MHC-SF assesses the constructs of emotional, social, and psychological well-being in sport. The scale comprises 14 items divided into three factors, namely, sport emotional well-being (Items 1–3), sport social well-being (Items 4–8), and sport psychological well-being (Items 9–14). Each item is responded on a six-point Likert scale, ranging from 0 (=never) to 5 (=every day). CFA showed a clear three-factor structure and internal consistency reliability was 0.89 for the subjective well-being subscale, 0.88 for the social well-being subscale and 0.90 for the psychological well-being.

The *Italian Mood Scale* (ITAMS; Quartiroli et al., 2017) measures the mood responses, and it is the validated Italian version of the Brunel Mood Scale (BRUMS; Terry and Lane, 2010). The 24-item ITAMS is divided into six factors, namely, Anger, Confusion, Depression, Fatigue, Tension, and Vigor. The response of each item was rated on a five-point Likert scale ranging from 0 (=not at all/per nulla) to 4 (=extremely/moltoissimo).

The *12-item Short Form Health Survey*, Italian version (SF-12, Apolone et al., 2001). The original SF-12 is a generic measure of health status, and it was developed by Ware et al. (1996) as the shorter version of the *36-item Short Form Health Survey* (SF-36, Ware et al., 1994). The 12 items are included into two subscales, namely, Physical Component Summary (PCS) and Mental Component Summary (MCS). We have used the validation of the Survey in Italian language (Apolone et al., 2001).

Procedures

Before lockdown, between September and December 2019, a group of bilingual (i.e., two Italian and two English) experts in sport and clinical psychology translated the Sport MHC-SF following a standard procedure based on the forward-backward translation method (Beaton et al., 2000). After discussing a few minor discrepancies on the syntax to establish agreement, we drafted the Italian version of the Sport MHC-SF in sport (see Appendix 1).

Participants were recruited using the authors' informal and professional network (i.e., clubs and sport centers). Coaches at these locations were informed regarding the study details (purpose and methodology) and identified any athletes who may

have met eligibility criteria of potential study participation (i.e., more than 18 years old and currently active in competitions). The study details were explained to the eligible athletes, and they gave informed consent agreeing to participate. Personal data were hidden, and all participants were anonymized. The study was conducted in accordance with the Declaration of Helsinki, and participants signed the informed consent to participate in the study. Each participating athlete completed the Sport MHC-SF, the ITAMS, and the SF-12 in about 20 min.

Statistical Analyses

Data were initially screened for multivariate outliers and normal distribution (Tabachnick and Fidell, 2013). Examination of histograms, skewness, and kurtosis of the variable scores showed that there were no substantial deviations from normal distributions.

We investigated the construct validity, the internal consistency, and concurrent validity of the Sport MHC-SF. To explore the factor structure of the scale and the invariance across the four groups of our sample (i.e., female, male, individual, and team sport), a Multigroup Confirmatory Factor Analysis (MCFA) was performed using AMOS graphic (Version 24.0; IBM, Armonk, NY, USA) in order to establish the comparability of measurement models across independent samples (Milfont and Fischer, 2010). We estimated CFA models using the maximum likelihood parameter estimates with standard errors and a mean-adjusted chi-square test statistic that is robust to non-normality. The models were evaluated according to different fit indices: root mean square residual (RMR), root mean square error of approximation (RMSEA), Tucker–Lewis fit index (TLI), and comparative fit index (CFI). Generally, an acceptable fit is inferred when RMR and RMSEA values are <0.08 (Hu and Bentler, 1999; Hooper et al., 2008). TLI and CFI values <0.90 are also considered reflective of good fitting models (Tucker and Lewis, 1973). The CFA model was evaluated according to the following fit indices: the chi-square test (χ^2), the CFI, the TLI, the RMSEA, and the standardized root mean square residual (SRMR). We followed the guidelines proposed by Hu and Bentler (1999), (i.e., the values of CFI close to 0.95 or above, RMSEA close to 0.06 or below, and SRMR close to 0.08 or below as indications of good fit, using these indices in combination; Brown, 2015).

Modification indices were also inspected to improve the model, and meaningful associations were included. Moreover, A step-up approach was adopted to examine different forms of invariance (i.e., configural, metric, scalar) following the suggestion by Crowson (2020). A baseline model was computed by gathering scores from female and male athletes participating in individual and team sports, and the expected relationships between each item and their latent factor were checked (i.e., configural invariance). Metric and scalar invariances were then, respectively tested by constraining the factor loadings and intercepts of items to be the same across samples. The comparisons of root mean square error of approximation (Δ RMSEA) and comparative fit indexes (Δ CFI) were used to inspect the changes in goodness of fits across models. A Δ CFI

≤ 0.01 and a $\Delta\text{RMSEA} \leq 0.015$ indicate that the null hypothesis of invariance should not be rejected (Chen, 2007).

The reliability of each Sport MHC-SF subscale was assessed in terms of internal consistency (Cronbach's α). However, as alpha has been criticized by methodologists as an inappropriate measure of internal consistency reliability (Dunn et al., 2014), we also present McDonald's omega, calculated using MBESS package in R. Additionally, concurrent validity was determined using a Pearson product moment correlation (Pearson r) between subscales of Sport MHC-SF, subscales of ITAMS, and subscales of SF-12.

Results

The scale demonstrated good reliability in terms of internal consistency (Cronbach alpha) for the aggregate score ($\alpha = 0.90$) and good to excellent reliability for the independent scores ("emotional well-being" = 0.85; "social well-being" = 0.90; "psychological well-being" = 0.93). We obtained similar results also for McDonald's omega (emotional well-being $\Omega = 0.86$, 95% CI = 0.82, 0.90; social well-being $\Omega = 0.90$, 95% CI = 0.87, 0.93; psychological well-being $\Omega = 0.94$, 95% CI = 0.91, 0.96). Multigroup Confirmatory Factor Analyses (MCFAs) evidenced a very good fit for the model proposed by Foster and Chow (2018) with "sport emotional well-being," "sport social well-being," and "sport psychological well-being" as dimensions [Model fit: $\chi^2(\text{df}) = 471.252(252)$, $p < 0.000$; CFI = 0.951; RMSEA = 0.049; RMR = 0.048]. Factor loadings for each item were significant and standardized regression weights ranged between 0.74 and 0.94 for the emotional well-being subscale, between 0.69 and 0.93 for social well-being, and between 0.71 and 0.91 for psychological well-being (see **Figure 1** for full details). Regarding measurement invariance among the male, female, individual, and team sport samples, when constraining factor loadings and intercept of items across groups, we obtained $\Delta\text{CFI} = 0.001$, $\text{RMSEA} = 0.003$ for metric invariance and $\Delta\text{CFI} = 0.004$, $\Delta\text{RMSEA} = 0.001$ for scalar invariance. These findings suggested that measurement invariance could be established among the samples (Cheung and Rensvold, 2002; Chen, 2007).

Correlation among Sport MHC-SF subscales, ITAMS subscales, and SF-12 subscales showed significant positive values between the subscales of Sport MHC-SF and SF12 subscales as well as with the vigor subscale of ITAMS. On the other hand, negative correlations emerged between Sport MHC-SF scales and the negative subscales of ITAMS (i.e., anger, confusion, depression, fatigue, tension). However, the values of correlation were low, confirming that Sport MHC-SF provide complementary information to mental health in athletes (see **Table 1**).

To provide a more detailed overview of the level of mental well-being of the sample of the Italian athletes, we compared the data of our sport-specific sample with similar measures (i.e., traditional version of MHC-SF) collected with an Italian normal population and reported in Petrillo et al. (2015). Effect size of the mean differences was estimated using Cohen's d (Cohen, 1988), for which 0.20, 0.50, and 0.80 are considered small, medium, and large effects, respectively. Specifically, the means (and standard deviations) of emotional, social, and psychological well-being

observed during lockdown were compared with those provided in Study 1 (see **Table 2**). We performed this comparison as the literature provides contradictory results. Moesch et al. (2018) reported that similar rates of mental issues exist when comparing athletes to normal populations. Lundqvist and Sandin (2014) have suggested the need to define more explicitly the conceptual framework of well-being in elite sport. Furthermore, Henriksen et al. (2020) recommended to better define mental health in a sport context and broaden the scope of assessment in sport-related mental health research.

Discussion

Study 1 aimed to provide an adaptation and validation of the *Sport Mental Health Continuum—Short Form* (Sport MHC-SF; Foster and Chow, 2018) in Italian language. Therefore, we investigated the construct validity, the internal consistency, and the concurrent validity of the scale in a sample of competitive Italian athletes.

The Italian version of Sport MHC-SF displayed a clear factorial structure and reflects the original version of the scale. Indeed, findings displayed the theoretically based arrangement of the 14 items in the three subscales: sport emotional, sport social, and sport psychological well-being. The CFA indicated an excellent fit for the model of the multidimensional structure of athletes' well-being, and that the loadings of all dimensions on the higher-order factor for mental health were reasonable.

The Italian version of Sport MHC-SF showed a very good internal consistency, similarly to the original scale and to the MHC-SF (Lamers et al., 2011). Cronbach alpha values exceeded 0.85 for all three subscales. Well-acceptable results on reliability were also obtained through McDonald's omega scores.

Concurrent validity analysis indicated that the Italian version of Sport MHC-SF is correlated with ITAMS subscales and SF-12 subscales. The positive correlation with the SF-12, and particularly with the Mental Component Summary, is encouraging considering that it is a generic measure of health status. Moreover, findings showed that the three questionnaires share some common variance, but at the same time, they measure different constructs.

It is also important to highlight the differences between the normal and sport population. Also, if the instruments used are slightly different in some items (see **Appendix 1**), conceptually they measure the same constructs (i.e., emotional, social, and psychological well-being). Although we found very small differences in total well-being and no differences in emotional well-being, moderate and large differences between the samples emerged for social and psychological well-being, with higher level of social well-being and lower level of psychological well-being in athletes. This is partially in line with the contradictory literature that reports similar rates of mental issues in athletes compared to the normal population (Moesch et al., 2018) or that "elite athletes experience a broadly comparable risk of high-prevalence mental disorders (i.e., anxiety, depression) relative to the general population" (Rice et al., 2016, p. 1333) or that psychological well-being is better in athletes compared to non-athletes (Alamdarloo et al., 2019). However, Lundqvist and Sandin (2014) suggested the need to define more explicitly the conceptual framework of

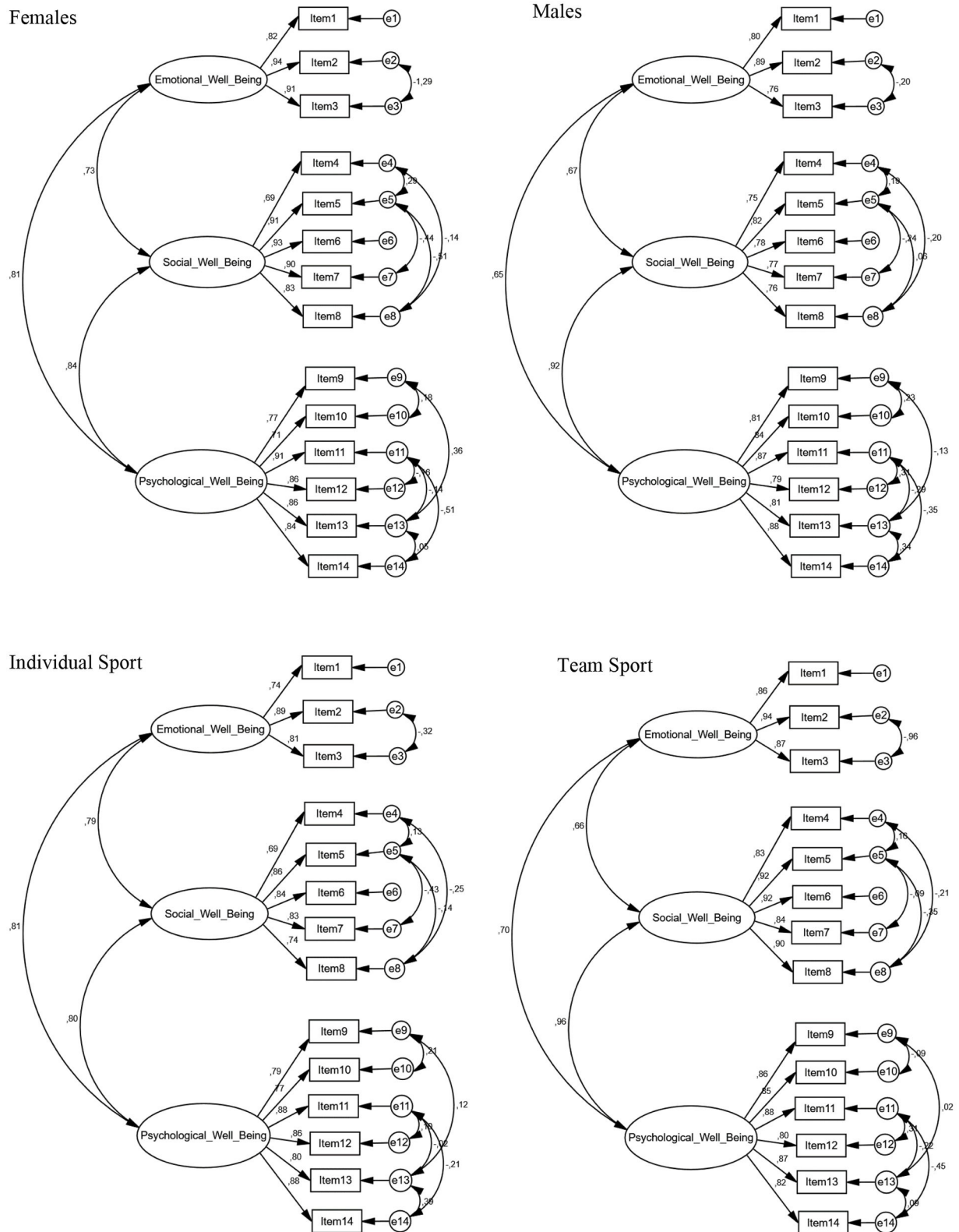


FIGURE 1 | Multigroup Confirmatory Factor Analysis of the Italian version of the Sport MHC-SF scale: standardized regression weight estimates.

TABLE 1 | Concurrent validity among Sport MHC-SF subscales, ITAMS subscales, and SF-12 subscales.

Latent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Emotional well-being											
(2) Social well-being	0.620										
(3) Psychological well-being	0.651	0.810									
(4) Anger	−0.213	−0.103	−0.085								
(5) Confusion	−0.189	−0.143	−0.170	0.597							
(6) Depression	−0.249	−0.164	−0.203	0.694	0.718						
(7) Fatigue	−0.143	−0.060	−0.081	0.490	0.505	0.466					
(8) Tension	−0.190	−0.063	−0.172	0.605	0.633	0.642	0.526				
(9) Vigor	0.352	0.337	0.351	−0.083	−0.199	−0.226	−0.232	−0.152			
(10) PCS	0.202	0.196	0.252	−0.171	−0.208	−0.252	−0.114	−0.104	0.237		
(11) MCS	0.359	0.350	0.358	−0.348	−0.434	−0.509	−0.377	−0.572	0.392	0.092	

All correlation coefficients are significant at $p < 0.01$.

TABLE 2 | Mean and standard deviation of the Italian and normal population in mental health dimensions.

Mental health dimension	Italian normal population		Italian sport population		Cohen <i>d</i>
	M	SD	M	SD	
Emotional well-being	3.97	1.12	3.85	0.96	0.07
Social well-being	2.73	1.01	3.90	1.13	1.09
Psychological well-being	4.45	1.02	3.97	0.97	0.48
Total well-being	3.73	0.85	3.91	0.91	0.21

well-being and the level (global or context-specific) on which the construct is investigated. Their integrated model of global well-being and context-specific well-being related to sport can be examined further in the future.

As mentioned before, a reliable tool for the evaluation of mental health levels in a sporting environment was not available in the Italian language and context. Hence, the development of the Italian version of the Sport MHC-SF allows professionals to examine Italian athletic populations' well-being and share projects and results with scholars in other countries. In conclusion, the Italian version of Sport MHC-SF is suggested to be a valid scale in the evaluation of the athletes' well-being and specifically for measuring the variability of well-being levels among athletes, with reference to emotional, social, and psychological variables. However, some limitation should be highlighted such as its small sample size and the need of a larger validation study checking for competitive level invariance.

STUDY 2

The purpose of Study 2 was to analyze the effects of SPI based on a mental health literacy program of professional cyclists during the COVID-19 lockdown, describing a professional intervention commissioned by the ACCPI.

Materials and Methods

Participants

A total of 38 Italian professional cyclists (10 men, 28 women) who ranged in age from 18 to 37 years ($M = 25.11$; $SD = 4.87$) agreed to participate in this study. They reported participating in 6–12 training sessions per week. Athletes were all competing at international level with an average of 4 h of training per day.

During the design of the SPI, all cyclists supported by the ACCPI were invited to participate. Nineteen athletes agreed immediately to take part in the SPI to enhance their mental health during the lockdown. Following that, another group of 19 cyclists asked to be included in the program and they formed a waiting list for the current study. Comparison between those two groups made sense since the comparison group spent equal time dealing with generic sport psychology skills, while not focusing on mental health literacy. It was our best chance to compare a carefully crafted intervention aiming mental health components to generic (or performance based) interventions within the elite sport domain. Therefore, we had two groups of professional cyclists: 19 athletes involved in the SPI group and 19 athletes (forming the waiting list) who were included in the comparison group.

Instruments and Intervention

The Sport Mental Health Continuum-Short Form (Sport MHC-SF; Foster and Chow, 2018), described in Study 1, was administered to analyze emotional, social, and psychological well-being in the participating cyclists. Between the two Sport MHC-SF assessments, a specific SPI was conducted with the athletes that agreed to participate.

The SPI was requested during the COVID-19 lockdown from the President of the ACCPI to prevent decreases in the athletes' mental well-being. The SPI was proposed and led by the first author with the collaboration of four psychologists and psychotherapists with strong expertise in the sport field. Intervention with the cyclists initiated about 3 weeks after the initial point of lockdown. Authors designed the intervention responding to components included in recent definitions of Mental Health Literacy (Furnham and Swami, 2018) with an

emphasis on sport-specific needs and priorities (Gorczyński et al., 2020).

Indeed, mental health literacy and educational strategies are fundamental in improving mental well-being. Moreover, we took into consideration the ecological framework of elite athletes' mental health needs proposed by Purcell et al. (2019). They suggested that "core foundational components" should include (i) mental health literacy to improve understanding, reduce stigma, and promote early help-seeking; (ii) a focus on athlete development (both career and personal development goals) and skill acquisition to help attain these goals; and (iii) mental health screening of, and feedback to, athletes" (p. 3). Furthermore, we used suggestions from international scholars and organizations (Reardon et al., 2019; Association for Applied Sport Psychology, 2020; International Olympic Committee, 2020a,b).

The SPI consisted of a webinar on mental health and well-being in athletes followed by three online focus groups. A Decalogue of behavioral indications to cope with the lockdown were constructed and introduced during the webinar. The mental health model is the Keyes (2002) two-continuum model, which includes, in one continuum, the presence and absence of mental illness or mental health concerns and, in the other continuum, the presence and absence of mental well-being. Mental health promotion serves as a protective feature against stressors (World Health Organization, 2002) and the International Society of Sport Psychology (ISSP) made a call for sport psychology consultants to increase the promotion of athletes' mental health (Schinke et al., 2018). The comprehensive framework for mental health to support elite athletes (Purcell et al., 2019) aims to reduce the risk of mental health symptoms developing or minimizing their potential impact and severity, informing in the same way our SPI. Such programs broadening mental health literacy help to build a culture that values the importance of mental health and well-being of athletes.

Authors utilized infographics as an efficient method to construct the Decalogue of behavioral indications during the lockdown for professional cyclists (see **Figures 2, 3**). Infographics is "an increasingly popular visual approach to communicate information (Muir and Munroe-Chandler, 2020, p. 2)," through the combination of images and text, since they clearly and concisely encapsulate large volumes of information (Dunlap and Lowenthal, 2016). It is also an efficient method to convey complex information to wider audiences promoting concepts and ideal practices (McCrorie et al., 2016).

Infographics can potentially be an important gateway to discuss mental health topics with athletes. Sport psychology consultants can increase athletes' awareness on the importance of mental health and also act as a liaison between athletes and mental health practitioners (Muir and Munroe-Chandler, 2020). In the particular case, the Infographic Decalogue was used as an introductory point for discussing important behavioral recommendations during lockdown. It assisted authors to initiate the discussion on the importance of mental health in professional sports, especially during a critical period such as the COVID-19 pandemic.

Online focus groups were directed on the development of "basic techniques for athletes to self-manage transient mood

states or psychological distress, such as relaxation techniques, [and] adaptive coping strategies" (Purcell et al., 2019, p. 5) helping professional cyclists deal with various difficulties (isolation, interruption of sport events, the reduction of the training volume, etc.) during lockdown. More precisely, athletes were presented with self-talk, relaxation, mindfulness, self-efficacy, and imagery skills.

Procedure

After the first author was contacted by the ACCPI, an initial screening of the professional cyclists—voluntarily deciding to participate—was performed. ACCPI asked their associated professional cyclists to voluntarily participate in the intervention. Thirty-eight cyclists joined the program with the first 19 included in the SPI, whereas the 19 athletes of the waiting list constituted the comparison group.

SPI lasted 1 month and was based on mental health literacy intervention. It consisted of:

- Creating and sending to the cyclists an Infographic Decalogue of behavioral guidelines helping them to cope with the lockdown (see **Figures 2, 3**),
- Conducting a webinar on mental health literacy and behavioral indication, as well as
- Three online focus groups on specific topics mainly devoted to the eudaimonic well-being for positive mental health.

Online workshops were held on a weekly basis, lasting 2 h and using a popular communication platform. During the first meeting, the president and the general secretary of ACCPI introduced the reported project with the five experts underlying the importance of supporting athletes' mental health during this critical period in accordance to the requests of the professional cyclists to their association.

Online focus groups comprised a theoretical introduction to the topic (first part) and a discussion (second part) of the following topics:

- A mental health webinar was focused on the Keyes (2002) model of mental health continuum and on the introduction and explanation of the Decalogue of behavioral suggestions. Theory followed by the ecological framework by Purcell et al. (2019) was also mentioned to increase cyclists' awareness of mental well-being and decrease the stigma related to mental health issues.
- The first online focus group entitled "Acting on one's thoughts to change emotions and behaviors: experiences of self-talk" explored self-talk technique from a motivational and attentional point of view. Theory was followed by a discussion with the athletes on the emotional and motivational problems they were facing during the lockdown and the self-talk technique as a strategy to cope with them. Moreover, the basics of Rational Emotive Behavioral Therapy (REBT) in sport have been introduced following the suggestion by Turner et al. (2020).
- The second online focus group entitled "From body to mind and vice versa: mindfulness and relaxation experiences" offered an overview of relaxation and mindfulness techniques.



FIGURE 2 | Infographic: Decalogue of behavioral indications for cyclists.

After a theoretical introduction, a practical session on relaxation (Autogenic Training; Shulz and Luthe, 1969) and mindfulness (Kabat-Zinn, 1982, 1990; Birrer et al., 2012) was presented to the participating athletes.

4. The third online focus group entitled “Self-esteem and Self-efficacy: Imagery experiences” examined the use of imagery as a technique to increase self-esteem and self-efficacy. After a theoretical introduction, a practical session of imagery was presented to the athletes (Holmes and Collins, 2001; Razon et al., 2014).

All the above were directed to the cyclists comprising the intervention group. A month after the end of the intervention, cyclists from both groups filled out the Sport Mental Health Continuum—Short Form (Sport MHC-SF; Foster and Chow, 2018) again. Scores were compared and analyzed accordingly (see below).

Statistical Analysis

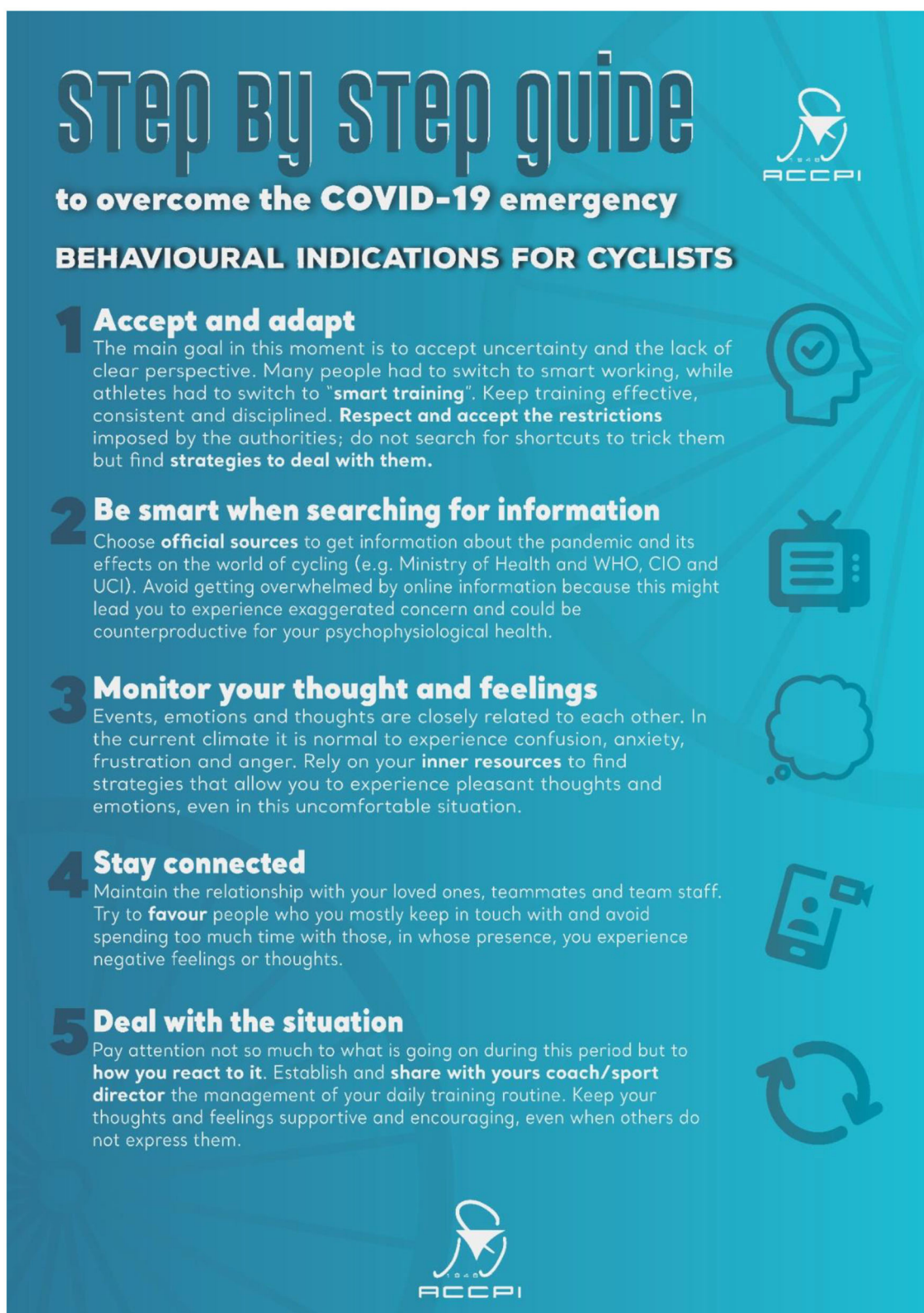
Data were initially screened for multivariate outliers and normal distribution (Tabachnick and Fidell, 2013). No missing values were identified due to the online submission in which all items had to be rated. To test the between- and within-group effects of the SPI, data were analyzed running a repeated measure multivariate analysis of variance (RM-MANOVA) 2 (group:

SPI and comparison) $\times$ 2 (time: test and retest) on all the scales of MHC. Effect sizes were calculated using partial eta square (η_p^2 ; Lakens, 2013), with 0.01, 0.06, and 0.14 considered small, medium, and large effects, respectively (Cohen, 1988). The significance level was set at 0.05, and statistical analyses were performed using the SPSS software (Version 25.0; IBM, Armonk, NY, USA).

Results

Descriptive statistics for the two groups of cyclists are provided in **Table 3**.

According to the suggestion provided by Keyes et al. (2008) and used also for the Italian validation of the MHC-SF in the normal population, we also applied diagnostic categories in the categorical assessment of mental health distinguishing levels of psychosocial functioning between flourishing, moderately mentally healthy, and languishing individuals. We did not find any languishing cyclists in any of the groups but found six moderately healthy athletes in each group. At the end of the lockdown, we found three cyclists who were still moderately healthy individuals in the SPI group with all the other athletes flourishing. Meanwhile, in the comparison group, the same six cyclists remained moderately healthy.



STEP BY STEP guide

to overcome the COVID-19 emergency

BEHAVIOURAL INDICATIONS FOR CYCLISTS

1 Accept and adapt
The main goal in this moment is to accept uncertainty and the lack of clear perspective. Many people had to switch to smart working, while athletes had to switch to "**smart training**". Keep training effective, consistent and disciplined. **Respect and accept the restrictions** imposed by the authorities; do not search for shortcuts to trick them but find **strategies to deal with them**.

2 Be smart when searching for information
Choose **official sources** to get information about the pandemic and its effects on the world of cycling (e.g. Ministry of Health and WHO, CIO and UCI). Avoid getting overwhelmed by online information because this might lead you to experience exaggerated concern and could be counterproductive for your psychophysiological health.

3 Monitor your thought and feelings
Events, emotions and thoughts are closely related to each other. In the current climate it is normal to experience confusion, anxiety, frustration and anger. Rely on your **inner resources** to find strategies that allow you to experience pleasant thoughts and emotions, even in this uncomfortable situation.

4 Stay connected
Maintain the relationship with your loved ones, teammates and team staff. Try to **favour** people who you mostly keep in touch with and avoid spending too much time with those, in whose presence, you experience negative feelings or thoughts.

5 Deal with the situation
Pay attention not so much to what is going on during this period but to **how you react to it**. Establish and **share with your coach/sport director** the management of your daily training routine. Keep your thoughts and feelings supportive and encouraging, even when others do not express them.

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FIGURE 3 | Continued



FIGURE 3 | Decalogue of behavioral indications for cyclists.

TABLE 3 | Descriptive statistics on Sport MHC-SF for the two groups of cyclists..

	Test		Re-test	
	SPI group	Comparison group	SPI group	Comparison group
Emotional well-being	3.92 (0.82)	4.03 (0.96)	3.85 (0.81)	3.64 (0.67)
Social well-being	3.69 (0.86)	4.00 (0.95)	3.57 (1.07)	3.96 (1.35)
Psychological well-being	3.89 (0.67)	4.27 (0.85)	4.14 (0.73)	3.60 (0.87)

To provide a more detailed overview of the extent to which the COVID-19 lockdown impacted athletes' mental health and well-being, we compared the data of our cyclists before the SPI (see test of SPI group in **Table 3**) with those of the same measure collected with Italian athletes before lockdown and reported in Study 1 (see Italian sport population in **Table 2**). Effect size of the mean differences was estimated using Cohen's *d* (Cohen, 1988), for which 0.20, 0.50, and 0.80 are considered small, medium, and large effects, respectively. Specifically, the means (and standard deviations) of emotional, social, and psychological well-being, observed during lockdown, were compared with those provided in Study 1. We found small to no effect on emotional (Cohen *d* = 0.08), social (Cohen *d* = 0.20), and psychological well-being (Cohen *d* = 0.09) for the Intervention group, and similar effect on emotional (Cohen *d* = 0.18), social (Cohen *d* = 0.10), and psychological well-being (Cohen *d* = 0.32) for the comparison group.

We assessed the effect of SPI between and within participants of study 2. RM-MANOVA yielded significant differences only for the group $\times$ time interaction on MHC (Wilks λ 0.772, p = 0.03, η_p^2 = 0.30, power = 0.71). Univariate follow-up showed significant differences on psychological well-being, $F_{(1,36)} = 6.91$, p = 0.012, η_p^2 = 0.17, power = 0.77. Professional athletes who received the intervention reported higher psychological well-being in the retest compared to the athletes who did not follow the SPI. No significant differences were found for emotional and social well-being.

Discussion

The purpose of Study 2 was to examine the effects of a short educational intervention, i.e., SPI, on professional cyclists during the COVID-19 lockdown. Its aim was to improve psychological responses through a mental health literacy intervention, supporting cyclists' ability to cope with the effects of the confinement. The intervention consisted of an Infographic Decalogue of behavioral guidelines specifically created and sent to the cyclists, along with a webinar on mental health and well-being. Both these interventions were followed by three online focus groups. Due to the practical constraints of lockdown, the online focus group methodology was necessary to allow group discussions among athletes in different geographical regions.

Online interactions may hinder engaged conversations. Hence, psychologists and psychotherapists conducting the intervention decided to maintain the same structure for each

focus group: each meeting begun with an introduction of the topic, allowing athletes to feel comfortable while starting to engage in the conversation. In the second part of the online focus groups, the experts encouraged athletes to share views and experiences engaging in conversations or using the group chat. Both modes of interaction supported the elicitation of viewpoints making those focus groups engaging and productive.

The intervention had an effect particularly on the eudaimonic feature of mental health showing important effects on psychological well-being. This is an important finding since it came as a product of a brief intervention limited on certain skills we prioritized based on related literature. Similarly, selected topics supported self-management, personal choice, and autonomy skills during a period of scarce control over one's environment. These topics obviously paid dividends showing participating cyclists reducing their distress and benefiting from those skills, at least during the confinement period.

However, we did not observe any changes in the hedonic (emotional) well-being and the social well-being. Given that the mental health is also an indication of alignment between the individual athlete and the surrounding context (Henriksen et al., 2020), the difficulty of the applied intervention to reach these elements of well-being is self-explanatory. Included skills and techniques did not incorporate areas of importance for this mental health component such as self-compassion and enhanced emotion experiences due mainly to the short duration and the urgency of the intervention (Galla, 2016). Longer and richer interventions could shed more light on such a possibility.

Social well-being relates to the degree individuals see themselves thriving within their social environment (Keyes, 2002). Even if social connection was included in the 10-point infographic, we did not put an emphasis on social connectedness. Again, both the ongoing pandemic and the short duration of the intervention did not allow chances for influencing this mental health component.

Interestingly, cyclists of the comparison group presented a slight decrease on their mental health continuum scores. Even if we are not in position to exclude mental components being emphasized by their medical and technical staff, diminishing related scores support the need for specialized mental health programs in elite sports and under circumstances of crises.

Interventions focused on stress or well-being within organizations have traditionally been couched within primary, secondary, and tertiary categories (see Fletcher et al., 2006). Specifically, these categories refer to interventions that (1) aim to reduce or prevent stressors from occurring (primary), (2) help individuals manage situations as they happen (secondary), or (3) promote reflection and learning about situations after they have happened (tertiary).

The above three points make perfect sense in relation to the attempted intervention. Infographic and the chosen online focus group sessions supported the initial goals of the program, with its results showing effectiveness on the psychological level ameliorating current contextual adversities. Intervention was also successful on preventing deterioration of quality of life and

mental health indices in the participating athletes, a clear point of successfully completing the program based on the second category above. Finally, our intervention even if it showed efficacy, had to be short and concise due to its urgency and special conditions under which it had to run. Its short duration did not allow chances for detailed reflection on learning and relevant situations as they unraveled. It is always interesting to investigate the long-term effects of similar mental health interventions in the near future.

Both of our studies add to the scarce literature related to mental health in elite sports. They are in line with the proposals of the ISSP and FEPSAC consensus/position statements for improving mental health in sports (i.e., Henriksen et al., 2020) since they help not only with the assessment, but also with the implementation of a simple and clear plan to support mental health in an unprecedented human crisis.

Limitations of the program include the small number of participants in each group and the inability to manage adequately the comparison group. Both of those factors would not be there if the intervention had run under normal conditions. The seriousness and the immediacy of the situation and the perceived demand led us to design an intervention with existing resources, testing our reflexes, and readiness. Future attempts of a similar mental health sport psychology intervention program could take advantage of our study and expand it adequately. Cyclists participating in the comparison group followed mental health support recommendations by their technical and medical staff. Even if all cyclists competing at a national and international levels were invited to take part in the described intervention, only 38 cyclists decided to partake. Reported gender and competitive experience of these cyclists were not ideal. Future research attempts exploring the effects of similar interventions need to provide more clues on those factors enabling emphatic conclusions. Moreover, the use of a qualitative method of analysis could have contributed additional explanatory answers on this study. Another limitation of Study 2 relates to the nature of the study, which was quasi-experimental in nature, based on an intervention commissioned by ACCPI: it was based on voluntary participation and without randomization of its participants. Finally, generalization of the intervention results in elite sporting contexts demands a larger sample from various competitive sports.

We believe that this intervention creates an important first attempt to enhance mental health literacy in elite athletes facing a global pandemic and limited resources to retain their performance level. Through its description, analysis, and results, we provide an initial short framework of its kind. Overall, our attempt supports the foundation of evidence-based guidance for enhancing mental health awareness and implementing programs that acknowledge diversity and quality assurance in sport.

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CONCLUSION

Study 1 showed that the Mental Health Continuum questionnaire for sport has excellent validity and reliability also in an Italian sample of athletes. It can be a useful instrument for assessing the well-being of athletes. As highlighted by Uphill et al. (2016), it also provides “a conceptual space that encapsulates the broad spectrum of both distressing and flourishing experiences, but recognizes that the strategies designed to ameliorate distressing symptoms may not necessarily be the same as those designed to enhance flourishing” (p. 2). The fit indices of the Italian version are similar to the original version developed by Foster and Chow (2018) on the basis of the MHC-SF developed by Keyes (2002). However, the Italian sport sample shows differences in comparison to the sample of the general Italian population investigated by Petrillo et al. (2015).

Study 2 showed that our intervention (SPI) framed within an organizational setting can influence the psychological aspects of eudaimonic well-being for positive mental health (Keyes, 2007; Neil et al., 2017). Indeed, “the eudaimonic approach to well-being is not simply interested in subjective happiness, but in the realization of human potential” (Neil et al., 2017, p. 102). Our intervention focused on stress and well-being within organizations on secondary and tertiary categories (see Fletcher et al., 2006; Neil et al., 2017). Specifically, it helped individuals manage situations as they happened (secondary) and promoted reflection and learning from those situations after they occurred (tertiary).

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by IRB Bind Center University of Chieti-Pescara. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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APPENDIX 1

Sport MHC-SF

During the past month, how often did your sport participant make you feel...

Nell'ultimo mese, quanto spesso la tua partecipazione allo sport ti ha fatto sentire...

1. Happy
Felice
2. Interested in your sport
Interessato al tuo sport
3. Satisfied
Soddisfatto
4. That you had something to contribute to your team or sport community
Di poter dare un contributo alla tua squadra o alla tua comunità sportiva
5. That you belonged to your team or sport community
Di far parte della tua squadra o comunità sportiva
6. That your team or sport community is a good place for all participants
Che la tua squadra o comunità sportiva sono un buon ambiente per tutti coloro che ne fanno parte
7. That people in your sport are basically good
Di avere a che fare con brave persone nel tuo sport
8. That the way your sport is organized makes sense to you
Che il modo in cui è organizzato il tuo sport ha senso per te
9. That you liked most parts of your athletic personality
Di apprezzare la maggior parte degli aspetti della tua identità sportiva
10. Good at managing the daily responsibilities of your sport
Di riuscire a gestire bene le responsabilità quotidiane del tuo sport
11. That you had warm and trusting relationships with others in your sport
Di avere, all'interno del tuo sport, relazioni cordiali e di fiducia con gli altri
12. That you had sport experiences that challenged you to grow and become a better person
Di avere avuto esperienze sportive stimolanti per crescere e diventare una persona migliore
13. Confident to think or express your own ideas and opinions to people in your sport
Fiducioso nel pensare o esprimere le tue idee e opinioni alle persone nel tuo sport
14. That you have a sense of direction or meaning within your sport
Che il tuo sport ha un senso o un significato per te

MHC-SF

During the past month, how often did you feel...

Nell'ultimo mese quanto spesso ti sei sentito/hai sentito...

- Happy
Felice
- Interested in life
Interessato alla vita
- Satisfied with life
Soddisfatto
- That you had something important to contribute to society
Di poter fare qualcosa di importante per la società
- That you belonged to a community (like a social group, or your neighborhood)
Parte di una comunità (un gruppo o il tuo quartiere)
- That your society is a good place, or is becoming a better place, for all people
Che la nostra società sta diventando u posto migliore per gente come te
- That people are basically good
Che le persone sono fondamentalmente buone
- That the way our society works makes sense to you
Che il modo in cui funziona la nostra società ha un senso per te
- That you liked most parts of your personality
Che ti piacciono la maggior parte degli aspetti della tua personalità
- Good at managing the responsibilities of your daily life
Bene nel gestire le responsabilità della tua vita quotidiana
- That you had warm and trusting relationships with others
Di avere delle relazioni sincere e cordiali con gli altri
- That you had experiences that challenged you to grow and become a better person
Di aver avuto delle esperienze che ti hanno aiutato a crescere e a diventare una persona migliore
- Confident to think or express your own ideas and opinions
Capace di pensare o esprimere le tue idee e opinioni
- That your life has a sense of direction or meaning to it
Che la tua vita ha un senso



Psychological Impact of the COVID-19 Pandemic on Athletes

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This study explored the influence of athletic identity and sports participation on the psychological well-being of athletes during a pandemic. The objective of the study was to understand the psychological impact of the coronavirus lockdown measure on athletes who were not able to carry out their normal daily routine. Athletes from nine different sports completed an online survey during the sixth week of the total lockdown in Nigeria. The online survey consists of an athletic identity scale and the Kessler Psychological Distress Scale (K10). Data collected were analyzed using Multiple regression and the Mann-Whitney test at 0.05 level of significance. The result of the findings revealed that category of sports (individual and team) ($M = 0.73$, $\beta = -6.116$) and athletic identity ($M = 59.16$, $\beta = -0.166$) predicts psychological distress to some degree. Few individual sports athletes and athletes with low athletic identity are prone to higher levels of psychological distress than team sports athletes and athletes with high athletic identity during the coronavirus pandemic lockdown. Individual sports athletes reported elevated levels of psychological distress compared to team sports athletes ($z = -2.186$, $p = 0.03$, $r = 0.27$). In conclusion, the results have confirmed that some athletes competing in individual sports experience elevated levels of psychological distress during the coronavirus pandemic, therefore they need the support of a sports psychologist during such periods to help in maintaining their psychological well-being.

Keywords: psychological distress, viral pandemic, athletes, athletic identity, age

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INTRODUCTION

Pandemics have been around for more than a century, and they continue to impact humanity negatively. There have been pandemics such as the H1N1 in Mexico, which rapidly spread to the whole world (Cowling et al., 2010), the MERS-COV, Ebola, and SARS which came later. These pandemics cause enormous negative economic, social, and security impacts on the global community (Qiu et al., 2017), but their psychological influence is hardly recognized. Recently, the world started to experience another pandemic caused by the novel coronavirus-19 that originated in Wuhan, China (Torsdahl and Asif, 2020). The coronavirus has a similar mode of transmission to SARS and MERS (Dong and Bouey, 2020), but it has spread so fast to many other countries, including Nigeria.

With the large-scale spread of this coronavirus and the knowledge of its transmission, most governments introduced heightened measures to control its spread (Taylor et al., 2008; Dong and Bouey, 2020). These measures include the use of protective equipment and the introduction of non-pharmaceutical protocols such as social distancing, hygiene guidelines, and, in more severe cases, a total lockdown (Cowling et al., 2010; Schinke et al., 2018). The consequence of these measures

implied that gatherings of people were not welcome (Dong and Bouey, 2020), and as a result, many sports events earlier scheduled were cancelled or suspended due to the high risk of spreading the virus. The major events postponed include the Olympics slated to be held in Tokyo, UEFA Euro Cup, UEFA Champions League, and CAF Nations Cup qualifiers (Samuel et al., 2020). Most football leagues and competitions were also affected by safety measures. In Nigeria, the National Sports Festival was postponed indefinitely, pending advice from the Nigeria Centre for Disease Control (Okpara, 2020). As expected, the postponement of these competitions came with a lot of economic hardships on host cities and sports event organizers. Sports fans also had their fair share. These postponements also have a significant psychological influence on the athletes who are to participate in these competitions.

Most studies have focused on the psychological implication of pandemics on the general population (McAlonan et al., 2007; Taylor et al., 2008), with very few paying attention to special populations like athletes in recent times (Turbeville et al., 2006; Pillay et al., 2020). Recent research on home confinements as a result of the coronavirus have shown that athletes experience negative psychological effects (Dong and Bouey, 2020; Toresdahl and Asif, 2020). In fact, some studies have revealed that athletes experience mental health challenges just like the general population and are therefore not immune (Gouttebarga and Kerkhoffs, 2018; Schinke et al., 2018; Pillay et al., 2020). On the other hand, other studies have stated that sports provide a protective effect that prevents psychological disturbances. For example, a study was carried out to compare general health in athlete and non-athlete women (Alamdarloo et al., 2019). The study found out that athletes differed from non-athletes in anxiety and severe depression, with the mean scores for these two variables lower in athletes compared to non-athletes. Similarly, another study suggested that physical activity in the right quantity has the potential to reduce symptoms of anxiety and depression (Siefken et al., 2019). It seems that there is no agreement as to the existence of mental health problems among sports athletes due to the belief that sports prevent ill mental health. However, recent studies on mental health in sports among elite athletes have revealed that, compared to the general population, athletes are under-diagnosed, and the culture of mental toughness promotes this situation (Schinke et al., 2018). Many athletes who exhibit these ill mental health symptoms, such as distress, burnout, depression, or sleep disturbance, adverse feelings or thoughts, and drug abuse (Gouttebarga and Kerkhoffs, 2018), hide it from their teammates and coaches due to the mental toughness culture that pervades the atmosphere.

Furthermore, athletes who suffer from these conditions may not inform their coach or teammates for fear of losing their playing position. If they compete in individual sports, they may not want to be deprived of competing against an opponent. Studies have shown that individual sports athletes are at a greater risk of psychological distress than team sports athletes (Tasiemski and Brewer, 2011; Purcell et al., 2019). Mental health challenges have been suggested to be more prevalent in individual sports athletes compared to team sport athletes (Pluhar et al., 2019), owing to the nature of individual sports. Specifically, individual

sports athletes have to deal with both success and failure on their own, while team sports athletes enjoy a shared responsibility (Mladenović, 2019). Furthermore, team sports provide more social opportunities compared to individual sports in which there is no peer support. This situation may be tougher for athletes who are much younger and inexperienced (Nicholls et al., 2016). For instance, studies have emphasized the high risk which college athletes are exposed to, including the inability of college athletes in dealing with the challenges that they encounter. In fact, youth athletes who are unable to deal with perceived failure prefer to drop out of sports participation (Crane and Temple, 2015), hence experiencing a depletion in their athletic identity. Similarly, a study on collegiate athletes' reaction to loss revealed that unsatisfied athletes tended to decrease their athletic identity compared to athletes who were satisfied by their performance (Brewer et al., 1999). Athletes reduced their self-identification with their athletic role as a response to poor performance.

Athletic identity refers to the degree to which an individual attributes or identifies with the athletic role. Although it is developed through social interaction and validation, it is accompanied by both negative and positive outcomes (Verkooijen et al., 2012; Reifsteck, 2013). This identity with the athlete's role is confirmed by others and motivates the individual involved to be more committed to training and sports goal achievement. Athletes who are high in athletic identity exhibit behaviors such as going regularly to the gym and sports field and even buying mostly athletic gears and equipment. However, an overemphasis on athletic identity may lead to negative outcomes as stated earlier. Studies have stated that a reduction in the opportunity to participate in sports harms the mental health of athletes and their athletic identity levels (Masten et al., 2006; Miller and Hoffman, 2009). Consequently, when an athlete is not regularly allowed to express himself/herself, there is a high tendency for that athlete to experience a reduced athletic identity (Fraser-Thomas et al., 2008; Altıntaş and Keleccek, 2017). This phenomenon is expected more in youth athletes, who may drop out of sports (Nicholls and Polman, 2007; Hall et al., 2017; Lewis et al., 2017), than in elite professional athletes who may cope with such a situation. In addition, it has also been revealed in other studies that when athletes, especially those high in athletic identity, are unable to engage in their daily routine as a result of injury (Mittly and Nemeth, 2016), they start to resent their identification as athletes (Hadiyan and Sheikh, 2015). This makes athletic identity a critical factor that should be considered especially in athletes as they go through the period of home confinement during the coronavirus pandemic.

Although recent studies are beginning to investigate the psychological well-being of athletes during the coronavirus pandemic (Costa et al., 2020; Mehrsafari et al., 2020; Pillay et al., 2020), most of these studies are from Europe and the USA. More studies are required to better understand athletes' experience from other climes like Africa and, specifically, Nigeria. There is limited knowledge about the influence of athletic identity and sports participation on the psychological well-being of athletes, especially during a pandemic. A recent study explored the differences in gender, type of sport, and competitive level in athletic identity during the coronavirus lockdown and found

out that elite athletes and team sports athletes showed higher athletic identity (Costa et al., 2020). However, this study did not investigate the influence of extrinsic rewards on psychological well-being and how athletic identity interacts with well-being in athletes during the coronavirus lockdown. Based on this, our study aims to investigate differences by competitive level, extrinsic rewards, and category of sports participation in athletes and understand how athletic identity, age, category of sport participation, and the number of years participating in sports interact with the psychological well-being of athletes during the coronavirus lockdown.

METHODOLOGY

Participants and Procedure

The sample comprised 64 athletes from nine different sports: two team sports (football and basketball) and seven individual sports (athletics, cycling, taekwondo, tennis, gymnastics, badminton, and table tennis). The participants were classified as professional athletes ($n = 20$), which included athletes who compete in national and regional tournaments, and non-professional athletes ($n = 44$) who compete in state tournaments. The authors contacted coaches known to them through voice calls and WhatsApp messages to help in reaching their athletes about the possibility of taking part in the study. This was done during the home confinement period of the total lockdown which started at the end of March 2020. A weblink to the consent form and online survey was made available to coaches and some athletes *via* WhatsApp from May 5, 2020, during the height of the pandemic lockdown in Nigeria. The online survey was open for 4 weeks from the May 5, 2020 to June 2, 2020. Due to the circumstances at that period, the authors could not determine which sports athletes could take part in the study. Hence, those who responded to the survey by completing it were regarded as study participants, and the participation was anonymous. Since we were interested in athletes all over the country, we did not request their location. The ethical approval board of the Department of Human Kinetics and Health Education was contacted by email, and they approved the study.

Measure

The full survey comprised 26 questions covering a range of subject areas; those reported here include demographic information: gender, age category, type of sport, and level in sport. In addition, the respondents were asked about their years of sports participation as well as earnings from sports.

Anxiety and Depression During the Viral Pandemic

To measure psychological distress during the pandemic, the 10 items from the Kessler Psychological Distress Scale (K10) were employed (Andrews and Slade, 2001; Kessler et al., 2002; Sampasa-Kanyinga et al., 2018). The K-10 was developed and validated as a screening tool for assessing the likelihood of common mental disorders in the general population and clinical samples (Kessler et al., 2002; Slade et al., 2011; Sunderland et al., 2012). The K-10 demonstrates strong psychometric properties (Pereira et al., 2019) and has been used across different

populations and cultures (Chan and Fung, 2014; Sampasa-Kanyinga et al., 2018). The K10 is a 10-item scale that asks respondents how often they have experienced certain symptoms during the preceding 4 weeks. The participants responded on a five-point scale depending on how frequently they experienced each symptom. The five-point scale ranges from none of the time (1) to all of the time (5). The K10 has items such as item 1 (In the past 4 weeks, about how often did you feel tired out for no good reason?) and item 5 (In the past 4 weeks, about how often did you feel restless or fidgety?). Past research has shown that K10 has satisfactory psychometric properties (Taylor et al., 2008; Sampasa-Kanyinga et al., 2018). In this study, the internal consistency was satisfactory ($\alpha = 0.86$).

Athletic Identity

To measure athletic identity, the original 10-item scale for athletic identity measurement was used (Brewer et al., 1993; Hadiyan and Sheikh, 2015; Tunçkol, 2015). This test was chosen because of its ability to measure levels of athletic identity and its high internal consistency index test-retest reliability. The Athletic Identity Measurement Scale is supported as a unidimensional and multidimensional instrument (Brewer and Cornelius, 2001). The evaluation of the unidimensional scale can be performed by using the total score to produce a single self-evaluation score that represents the athletic identity, with higher scores indicating a strong athletic identity. The multidimensional scale contains four scales: self-identity, social identity, exclusivity, and negative affectivity (Brewer et al., 1993). Self-identity items capture reports that are self-referenced. Social identity items express the degree to which individuals view themselves as occupying the athletic role. Exclusivity measures the self-worth of an individual established through participation in the athletic role. Negative affectivity is the degree to which individuals experience negative emotions from undesirable sporting outcomes such as injury or retirement. The participants were asked to indicate their agreement with each item by responding on a seven-point scale from “strongly agree” to “strongly disagree.” The scale comprised 10 items measuring self-identity (e.g., “I have many goals related to sport”), social identity (e.g., “Most of my friends are athletes”), negative affectivity (e.g., “I feel bad about myself when I do poorly in sport”), and exclusivity (e.g., “Sport is the most important part of my life”). The internal consistency of this questionnaire was satisfactory ($\alpha = 0.93$).

Data Analysis

The characteristics of the participants were described using frequency distribution, while group differences were subjected to Mann-Whitney tests since the data collected did not meet the assumptions of parametric tests such as small samples and normality of data. To understand whether one group experiences psychological distress more than the other during the coronavirus lockdown, the Mann-Whitney test was conducted to test the difference between professional and non-professional athletes, team and individual sports athletes, and athletes who earned financial rewards from sports participation and athletes who do not earn from sports participation. Multiple regression

TABLE 1 | Sample description.

		<i>n</i>	Percentage (%)
Gender (<i>n</i> = 65)	Male	56	88
	Female	8	13
Age category	13–17	7	11
	18–23	37	58
	24–29	17	27
	30–35	3	5
Earn from sports participation	No	27	42
	Yes	37	58
Type of sports	Athletics	2	3
	Badminton	7	11
	Basketball	3	5
	Cycling	1	2
	Football	44	69
	Gymnastics	2	3
	Table tennis	1	2
	Taekwondo	2	3
	Tennis	2	3
Level in sport	Professional	20	31
	Non-professional	44	69
Years in sports participation	1–5 years	19	30
	6–10 years	19	30
	11–15 years	11	17
	Over 15 years	15	23

TABLE 2 | Prevalence of psychological distress by sample characteristics.

		Low (10–19) (%)	Moderate (20–24) (%)	High (25–29) (%)	Very High (30–50) (%)
Gender	Male	54	14	18	14
	Female	29	0	29	43
Earn from sports participation	No	50	19	19	12
	Yes	47	8	19	25
Category in sport	Individual sports	31	13	19	38
	Team sports	57	13	20	11
Level in sport	Professional	53	16	16	16
	Non-professional	47	12	21	21

analysis was performed in order to determine the possible effect of the interaction among athletic identity, years participating in sports, age, and psychological distress scores (criterion variable). We used STATA version 14 for all statistical analysis. All statistical tests were performed at 0.05 level of significance.

RESULTS

Sample characteristics are displayed in **Tables 1** and **2**. Results from the Mann–Whitney tests are shown in **Table 3**. Analysis

TABLE 3 | Mann-Whitney tests for psychological distress.

Variables		<i>M</i>	<i>SD</i>	<i>p</i> -Values
Level in sports	Professionals	20.40	9.08	0.527
	Non-professionals	21.27	8.29	
Category of sport	Team sports athletes	19.34	7.29	0.029*
	Individual sports athletes	25.59	9.99	
Financial difference in sports participation	Athletes who earn	21.43	8.83	0.648
	Athletes who do not earn	20.41	8.11	

* $P < 0.05$.

TABLE 4 | Regression result for psychological distress.

	<i>M</i>	<i>SE</i>	β
Constant		7.164	0.0001
Athletic identity	59.16	0.073	−0.143*
Sport type	0.73	2.610	−6.116*
Age	21.86	0.261	−0.438
Years participating in sports	9.66	0.224	−0.058
R-squared	0.20		
No. of observations	64		

* $P < 0.05$.

by competitive level (non-professional and professional) did not yield any significant difference on psychological well-being between professional and non-professional athletes ($z = 0.63$, $p = 0.53$, $r = 0.08$). Specifically, professional athletes were not different from non-professional athletes based on psychological distress. There was a significant difference between individual sports athletes and team sports athletes ($z = -2.19$, $p = 0.03$, $r = 0.27$), but with a small effect size. Financial opportunities did not reveal any significant difference. Athletes who earned from their participation in sports did not differ significantly in psychological distress from those who did not earn from sports participation ($z = 0.46$, $p = 0.65$), and the effect size of the analysis was small ($r = 0.06$).

Results from the multiple regression with psychological distress as the dependent variable and athletic identity, age, sport type, and years participating in sports as predictor variables are displayed in **Table 4**. The results show that the categories of sport participation ($b = -6.116$, $SE = 2.610$, $p = 0.023$) and athletic identity ($b = -0.166$, $SE = 0.075$, $p = 0.03$) have significant but negative relationships with psychological distress. The other variables had no significant relationship with psychological distress.

DISCUSSION

This study sought to investigate the influence of athletic identity on the psychological well-being of athletes during the COVID-19 pandemic. In this study, we were interested in finding out the differences in psychological distress between professional and non-professional athletes, between individual

and team sports athletes, and between athletes who earned from sports participation and those who do not earn from sports participation during the COVID-19 pandemic lockdown. There were two significant findings of this study. The first is that individual athletes differed significantly from team sports athletes in their psychological response to the COVID-19 pandemic lockdown. Secondly, we found out that athletic identity has a significant relationship with psychological distress.

Our study revealed that individual sports athletes experienced high psychological distress compared to team sports athletes who experienced low psychological distress. However, our result should be interpreted with caution, owing to the number of individual athletes who participated in the study. Individual sports athletes are at a higher risk of experiencing psychological distress due to the pandemic lockdown that prevents participation in regular sporting activities. Studies have shown that individual sports athletes are at a greater risk of psychological distress than team sports athletes (Tasiemski and Brewer, 2011; Purcell et al., 2019). Furthermore, other studies have suggested that individual sports provide little or no social opportunities and a lot of personal responsibility for both success and failure, hence making individual athletes more prone to psychological distress compared to team sports athletes (Dias et al., 2010; Mladenović, 2019; Pluhar et al., 2019). For instance, individual sports athletes attribute failure to themselves more than athletes in team sports where there is a diffusion of responsibility, and this situation makes them more prone to psychological distress when compared to team sports athletes (Nixdorf et al., 2016).

Based on the result from the multiple regression analysis, our study showed that the age of athletes and the number of years spent participating in sports did not predict psychological distress. However, athletic identity and category of sport participation were able to predict psychological distress to some degree. Athletes who competed in individual sports experienced higher psychological distress compared to those who competed in team sports. This finding is supported by a number of studies (Dias et al., 2010; Pluhar et al., 2019). The circumstances surrounding the nature of individual sports make the athletes who take part in individual sports prone to psychological distress than team sports athletes (Nixdorf et al., 2016; Purcell et al., 2019). Furthermore, athletes who reported higher athletic identity experienced lower psychological distress compared to those who reported lower athletic identity. Although there are no studies that have directly reported this finding, our findings are similar to a previous study which showed that an increase in self-identity decreases anxiety levels (Masten et al., 2006). The abrupt end to sports events and activities brought about by the COVID-19 lockdown is associated with a loss of aspects that contribute to one's sense of self, which can negatively affect self-identity and lead to depressive symptoms (Tasiemski and Brewer, 2011).

We found out that both professional and non-professional athletes do not differ in the symptoms of psychological distress that they reported. This result has been confirmed in a study that sought to investigate the effect of soccer on mental health (Heun and Pringle, 2018). It was concluded that participants in football are not different from the general population in mental

health problems. Specifically, there are general risk indicators such as negative life events in which both athletes and the general population experience comparable psychological distress (Rice et al., 2016; Purcell et al., 2019).

With regards to financial compensation, there was no significant difference in psychological distress between athletes who earned from sports participation and other athletes who did not earn from their participation in sports. Previous studies have highlighted the importance of non-monetary rewards to athletes over monetary rewards (Podlog et al., 2015; Maier et al., 2016). Hence, our study suggests that the absence of extrinsic rewards from sports during the COVID-19 pandemic lockdown did not influence the psychological reaction of athletes who usually received financial reinforcement.

The findings of this study have implications for coaches and athletes who compete at state, regional, and national sports tournaments in Nigeria. Nigerian athletes, especially individual sports athletes who depend largely on their sport as a means of achieving their goals, may suffer the consequences of this over-dependence during the COVID-19 lockdown. Sports psychologists are not usually present as part of the support staff to athletes in most sports federations. For this reason, local sports coaches work with athletes based on their experience alone, without any knowledge of mental health, thereby increasing the chances of mental health problems in athletes. Nigeria sports federations should engage the services of sports psychologists as part of the support staff to athletes, include courses that emphasize psychological education in the training programs of coaches, and organize online mental health seminars as part of athlete education during and beyond the lockdown period.

LIMITATIONS

The main limitation of this study was the size of the sample, which is relatively low and had more respondents from one sport (football). In addition, most of our samples were from team sports. Hence, the data cannot be easily generalized. More studies with larger samples are needed to be able to generalize the findings. Our study was not able to compare gender differences due to the low number of female athletes responding; more studies are required in this regard. Furthermore, the study included a self-report psychological distress scale which was not validated for the intended population. Hence, we cannot draw any causal conclusion based on the current findings.

CONCLUSION

In conclusion, the results of this study indicate that individual sports athletes experienced high psychological distress as a result of the COVID-19 pandemic lockdown. The number of individual sports participants in the study were fewer compared to team sports participants, and this may have contributed to this result. Hence, this result should be interpreted with caution. Furthermore, this result should inform practitioners to pay closer attention to athletes who compete in individual sports. For example, the COVID-19 pandemic lockdown is a

peculiar situation in which athletes had to be in isolation, away from their sport without any certainty of resumption or any form of real social support from relatives and friends. It might have led to feelings of sadness and hopelessness in some individual sports athletes. For this reason, coaches and the other staff who work with individual sports athletes should regularly keep in touch with the athletes using online interventions during the pandemic lockdown to help them have a sense of belonging. Further research should focus on determining, by comparing different sports, the highest prevalence of psychological distress.

Our data showed that athletic identity and category of sports participation predict, to a certain extent, the level of psychological distress athletes experience during the COVID-19 pandemic lockdown. These findings may have important implications for practitioners, coaches, and athletes. A number of studies have suggested that individual sports athletes experience anxiety and psychological distress more than team sports athletes (Pluhar et al., 2019). With regards to athletic identity, it is important to note that athletes may reduce their connection with the athletic role as a means of protecting their self-image (Brewer et al., 2010). When some athletes begin to divest or reduce their athletic identity during a pandemic, it may be a sign that they are experiencing psychological distress. However, this might not be the case for other athletes. Nevertheless, it demands some level of awareness from coaches and sports psychologists. Hence, athletic

identity should be considered not as the cause of psychological distress but as a potential predictor of psychological distress during pandemic lockdowns. Sports federations in Nigeria should employ sports psychologists who can support athletes in readjusting their goals and adapting to changing circumstances like the coronavirus pandemic lockdown, using accessible online interventions. More research is needed to understand the interaction between athletic identity and psychological distress.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Department of Human Kinetics and Health Education. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

CU and CA wrote the Introduction, discussion and conclusions. Data collection and analysis was mainly done by CU. The authors approved the submitted version.

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Using Slow-Paced Breathing to Foster Endurance, Well-Being, and Sleep Quality in Athletes During the COVID-19 Pandemic

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The coronavirus disease 2019 (COVID-19) has been causing major disruptions in the sporting world. Negative physiological and psychological effects on athletes have been reported, such as respiratory issues and increased stress. Therefore, it is timely to support this population by presenting cost-effective and accessible intervention techniques to reduce this impact. Slow-paced breathing (SPB) has the potential to counteract many of the detrimental effects of COVID-19 that can directly affect sports performance. In this article, we present and justify the use of SPB in athletes by focusing on three key outcomes, namely aerobic endurance performance, emotional well-being, and sleep quality. We examine the physiological mechanisms that underpin these three outcomes and review literature showing that SPB can activate anti-inflammatory pathways, increase lung capacity and, in turn, improve aerobic endurance, emotional well-being, and sleep quality. We conclude that interventions using SPB can have preventive and rehabilitative properties for athletes. Future studies should empirically test the potential of SPB to help this specific population.

Keywords: HRV, cardiac vagal activity, cholinergic anti-inflammatory pathway, cytokine storm, mental health, lung inflammation, biofeedback

INTRODUCTION

The global outbreak of the coronavirus disease 2019 (COVID-19) in March 2020 (WHO, 2020) is having a major negative impact on the physiological and psychological health of individuals and society in general (Brooks et al., 2020; Fu et al., 2020; Mohanty et al., 2020). Physiological effects range from dyspnea (Carfi et al., 2020) to acute myocardial injury (Zheng et al., 2020) whilst negative psychological effects include impairments in well-being and mental health (Hull et al., 2020). These negative effects are of concern in professional sport because they are likely to be detrimental to athletic performance, thus it is important to ensure that athletes are receiving the appropriate support during the outbreak (Hull et al., 2020). Accordingly, the aim of this article is to propose the use of slow-paced breathing (SPB) in athletes to counteract the negative physiological and psychological impacts of COVID-19.

The majority of symptomatic patients have mild flu-like symptoms. However, the physiological effects associated with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections

can evolve into pulmonary embolism, pulmonary fibrosis, acute myocardial injury, and chronic damage to the cardiovascular system (Faggiano et al., 2020; Zheng et al., 2020; McDonald, 2021; Raman et al., 2021). Little is known about the long-term sequelae of COVID-19 as a result of these complications. A study of 147 symptomatic COVID-19 patients showed that only 18 (12.6%) were completely free of any COVID-19-related symptoms around 2 months following symptom onset (Carfi et al., 2020). In another study, almost half of recovered patients reported at least one unresolved symptom related to COVID-19 (Klein et al., 2021). Aside from the impairment of certain physiological functions, other negative economic, social, and psychological consequences can be observed, such as infection fears, financial loss, frustration, decreased mood, and post-traumatic stress symptoms (Brooks et al., 2020; Huang and Zhao, 2020). In general, mental health issues have been common during the COVID-19 outbreak (Huang and Zhao, 2020; Shi et al., 2020). In line with this, 44.1% of patients recovering from COVID-19 reported worsened quality of life around 2 months following symptom onset (Carfi et al., 2020).

Although there is no empirical evidence on the prevalence or impact of COVID-19 on physiological processes in athletes to date, the potential for COVID-19 to impair performance is highly concerning for professional athletes (Kim et al., 2020). Literature on COVID-19 has raised concerns that athletes may be more susceptible to viral respiratory tract infection due to vigorous exercise (Hull et al., 2020). Regarding psychological issues, young people—a demographic that applies to most athletes—represent a high-risk group for mental illness in the COVID-19 pandemic (Huang and Zhao, 2020; Shi et al., 2020). The potential mid- to long-term sequelae due to the infection caused by the SARS-CoV-2, the postponement of major sports events such as the Olympic Games in Tokyo, and social distancing may constitute major health- and career-related stressors for athletes (Hull et al., 2020). These stressors negatively affect outcomes at different levels, for instance endurance, mood, and sleep quality (Mon-López et al., 2020). Decreased aerobic endurance and emotional well-being can be decisive in competitive situations, especially when athletes strive to achieve peak performance under pressure. However, there is a lack of interventions specific to the context of sports within a pandemic period that (1) target both physiological and psychological issues and (2) can easily be implemented into daily life. It is timely to develop strategies to counteract the negative impact of COVID-19 in sports and support athletes' performance and mental health.

In this perspective article, we propose that SPB is an intervention technique that can have preventive and rehabilitative effects on certain sports-relevant outcomes that are impaired by COVID-19, namely aerobic endurance, emotional well-being, and sleep quality. In the following subsections, we (1) review literature on the effect of SPB on the psychophysiological processes that are negatively affected by COVID-19, and which are especially relevant for the aforementioned outcomes, and (2) outline the working mechanisms of SPB that may underpin these effects. Regarding preventive effects, we argue that SPB may contribute to less mid- to long-term physiological sequelae in athletes when they are eventually infected with

SARS-CoV-2. This reduction of sequelae is thought to occur because of the health-promoting effects of SPB, which can strengthen psychophysiological processes involved in aerobic endurance performance, emotional well-being, and sleep quality. Regarding rehabilitative effects, we argue that SPB may reduce the detrimental effects of COVID-19 on sports performance, thus potentially shortening the length of the recovery period.

SLOW-PACED BREATHING

Slow-paced breathing is a breathing technique that aims to slow down the inhalation and exhalation phases to a controlled pace that is determined by a visual, auditory, or kinesthetic pacer (Laborde et al., 2019a). Whereas spontaneous breathing usually comprises between 12 and 20 cycles per minute (cpm) in adults (Tortora and Derrickson, 2014), SPB reduces the breathing pace to around 6 cpm (Lehrer and Gevirtz, 2014). The mechanisms underlying the positive physiological effects of SPB are the following: Firstly, it enhances respiratory sinus arrhythmia, i. e., the increase and decrease in heart rate concomitant to, respectively, inhalation and exhalation (Lehrer and Gevirtz, 2014; Shaffer and Meehan, 2020). Secondly, it enhances baroreflex functioning, combining respiratory frequency to the intrinsic frequency of the baroreflex, which is also 6 cpm (Lehrer and Gevirtz, 2014). Finally, it enhances vagal afferents within the inhalation phase via stretching of the pulmonary afferents (Noble and Hochman, 2019) and enhances vagal efferents in both the short and long term (Laborde et al., 2019a). Importantly, the vagus nerve seems to underlie the range of physiological effects influenced by SPB (Bernardi et al., 2001; Gerritsen and Band, 2018; Mather and Thayer, 2018; Shaffer and Meehan, 2020).

Slow-paced breathing has already been shown to have positive effects on both physiological and psychological levels (Lehrer et al., 2020). In athletes, interventions that slow breathing rate (i.e., through biofeedback or SPB) can improve emotional well-being (Mather and Thayer, 2018; Laborde et al., 2019a; Lehrer et al., 2020), improve sleep quality (Laborde et al., 2019a), and positively influence athletic performance both objectively and subjectively (Jiménez Morgan and Molina Mora, 2017). In the following subsections, we review current literature the sports-relevant impairments caused by SARS-CoV-2 that may be counteracted by SPB and summarise these findings in **Table 1**.

Affected Processes Linked to Cardiac Vagal Activity Modulation

Symptomatic COVID-19 patients can develop Acute Respiratory Distress Syndrome (ARDS). ARDS is characterized by a strong immune response that involves the release of high levels of various pro-inflammatory cytokines in the lungs, a phenomenon known as cytokine storm or hyperinflammation (Bonaz et al., 2020; Guo et al., 2020). Hyperinflammation may be caused by the cytopathic effect mediated by SARS-CoV-2 expressing the binding spike-like surface projections for the angiotensin-converting enzyme 2 (ACE2) receptor. This virus enters the target organ cell by binding its spikes to ACE2, a membrane-bound aminopeptidase that is highly expressed in the heart

TABLE 1 | Summary of studies with slow-paced breathing that target variables that are relevant in the context of the COVID-19 pandemic.

Study	Relevant dependent variable	Relevant findings with effect sizes ¹	Biofeedback	Target population	Sample size
Bernardi et al., 2001	Hypoxia, hypercapnia, and baroreflex sensitivity	SPB reduced the chemoreflex response to both hypoxia and hypercapnia	No	Healthy adults	15
Bernardi et al., 1998	Oxygen saturation and exercise performance	SPB reduced dyspnea and improved both resting pulmonary gas exchange and exercise performance	No	Chronic heart failure patients and healthy adults	61
Bilo et al., 2012	Ventilation efficiency for oxygen	SPB increased blood oxygenation and reduced systemic and pulmonary arterial pressure	No	Healthy adults	Experiment 1: 39; Experiment 2: 28
Laborde et al., 2019a	SSQ and CVA	SPB increased subjective sleep quality ($d = 0.51$) and increased overnight-CVA ($d = 0.68$) as well as morning-CVA ($d = 0.42$)	No	Healthy adults	64
Laborde et al., 2019b	Adaptation to psychological stress after physical exertion and CVA	SPB led to better Stroop interference accuracy ($\eta^2 = 0.170$) after physical exertion	No	Young adults	Experiment 1: 60; Experiment 2: 60
Laborde et al., 2016	CVA	CVA was higher during SPB compared to control ($d = 0.35$)	No	Adolescents with intellectual disability	17
Paul and Garg, 2012	Anxiety, CVA, and sports performance	SPB reduced both trait and state anxiety, increased CVA (HF), and increased sports performance (dribbling, shooting, and passing)	Yes	Basketball players	30
Pusenjak et al., 2015	Self regulation (heart rate, galvanic skin response, and coherence)	HR during stress tasks was better in SPB group than control.	Yes	Athletes	39
Wells et al., 2012	CVA and stress reaction	SPB after stressor increased HF ($\eta^2 = 0.122$)	Yes	Trained musicians	45

Notes. ¹Wherever reported. CVA, cardiac vagal activity; SPB, Slow-paced breathing; SSQ, Subjective sleep quality; HRV, Heart rate variability; and HF, High frequency.

and lungs. The inhibition of the ACE2 function contributes to hyperinflammation (Fudim et al., 2020). This hyperinflammation can lead to apoptosis of epithelial cells as well as to vascular leakage, which results in ARDS (Martin et al., 2005). The interaction of SARS-CoV-2 with ACE2 may also lead to chronic damage to the cardiovascular system (Kaniusas et al., 2020; Zheng et al., 2020).

It has been hypothesized that hyperinflammation and the consequent worsening of a patient's health status can be reduced or even prevented by specifically targeting the cholinergic anti-inflammatory pathway (Bonaz et al., 2020). Pro-inflammatory cytokines activate the afferent fibers of the vagus nerve, the major nerve of the parasympathetic nervous system. The afferent vagal fibers transport inflammatory information to the nucleus of the solitary tract, which enables the detection of the inflammatory process. The neurons of the nucleus of the solitary tract activate the dorsal motor nucleus of the vagus nerve, whose efferent fibers trigger the cholinergic anti-inflammatory pathway (Pavlov et al., 2003; Kaniusas et al., 2020). The cholinergic anti-inflammatory response is characterized by the activity of acetylcholine, which is secreted by T-cells when they identify macrophages or other cytokine-producing cells (Kaniusas et al., 2020). Acetylcholine

binds to the acetylcholine surface receptors of macrophages, which inhibits the release of inflammatory mediators by these macrophages and leads to the suppression of pro-inflammatory cytokines (Kaniusas et al., 2020).

To summarize, the vagus nerve modulates the immune response to inflammatory processes in the body by means of the cholinergic anti-inflammatory pathway, which counteracts the cytokine storm caused by ARDS (Kaniusas et al., 2020). In support of this, a meta-analysis showed that heart rate variability (HRV) indices of cardiac vagal activity (CVA)—the activity of the vagus nerve regulating cardiac functioning—are negatively associated with markers of inflammation (Williams et al., 2019). This finding suggests that CVA serves as an indirect marker of the activity of the neurophysiological function responsible for adaptively regulating inflammatory processes in humans (Williams et al., 2019). Consequently, increasing CVA can lead to increased anti-inflammatory effects, which reduces the severity of COVID-19.

Slow-paced breathing has already been shown to enhance CVA (Wells et al., 2012; Laborde et al., 2019a; Lehrer et al., 2020), with evidence existing for acute (Laborde et al., 2016; You et al., 2021), and chronic (Laborde et al., 2019a) increases in

CVA. In athletes, SPB acutely increased CVA even after one single SPB session (You et al., 2021). CVA has been used as a biofeedback marker for SPB training in the applied field (Lehrer and Gevirtz, 2014; Shaffer and Meehan, 2020). A recent meta-analysis showed that SPB combined with HRV biofeedback has the largest effect sizes for athletic performance in general (Jiménez Morgan and Molina Mora, 2017; Lehrer et al., 2020; Pagaduan et al., 2020), and another with non-athletes revealed that SPB with HRV biofeedback reduced self-reported acute stress and anxiety with large effect size (Goessl et al., 2017). Three theories, namely the neurovisceral integration model (Thayer et al., 2009), the polyvagal theory (Porges, 2007), and the vagal tank theory (Laborde et al., 2018b), highlight the role of CVA as a marker of the effectiveness of self-regulatory processes and health-related autonomic regulation. SPB, with or without biofeedback, has shown to increase adaptive self-regulation, for instance inhibition (Laborde et al., 2019a), and to counteract self-regulation failure, by lowering stress (Laborde et al., 2016) and anxiety (Paul and Garg, 2012; Wells et al., 2012), including competitive anxiety (Pusenjak et al., 2015). Consequently, SPB is thought to strengthen the connection between brain networks involved in emotion regulation (Mather and Thayer, 2018), thus contributing to increased emotional well-being. In general, the main mechanisms of action underlying the physiological and psychological effects of SPB are expected to derive from this influence of SPB on CVA, as already discussed (Lehrer and Gevirtz, 2014; Jiménez Morgan and Molina Mora, 2017). As increased CVA may prevent cytokine release syndrome (Huston and Tracey, 2011) and has been positively associated with both athletic performance (Buchheit, 2014; Bellenger et al., 2016; Jiménez Morgan and Molina Mora, 2017; Lehrer et al., 2020; Pagaduan et al., 2020) and emotional well-being (Mather and Thayer, 2018), we argue that CVA mediates the benefits of SPB on the sports-relevant outcomes that can be impaired by COVID-19 which we describe in this article.

Affected Processes via Lung Function Modulation

Respiratory issues are among the most common concerns related to COVID-19 and they can occur in the form of diffuse alveolar damage, severe hypoxemia, interstitial pneumonia, or increased pulmonary embolism (Faggiano et al., 2020; Kaniusas et al., 2020; Mohanty et al., 2020). Dyspnea has been found to be one of the most prevalent manifestations to persist in patients following recovery from symptomatic COVID-19, with most patients reporting symptoms for as long as two (Carfi et al., 2020; Rodriguez-Morales et al., 2020; Raman et al., 2021) to 3 months (Arnold et al., 2020; Garrigues et al., 2020; Wong et al., 2020) after discharge from hospital. As previously described, SARS-CoV-2 targets ACE2 receptors, which are highly expressed in the lungs. The virus then invades alveolar epithelial cells, resulting in the aforementioned respiratory symptoms (Turner et al., 2004; Zheng et al., 2020). Indeed, pulmonary fibrosis, a scarring of the lung tissue that most commonly presents as dyspnea, has been found three months after onset of COVID-19 (Zha et al., 2020; Willi et al., 2021). Given that restrictive ventilator defects

caused by the pulmonary fibrosis can substantially affect patients' physical abilities in the recovery stage, early rehabilitation seems particularly important (Yu et al., 2020).

We propose that SPB is an effective technique to improve lung function for the purpose of both prevention and rehabilitation. The effects of SPB on lung function are explained by means of the biomechanics of lung ventilation, which is strictly related to blood oxygen, carbon dioxide, and pH homeostasis (Russo et al., 2017). SPB leads to lower respiratory rate and increased tidal volume (Bernardi et al., 2001; Russo et al., 2017). Decreasing respiratory rate and increasing tidal volume improves ventilation efficiency by reducing alveolar dead space, thus improving oxygen saturation (Bilo et al., 2012). SPB has been shown to represent the optimal breathing rate for improving alveolar ventilation and reducing dead space, which in turn increased general exercise performance in a study of chronic heart failure patients (Bernardi et al., 1998). Because of the potential of SPB to improve oxygen saturation in different populations, we argue that SPB may help limit the impact of the shortness of breath caused by pulmonary fibrosis, thus enhancing aerobic endurance performance during exercise.

Effects on Sleep Quality

An array of recent studies have shown that the COVID-19 pandemic has a detrimental impact on sleep quality, with low sleep quality leading to higher daily dysfunctions (Cellini et al., 2020; Fu et al., 2020; Salehinejad et al., 2020; Targa et al., 2020). In general, the changes in social and work-related schedules as a result of COVID-19-related restrictions lead to alterations in sleep patterns and individuals' circadian rhythms (Targa et al., 2020), however, the effects of these changes in athletes specifically is still unknown. The cancelation or postponement of competitions, for instance the Olympic Games in Tokyo (Olympic Games, 2020), may also impair professional athletes' sleep quality due to the inherent uncertainty and disruption of medium- to long-term goals. As sleep restriction can negatively affect athletic performance, cognitive function, and mood (Fullagar et al., 2015), research into the impact of the COVID-19-pandemic restrictions on athletes' sleep quality is warranted.

Due to its restorative effects on the immune and endocrine systems (Frank and Benington, 2006), sleep is critical for professional athletes during the COVID-19 pandemic (Bonaz et al., 2020). Sleep disturbance impairs immunity via activation of the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system (Peake et al., 2017). A nocturnal sleep pattern has been shown to prime the immune system to challenge infections challenge and enhance immune-surveillance. When sleep is disrupted, the activity of T helper 1 cytokines such as interferon- γ , which provide important protection against intracellular viral and bacterial change, tends to decrease, whereas the activity of T helper 2 cytokines such as interleukin-10 tends to increase (Irwin, 2015). Over time, the decreased activity of T helper 1 cytokines can lead to a detrimental host defense, which is also characterized by an increase in the plasma inflammation markers C-reactive protein and interleukin 6 (Peake et al., 2017). Studies have demonstrated the detrimental effects of low sleep quality on immunity by, for example, showing a decreased anti-hepatitis

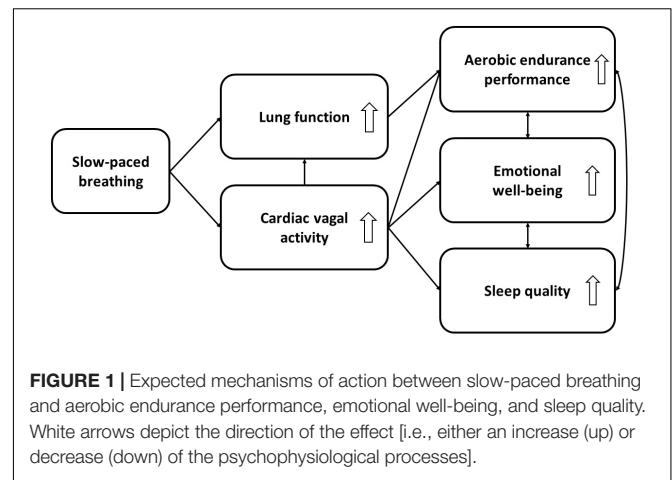
antibody response after hepatitis-B vaccination (Prather et al., 2012), and an increased chance of developing a common cold (Prather et al., 2015).

To date, few published studies have investigated the effect of SPB on sleep quality (Tsai et al., 2015; Laborde et al., 2019a). One, an intervention study with self-reported insomniacs, showed improved markers of sleep quality such as sleep efficiency when participants practiced SPB for 20 min before going to sleep, although vagally-mediated HRV parameters did not differ from spontaneous breathing (Tsai et al., 2015). Another study showed that, following a 30-day SPB intervention, subjective sleep quality was higher in the SPB group when compared to a control group, with this result being mediated by increased CVA (Laborde et al., 2019a). Although more research on the effects of SPB on sleep quality is needed, these initial findings point toward the potential of SPB for improving sleep quality. We argue that increased sleep quality, along with increased CVA, will improve immunity in athletes, thus contributing to increase aerobic endurance and emotional well-being.

Considerations for Slow-Paced Breathing Interventions

Given the potential benefits of SPB on the aforementioned mechanisms and outcomes, appropriately conducted intervention studies are of critical importance in order to test the psychophysiological effects of SPB on athletes. Ideally, an implementation of an SPB intervention during a COVID-19-pandemic adheres to at least three key principles: (1) it is delivered in a “COVID-secure” manner, (2) it is easy to incorporate into the individual’s daily routine, and (3) it is cost-effective. One way to realize all three of these principles is through a smartphone-guided breathing application. Athletes could be educated through a virtual workshop to learn the correct breathing technique prior to downloading a related smartphone application. Smartphone applications that display and time the duration of the in-hale and exhale within an SPB exercise have been shown to be effective in increasing CVA (Laborde et al., 2019a), whilst applications more generally are also useful for increasing the accessibility of mental skills training for athletes (Rist and Pearce, 2017). Certainly, smartphone applications can overcome many of the barriers that may have prevented in-person interventions from taking place, such as the current social and travel restrictions as well as social distancing rules. Of the many methods to enhance CVA (Fatisson and Oswald, 2016; Laborde et al., 2018a), for instance transcutaneous vagus nerve stimulation (Borges et al., 2019, 2020, 2021), or meditation with mindfulness training (Garland et al., 2014), SPB offers a simple, easy-to-implement, and beneficial intervention technique with both psychological and physiological outcomes for athletes that can be delivered in lockdown or isolation scenarios.

Previous work has found that an effective way to integrate SPB into one’s daily routine is to perform the exercise before going to sleep (Laborde et al., 2019a). This daily ‘event’ can represent a simple prompt by which to remember to complete the SPB session, whilst it is also usually a quiet time of the day. It is particularly suitable when considering that SPB may acutely increase sleep quality (Laborde et al., 2019a). Interestingly,



there is considerable variation in the implementation of SPB in research. For instance, it has been performed with or without biofeedback or a resonance assessment, and convenient protocols can be found in literature (Lehrer et al., 2000; Shaffer and Meehan, 2020). We recommend a daily SPB session of 15 minutes, breathing at a rate of 6 cpm with a slightly longer exhalation (through pursed lips) than inhalation (through the nose). Prolonged exhalation has been shown to contribute to larger fluctuations in beat-to-beat heart rate compared to prolonged inhalation and, therefore, to higher CVA (Strauss-Blasche et al., 2000; Allen and Friedman, 2012; Laborde et al., 2016, 2019a). Slower breathing can be difficult for some individuals, which may lead to hyperventilation and expelling excessive amounts of carbon dioxide (Shaffer and Meehan, 2020). In such cases, the participants should be instructed to take shallower and smoother breaths whenever they feel faint or that their heart is beating too hard (Shaffer and Meehan, 2020). Alternatively, SPB may be contraindicated for athletes whose overbreathing compensates for increased acidity in the blood. For these individuals, SPB may increase CO₂ levels in the blood and dangerously increase acidosis (Khazan, 2013; Shaffer and Meehan, 2020).

Future studies on the effects of SPB on the variables discussed here should perform SPB either within a single testing session (Laborde et al., 2019b; You et al., 2021) or following a number of daily sessions, for instance over four to 8 weeks (Schumann et al., 2019; Laborde et al., 2019a). In both cases, the variables of interest should be measured before and directly after the intervention. If the aim of the respective study is to investigate mid-term effects, then measurements should also be made after a number of weeks. A long side the SPB condition, the prospective study should have at least one control condition that involves participants performing a comparable task, which can be using social media or performing SPB with a frequency within the range of spontaneous breathing, i.e., between 12 and 20 cpm. Previous research investigating SPB shown effect sizes of $d = 0.51$ (subjective sleep quality) and partial $\eta^2 = 0.20$ (for CVA) when compared with a control condition (Laborde et al., 2019a), equivalent to medium and large effects, respectively, with a sample size of 64 participants (Cohen, 1988).

DISCUSSION

In this perspective article, we have discussed the potential of using SPB to strengthen psychophysiological processes that can be impaired by COVID-19, thus counteracting its negative impact on sports performance. We have focused on three variables that are particularly important for sports performance, namely aerobic endurance performance, emotional well-being, and sleep quality. The processes and possible mechanisms of action discussed here are depicted in **Figure 1**.

To summarize, we expect the following mechanisms of action to underpin the positive effects of SPB on aerobic endurance performance: Firstly, SPB enhances CVA, which is an index of anti-inflammatory effects regulated by the activity of the vagus nerve (Williams et al., 2019). Secondly, in parallel to the beneficial effects of CVA on lung function, SPB improves oxygen saturation, thus enhancing lung function and limiting the effects of dyspnea caused by COVID-19 (Bilo et al., 2012; Russo et al., 2017). Thirdly, sleep quality, which is increased as a result of the positive effect of SPB on CVA (Laborde et al., 2019a), improves immunity (Frank and Benington, 2006), thus helping the body to resist the COVID-19 infection (Targa et al., 2020). A stronger general anti-inflammatory function, coupled with greater oxygen saturation and immunity, may contribute to increased aerobic endurance performance. Future empirical research that seeks to test these mechanisms is strongly recommended as no such studies currently exist. Regarding emotional well-being, SPB can increase CVA and potentially emotional well-being. CVA is positively associated with emotion regulation (Thayer et al., 2009; Mather and Thayer, 2018), which may explain the role of SPB in reducing stress and anxiety, thus increasing emotional well-being (Goessl et al., 2017). Additionally, SPB promotes emotional well-being through improving sleep quality, as sleep positively affects mood (Fullagar et al., 2015).

Understanding the aforementioned mechanisms of action underlying SPB enables the generation of preventive and rehabilitative intervention ideas for professional athletes. The target group for SPB as a preventive measure consists of athletes without any COVID-19 infection history. SPB for this group is expected to serve a protective function, as the COVID-19-relevant physiological processes may be optimized by such an intervention. Thus, athletes without any COVID-19 history will be less susceptible to a COVID-19 infection, or will have a reduced likelihood of presenting complications in the event of a future infection. Future research should investigate the effects of SPB on COVID-19 or further diseases that cause respiratory syndromes. Regarding rehabilitative effects, SPB is expected to

be effective in athletes who have already been infected. As the physiological processes that are relevant for sports performance are thought to be optimized, SPB may have the potential to speed up the recovery process, thus enabling the athletes to return to training more rapidly. Future studies should investigate this hypothesis in athletes with a medical history of COVID-19. In general, the effectiveness of both preventive and rehabilitative approaches should be examined.

Aside of testing both preventive and rehabilitative approaches, the mechanisms described in this article enable future research to test further new hypotheses. Firstly, intervention studies of SPB in athletes should be conducted to examine the benefits of this technique as proposed here. Secondly, considering the societal impact of COVID-19, the model presented in **Figure 1** is able to accommodate additional variables derived from future research or be transferred to other fields with different target groups. The general population, which usually has less optimal CVA (Rossi et al., 2014) and lung function (Stang et al., 2015) in comparison to athletes, may particularly benefit from SPB interventions and show greater improvements in these physiological outcomes.

CONCLUSION

Slow-paced breathing can activate anti-inflammatory pathways and increase lung capacity, which consequently increases aerobic endurance, emotional well-being, and sleep quality. Its cost-effectiveness and ease of use makes this technique a promising way to counteract the symptoms of COVID-19. Thus, SPB may become an essential part of the toolbox of sports psychologists in times of widespread restrictions, uncertainty, and possible performance decrements.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

UB and SL contributed to the conceptualization of the original draft. UB wrote the first draft. SL, BL, FJ, EM, and MW provided critical comments to improve the manuscript. All authors contributed to the article and approved the submitted version.

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Toward Improved Triadic Functioning: Exploring the Interactions and Adaptations of Coaches, Parents and Athletes in Professional Academy Soccer Through the Adversity of COVID-19

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On March 23rd, 2020, elite soccer academies in the UK closed in compliance with the government enforced lockdown intended to contain the COVID-19 pandemic. This forced parents, players, and coaches to reconsider how they interacted with, and supported, one another. The aims of the present study were (a) to explore the perceptions of players, parents, and coaches (i.e., the athletic triangle) regarding how they interacted and collaborated with one another during the COVID-19 pandemic to support wellbeing and performance, and; (b) to identify opportunities to enhance workings of those within the athletic triangle resulting from adaptations made following enforced lockdown. Using an interpretive description methodology, semi-structured interviews were conducted with five coaches, six players, and six parents from an English elite academy soccer club. Interviews were analyzed using thematic analysis. Findings highlighted (a) the importance of support and the different means of communication used between members of the athletic triangle to facilitate such support; (b) the increased understanding of each member of the athletic triangle, leading to enhanced relationships, and; (c) how members of the athletic triangle adapted practice to facilitate relationship development during the pandemic and beyond. The identification of these considerations has implications for coach and parent education initiatives to allow for optimal functioning of the athletic triangle as elite academy soccer clubs return from lockdown. These include (a) the importance of continued communication between coach, athlete and parent; (b) increasing understanding of each individual within the athletic triangle; and (c) utilizing key interpersonal and technological skills learnt during the lockdown to further facilitate engagement within the athletic triangle.

Keywords: academy, coaches, parents, players, collaboration, soccer

INTRODUCTION

On March 11th, 2020, the World Health Organization (WHO) declared the outbreak of COVID-19 a pandemic, meaning that the disease had spread worldwide. On the March 23rd, in response to the pandemic, the UK government introduced an initial three-week full-scale lockdown across the country. Guidelines stated that people would only be able to leave their home to shop for basic necessities, partake in one form of exercise a day, provide care for a vulnerable person, or to travel to and from essential work that could not be completed from home (Gov.UK, 2020).

On March 13th, the English Premier League and English Football League took the decision to suspend all domestic league and cup competitions, which also included the cessation of training for all clubs across the country (Premier League, 2020). Not only did this impact those at the first team level of soccer, both in the men and women's game (Clarkson et al., 2020), but it also affected the thousands of young people involved in academy soccer. As lockdown continued, the COVID-19 pandemic left players and their families, as well as coaches and support staff, having to adapt to prolonged periods of social distancing. This also meant daily face-to-face interactions between players, coaches, and parents were prevented.

Within talent development pathways, such as soccer academies, it is evident that coherence between key stakeholders (e.g., coaches, athletes, parents, etc.) is a key factor influencing effectiveness (Martindale et al., 2007; Henriksen, 2015). As Martindale et al. (2005) argued, clarity and consistency of message are needed between the key stakeholders of young athletes, specifically coaches and parents, if the child's potential is to be reached. Thus, strategies such as frequent communication and regular in-person interactions are often adopted within academies to share such messages. Unfortunately, the unprecedented situation presented by lockdown measures meant that those working within soccer academies suddenly and rapidly had to develop new ways of maintaining such clarity and consistency of message between coaches, parents, and players.

The nature and quality of interactions and relationships that develop between parents, coaches, and young people can have consequences not only in maintaining players' technical development, but also facilitating optimal psychological, social, and performance outcomes (Davis and Jowett, 2010; Brustad, 2011). For example, research examining parent and coach initiated motivational climates within youth sport indicated that both motivational climates were significantly related to children's psychological outcomes such as self-esteem, trait anxiety, and autonomous regulation, as well as sporting behavior (O'Rourke et al., 2014; Davies et al., 2016).

However, it is recognized that interactions between these individuals (i.e., the members of the 'athletic triangle'; Smith et al., 1989) can be complex (Knight et al., 2017). For example, Clarke and Harwood (2014) identified that for parents within elite academy soccer, negotiating the distribution of power and responsibility with their son's coach was a challenge, as was understanding what was expected of them. Such complexity is exacerbated as the requirements of parents and coaches,

and consequently the interactions that occur between parents, coaches, and players, differ depending upon player's age and stage of development (Wylleman and Lavalée, 2004). For instance, children may first enter soccer academies at the age of 8 or 9 years. At this age they are constantly playing, getting together and learning how to get along with their peers, however, they will still seek refuge with their parents if they feel insecure (Erikson, 1982). Parents of children within this age group take on a leadership role and are often highly involved in their child's life, both within and beyond sport (Fraser-Thomas et al., 2008). Moreover, children of this age, place great value upon their parents' guidance and support (Hoyle and Leff, 1997; Furusa et al., 2020) and thus during challenging times, such as the COVID-19 pandemic and associated lockdown, they are likely to be more heavily reliant upon their parents (Nickerson and Nagle, 2005).

In contrast, as children move into adolescence, they are looking to achieve more mature relationships with their peers, whilst also seeking independence from parents and older adults (Rice, 1998). At this stage, coaches begin to have more involvement over the child's sporting development (Bloom, 1985), with parents becoming less involved in the provision of sporting advice at this age (Knight et al., 2010). However, parents remain critical in their continued provision of emotional support, helping their child to manage obstacles and challenges, which are likely to be apparent during the COVID-19 pandemic (Holt and Dunn, 2004; Holt and Mitchell, 2006; Knight et al., 2010). The impact of government mandated behavior change requirements during COVID-19 comes at an important time for those children in late childhood and young adolescence (herein collectively referred to as players) who are experiencing profound psychological and socioemotional transformation (Orben et al., 2020; Urbina-Garcia, 2020). As players experience such psychological and transformational challenges, it is likely that the dynamic interplay between members of the athletic triangle would remain critical during lockdown.

Individuals within the athlete triangle can influence each other in numerous ways. Specifically, Sprecher et al. (2002) argued that network members can affect the relationship quality of the dyadic relationship through three different processes: opportunity, information, and support. Opportunity refers to the experiences or possibilities that one individual provides the dyad to initially meet, build, and then sustain their relationship. Information refers to the many different pieces of information that an individual can provide to the dyad. Support refers to how an individual may assist in providing care or understanding to a member or both members of the dyadic relationship. Applying this theory to understand the influence of parents on coach-athlete relationships, Jowett and Timson-Katchis (2005) highlighted the importance of parents in providing key information regarding nutrition, wellbeing, and other activities, as well as providing opportunities through financial backing and providing transport. However, the researchers also argued that parents could be more influential if they were given a chance to share more information, provide further opportunities to their child and coach, and were made more aware of the difficult transitions experienced through the development pathway. In contrast to daily interactions at academies, where

players and coaches communicate and players may then pass information on to their parents, during the pandemic, much of the interaction would have to occur between coaches and parents who would then distill this information to players. Therefore, it could be argued that during the pandemic, the importance of the quality of the relationship between parents and coaches was further enhanced as parent-coach interactions would not only play a key role in the maintenance and development of the coach-athlete relationship, but the continued holistic development of the player.

Existing literature examining parent-coach interactions within sport shows that positive interactions between coaches and parents are associated with superior experiences for young athletes (Wolfenden and Holt, 2005). For instance, there is evidence of higher enjoyment levels, reduced perceptions of pressure and anxiety, and smoother transitions (Wolfenden and Holt, 2005; Lauer et al., 2010; Knight and Holt, 2014). Findings have also shown that positive parent-coach interactions are beneficial in facilitating coaches' work with young athletes (Gould et al., 2008), as well as enhancing parents' involvement in their children's sporting lives (Knight and Gould, 2017). For instance, in their study examining parental involvement in youth tennis, Knight and Holt (2014) identified that optimal involvement is underpinned by parents seeking to understand and enhance their children's journey. Key to this was developing an understanding emotional climate, in which they demonstrated an understanding of their child and their child's sport. One of the key strategies to develop such understanding was through maintaining a strong parent-coach relationship, enabling parents to obtain more guidance from coaches.

However, research examining parental stressors within a youth soccer academy has identified that the quality of communication from coaches can be a key stressor for parents in trying to navigate their way through academy soccer (Harwood et al., 2010). Specifically, parents have indicated that they can feel 'excluded from the communication loop, unable to assist in their sons' development' (Harwood et al., 2010, p. 52). Furthermore, parents have highlighted that uncertainty regarding how to approach coaches can also be a cause for concern within academy soccer (Clarke and Harwood, 2014). Consequently, it appears that, while parent-coach communication is needed for optimal involvement from parents, such communication is not always forthcoming and, in fact, some coaches actively avoid contact with parents or limit their interactions with them (Knight and Gould, 2017).

Given the criticality of effective interactions between members of the athletic triangle, particularly communication, in enhancing not only players but also parents and coaches' experiences and wellbeing, understanding the impact of enforced social distancing on such interactions is important. Particularly, identifying strategies that can be used to maintain interactions when in-person engagement is not possible will not only provide pertinent insights regarding how to maintain relationships during this pandemic, but also provide insights that may be beneficial to enhance relationships once social distancing requirements are removed. As such, the aims of the present study were (a) to explore the perceptions of players, parents, and coaches (i.e., the athletic triangle) regarding how they interacted and collaborated

with one another during the COVID-19 pandemic to support wellbeing and performance, and; (b) to identify opportunities to enhance workings of those within the athletic triangle resulting from adaptations made following enforced lockdown.

MATERIALS AND METHODS

Methodological Approach

An Interpretive Description (ID; Thorne, 2016) methodology was employed for this study to gain insight into the way members of the athletic triangle have collaborated with one another during COVID-19, and to identify learning opportunities to facilitate effective relationships following the pandemic. Developed by Thorne et al. (1997), the purpose of ID is to understand complex disciplinary questions and generate new knowledge for use in applied research settings (Thorne, 2016). ID utilizes an inductive analytical approach to identify themes and patterns within participants' subjective perceptions and experiences but acknowledges that the researcher may possess prior knowledge in the area being explored which may influence data collection and analysis (Thorne, 2016). Therefore, ID was deemed appropriate for the current study for two reasons: (1) It sought to understand a complex question from the perspective of three different participant groups (i.e., parents, coaches, and players), and; (2) the study aimed to produce practical, applicable information intended to enhance collaborative working of those within the triad.

Consistent with a constructivist philosophy, ID recognizes the constructed and contextual nature of human experience whilst accepting that there can be shared realities across individuals (Thorne, 2016). With regards to its ontological orientation, ID is naturalistic, assuming that the development of knowledge results from the interaction between the researcher and the object being researched. Furthermore, due to the multiple realities that will be encountered, no *a priori* theory would be able to encompass such knowledge, and therefore, a theory must develop from or be grounded in the data. For this reason, this study does not claim to represent a definitive truth, but rather a 'tentative truth claim' (Thorne et al., 2004).

Participants

Participants were recruited from a category one elite soccer academy in England¹. Purposeful maximum variation sampling (Patton, 2002) was used to identify parents, players, and coaches across the academy who could provide insights into how they interacted and communicated during the COVID-19 lockdown. Specifically, the following criteria were applied: (a) a player within the under 9 to under 16 age groups; (b) a parent of a player within the under 9 to under 16 age groups and (c) full time coach within the under 9 to under 16 age groups. Overall, the sample consisted of 17 participants, of which there were five coaches, six parents, and six players. Coaches (all male) ranged in age from 26 to 42

¹Each academy across the English Premier League and the English Football League is ranked between 1 and 4 (one being the highest and four being the lowest) based on criteria including productivity rate, training facilities, coaching, education and welfare provisions.

years ($M = 34.4$) and had been coaching in academy soccer for an average of 7.4 years. Parents (three fathers and three mothers) ranged in age from 34 to 52 years ($M = 43.8$) and had been involved in academy soccer for an average of 6.3 years. Players ranged in age from 8 to 15 years ($M = 13$) and had been involved in academy soccer for an average of 5.8 years, (ranging from 2 to 8 years). Of note, the parents and players were each in dyads (i.e., each parent participant, was the parent of one of the player participants). Of the 17 participants, six were located within the foundation phase (FP: Under 9 (U9) to Under 12 (U12) and 11 within the youth development phase (YDP: Under 13 (U13) to Under 16 (U16)). To maintain anonymity, it was not possible to identify the specific age group of each participant. Rather participants were classified as early (E; first two years of the age group) or late (L; last two years of the age group) FP or YDP. Each participant was given a pseudonym, which is used throughout the manuscript. Further participant information is presented in **Table 1**.

Procedure

After gaining institutional ethical approval, emails containing a project information sheet were sent out to coaches and parents, inviting them to take part in the study. Players were recruited through communication with parents, who acted as gatekeepers, and following parental consent, provided assent to take part in the study. To prevent members of the academy being aware of who else participated in the study, interested participants were asked to email the lead author directly to organize a time for an interview. Direct correspondence via email between the lead author and each interested participant allowed a connection to be developed prior to the interview (Deakin and Wakefield, 2014), and confidentiality to be maintained. Interviews were arranged with participants at a time of their convenience, with player and parent interviews being scheduled separately. Previous research has indicated that the presence of parents during children's

interviews can impact on the amount of detail children provide regarding their experiences (Gardner and Randall, 2012), thus parents were asked to leave the room when their child was being interviewed, and vice versa. Before the interview, each participant was provided with an electronic informed consent and project information sheet. Parents provided consent for their child to take part in the study, whilst children provided assent. The parent who took part in the study was the parent that deemed themselves to have the most interaction with their son's lead coach. Participants were informed of the aims of the study and reminded their data would be treated confidentially.

Data Collection

Data was collected using semi-structured interviews that followed the guidelines recommended by Rubin and Rubin (2012). Due to government guidelines in place for the COVID-19 pandemic, interviews were carried out via video calling software such as Skype and Microsoft Teams. Existing literature has highlighted that the familiarity of being in one's own environment may lead participants to feel more comfortable in talking openly (Seitz, 2016). It has also been suggested that technical issues, such as a loss of connection, may cause a loss of rapport between researcher and participant (Seitz, 2016). With this in mind, the lead author ensured that as secure a connection as possible was established with each participant before commencing the interview, and interviews began with rapport-building. The interview guide was examined by the co-authors, and then piloted with a professional soccer academy coach to ensure that the questions asked were appropriate and pertinent to the research aims.

Prior to the start of the interview, participants were asked to complete a demographic form which gathered information on the participant's age and number of years they had been involved in academy soccer. Subsequently, the first part of the interview acted as a rapport-building period which was important for two reasons. Firstly, it was deemed necessary to establish a relationship with participants, and secondly, rapport can help relax the participants who may experience feelings of embarrassment or discomfort in being recorded (Hay-Gibson, 2009). To facilitate this, at the start of interviews with players, in order to make them feel comfortable talking, they were asked questions such as, "Which team do you support? and who is your favorite player and why?". Questions were asked to parents and coaches relating to their history as a sporting parent or coach. Following this, the bulk of the interview addressed three main topics relative to the study aims: (1) Participants experiences of the COVID-19 pandemic. For instance, parents were asked, "What have been the main challenges for you with regards to your son's development over the lockdown period?" (2) How have those within the athletic triangle collaborated during the pandemic. For instance, players were asked, "How have your coaches/parents been supporting you during the lockdown period?" (3) How the pandemic has impacted upon players' holistic development. For instance, coaches were asked, "What impact do you think the COVID-19 pandemic has had on the holistic development of the players within your age groups?". Follow up questions and probes were used to explore responses and experiences provided by participants and to facilitate the

TABLE 1 | Participant information.

Participant Number	Name	Role	Age Group
1	Liam	Coach	YDP-L
2	David	Coach	YDP-L
3	Oliver	Coach	FP - E
4	John	Parent	YDP-E
5	Daniel	Player	YDP-E
6	Rachel	Parent	YDP-L
7	Harry	Player	YDP-L
8	Charlotte	Parent	YDP-L
9	Andrew	Parent	YDP-L
10	Frank	Player	YDP-L
11	William	Player	YDP-E
12	Kyle	Parent	FP-E
13	Tom	Coach	YDP-E
14	Isaac	Player	FP-E
15	George	Coach	FP-L
16	Alice	Parent	FP-L
17	Zane	Player	FP-L

flow of the interview. Using this type of interviewing approach “assure[s] that you ask the questions to cover the overall topic and then pursue what you hear to get the depth, detail and richness you need” (Rubin and Rubin, 2012, p. 129). The final part of the interview allowed participants the opportunity to discuss any potential issues that arose during the interview or to ask any further questions they had.

The lead author conducted all the interviews and throughout the process of data collection documented personal reflections from the interviews and discussed progress of these with the co-authors. On average, parent interviews lasted 81 min (range was 60 min – 111 min), coach interviews lasted 64 min (range was 52 min – 115 min), and player interviews lasted 41 min (range was 32 min – 61 min).

Data Analysis

Interviews were audio-recorded, and then transcribed verbatim by the lead author with coaches and parents provided with a copy of their own transcript. Transcripts were not provided to ensure they were “true”. Rather, coach and parent participants were provided with the transcript because previous research has indicated that returning transcripts can have both affirming and cathartic outcomes among the participants interviewed (Forbat and Henderson, 2005). Moreover, by letting participants know at the start of the interview that they will be able to review their transcripts, we have learnt in previous studies that it can help to put participants at ease and increase the quality of information they share. Unfortunately, due to issues with confidentiality, transcripts were not provided to players as they would have had to be emailed to parents to be shared. Instead, players were provided with a brief overview of the main patterns found within the data.

Once interviews were transcribed, data were then transferred, sorted, and organized using NVivo software (NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 12, 2019). Transcribing the interviews facilitated the close reading and interpretative skills the researcher required to analyze the data (Lapadat and Lindsay, 1999). The interviews produced 306 pages of single-spaced text, or 177,815 words from the 17 participants.

In line with an ID methodology, an approach to analysis was utilized that would capture themes and patterns within the participants’ subjective perceptions and experiences (Thorne et al., 1997). There may be similarities between individuals’ accounts, which can be identified, and the authors sought to identify and interpret these similarities. Thematic analysis (TA) was used, which provides a theoretically flexible approach to analyzing qualitative data (Braun et al., 2016). TA focuses on identifying, analyzing, and interpreting patterns of meaning within the data and follows six phases: (a) familiarization with the data; (b) generating initial codes; (c) searching for themes; (d) reviewing themes; (e) defining and naming themes; (f) writing up the report (Braun et al., 2016). In following these six-phases, the analysis was a recursive process, where the lead author continually moved back and forth, through the phases as data collection and analysis progressed.

Before coding the data, transcripts were read through to allow for familiarization with the data and notes were made with

regards to anything that grabbed the lead author’s attention. Following this, using NVivo software, initial codes were identified from the data set that were of relevance to the research questions. In line with ID, it was acknowledged that the researcher’s theoretical and practical knowledge of working within an elite academy soccer club, including supporting the athletic triangle, would influence analysis (Hunt, 2009). Despite ID being a predominantly inductive and interpretative methodology, it recognizes that prior knowledge is available to the author, which in turn, can be used to guide data collection and initial analysis of the data.

Following initial coding, the process of theme development required the grouping of codes to identify ‘higher-level’ patterns that involved identifying ways of grouping codes together around a meaning or concept that they all shared. Where appropriate, codes were either removed (kept in a subfolder), conceptually expanded or reduced, or combined with other codes to create a potential descriptive theme. For example, the code, ‘recognizing the importance of sleep’ was deemed irrelevant to the research question, and did not combine with any other code, and was subsequently removed. Where appropriate, subthemes within descriptive themes were generated to identify notable, distinct patterns within a theme. For example, the two codes of ‘player ownership’ and ‘maintaining levels of independence’ were combined to make the sub-theme of ‘facilitating players’ independence’ that came under the descriptive theme of ‘Adapting practice to facilitate player and triad development during COVID-19 and beyond’.

Themes were then reviewed to ensure they formed a clear pattern, and that the proposed themes best reflected the meanings within the complete data set. At this point, data from the earlier stages of analysis were coded that may have been missed in accordance with these themes. The lead author then met with the co-authors to present the themes. The two co-authors acted as ‘critical friends’ (Smith and McGannon, 2018), allowing the lead author to engage in critical dialog and reflect upon and explore alternative explanations and interpretations in relation to the data. In line with a constructivist philosophy, that states different people may experience reality differently, engaging in conversation with the co-authors allowed the author to acknowledge that other and/or additional plausible interpretations of the data can exist (Smith and McGannon, 2018). Such discussions therefore encouraged the production of findings that reflected the data gathered, and so prompted *interpretive authority* (Thorne, 2016), enhancing the methodological rigor of the study. Once the themes had been finalized, the write-up of the study began.

RESULTS

During data collection and analysis, it became clear that, despite seeking to explore triadic relations, participants did not in fact spend much time working as a triad. Thus, the information provided regarding interactions across the triad was relatively limited. Rather, parents, coaches, and players instead discussed their interactions and working as dyads (i.e., parents and

players, players and coaches, coaches and parents, etc.) and offered perceptions of how individual members within the triad supported one another during the lockdown. As such, in the following sections, where triadic interactions were discussed these have been shared but in the majority of situations, the focus is on dyadic interactions or individual support. Further discussion of this, along with methodological challenges associated with examining triadic interactions, are provided in the discussion.

From the analysis, three main themes relating to adaptations made by parents, coaches, and players during the COVID-19 pandemic were identified from the data: 'Keeping everyone involved and supported', 'Increasing understanding of each other beyond soccer', and 'Adapting practice to facilitate player and triad development during COVID-19 and beyond'. These themes were considered to be recurrent across the dataset, although certain nuances were apparent in relation to the developmental age/stage of the players. Each theme contained sub-themes, which offer further insight into the experiences of interviewed participants.

"I Just Thought I Would Call You to See How You Are": Keeping Everyone Involved and Supported

This theme captures how those within the athletic triangle recognized the importance of maintaining communication throughout the containment measures of COVID-19. Members of the triangle, particularly parents and coaches, adapted their means of communication to ensure all other members received the support perceived as necessary during the lockdown. Specifically, three sub-themes emerged from the data: providing emotional support, the importance of interacting through various means of communication, and maintaining social connection to support wellbeing.

Providing Emotional Support

During lockdown, members of the athletic triangle provided support to one another to help players engage with those at the club. There was recognition from coaches and parents, that some players may become isolated and miss the chance to interact with others and engage with the remote coaching program being delivered by the club. One parent highlighted the joint effort of himself and the age group coach in reaching out to players who were drifting away from the group:

Others have sort of lent on me to be the sort of conduit between a lot of the boys in the group and pulling people together and identifying who is out on a limb or who isn't interacting and pulling them back into the group as quickly as we can. I think me and Oliver [coach] have worked together on that as well. (Kyle, parent, FP-E)

In contrast to those in the younger age group, within older age groups, coaches seemed to encourage players to take on this responsibility themselves. For instance, as well as engaging with players himself, one coach used players whom he believed were leaders within the group to contact others to make sure none of

the players from the squad were left out of any social activities or interactions:

What I did was engage with players in the group who I thought would be good social leaders... I asked one of the boys who is the admin in the group, and then I messaged the boy's parent and asked if I could pass his number on to him to get him to add him into the group... Before I passed the group on, he was engaging a lot more with them and chatting to people and meeting up with a couple which was good. (George, coach, FP-L)

It was apparent that it was not just the players that the coaches and parents were looking out for, but also one another:

I had a call from a parent about a week ago, and he just went, 'ah are you alright G, I just thought I would call you to see how you are?' When I answered the phone, and he said that, I was like "ah, I wasn't expecting that at all," but it is quite a nice thing really... they do value what you are doing for them and their child. (George, coach, FP-L)

Similarly, coaches sought to offer support to parents whom they perceived needed it:

I've still tried to keep some dialog going with parents who I feel it is beneficial for... so that particular lad in question, his mum will share what she's done... 'I went for a run, come back and feel brilliant, I can deal with those clowns at home now'. I think that's almost her having someone to bounce off of sometimes, to share what she's going through at home with the lads. (Liam, coach, YDP-L)

Overall, it seemed that by providing emotional support to each other, discussions about soccer became less prevalent. As a result, interactions that occurred throughout lockdown were perceived to be more personable, supportive, and thus allowed for more open communication between parents and coaches. One coach suggested, "when they feel comfortable to share how their weeks gone with you, I think there's a real open channel there now." (Liam, coach, YDP-L). Throughout the interviews it was apparent that this ongoing provision of emotional support brought parents and coaches closer together and was enhanced through the use of different means of communication (detailed in the next sub-theme).

The Importance of Interacting Through Various Means of Communication

Participants identified various means of communication to engage with and support other members of the athletic triangle in view of government restrictions regarding face-to-face meetings. The means of communication selected was informed by the objectives for the exchange, and the perceived needs and abilities of those involved. For example, the use of video calling allowed coaches, parents, and players to continue interacting and building relationships with one another, as one player explained:

With the zoom calls... it was obviously mainly about me and what I was doing but then it also gave the opportunity to speak to my mum and dad and be like 'how are you?' The first part of the meeting was about me but then it was like checking on the whole family and that everything was ok... I think that's good. It builds the relationship up in that parents can trust the coaches as

well, because they play such a big part in our lives so they're going to play a big part in their lives as well. (Daniel, player, YDP-E)

This highlights players' awareness of the importance of the relationship between their coach and parent. This awareness seemed to be more clearly apparent among players from the older age groups.

Parents described how the use of video calls allowed them to feel invested and valued in the player development process:

They had their end of season review . . . they had just a small little conversation saying right you're now going to go away, and we'll talk about some of your strengths and weaknesses. . . they had a scheduled meeting the week after where we were there as well. That was quite nice that all three of us were sat round the table. (John, parent, YDP-L)

As this quote also highlights, players in older age groups were provided with more responsibility over their development than those in younger age groups, as alluded to within the last theme, and the use of technology played an important part in encouraging this.

However, despite the majority of participants discussing the benefits of video calls, there was a realization from coaches that not all parents and players were able to use video calls due to time constraints and technical issues, "We've got some lads who haven't got Wi-Fi or their Wi-Fi is poor. We're having to communicate in different ways and be really resourceful and skilful in the ways that we're doing it." (Liam, coach, YDP-L). Therefore, alternative means of communication were also utilized:

I've tried to mix my communication up. I've done some texts, some phone calls, some voice notes, so when I'm texting the group, I'll do it that way as well. Some video messages as well just to try and change it up. (Oliver, coach, FP-E)

Furthermore, coaches realized that some parents were not understanding or forwarding on information to players. During the regular season, coaches would communicate information directly with players. However, the COVID-19 pandemic meant information was being communicated to players via parents. Barriers to communication included parents who worked shift patterns and were not contactable during the day, as well as issues regarding the native language of the parent. For instance, two coaches described having to translate messages before sending them to ensure key information was effectively transmitted to parents for whom English was not their first language:

There's a Danish guy. He's difficult in terms of having to communicate. I will write a message, and then I'll translate it and send it to him . . . I called him and said, 'are you ok me doing that [translating]?' I didn't want it to come across rude or condescending . . . He said he really liked it because, 'some of the words I don't understand, and you're helping me out because you are converting it into Danish'. (Oliver, coach, FP-E)

We've got lads from an Islamic background. Parents speak Arabic, and we're having to send literature out to them in Arabic now and getting translators to get it out to them because sometimes we will communicate via the lads . . . this will now not only help people who speak Arabic, it will help people who speak Italian,

for example. That initiative now has been put into our induction pack. (Liam, coach, YDP-L)

Adapting their means of communicating, due to the COVID-19 restrictions on face-to-face contact, highlighted coaches ongoing personal development as well as adaptations to policy within the organization.

Lastly, it became apparent that how participants interacted with each other differed depending on their age. For instance, players within the YDP-L took on the responsibility of organizing interactions and sessions themselves through phone calls and social platforms such as WhatsApp, "Phone calls, texts, social media, there are so many ways in which they are communicating with each other" (Andrew, parent, YDP-L). Whereas within the FP-E, where players may not have developed the ability to initiate communication, parents were required to help facilitate interactions with other players:

I'm mates with the dad and they got given a PS4, and I said, 'we've got to get the boys on FIFA and get them sorted', so I bought the kids a 3-month membership. I just wanted Isaac to do things with his best mates, and his best mates to interact with Isaac, that part was so important for us. (Kyle, parent, FP-E)

Maintaining Social Connection to Support Wellbeing

Reflecting on the start of lockdown, participants across all ages discussed initial concerns with maintaining connections with players. One coach explained, "the social corner² was the biggest concern. . . because the boys are kind of stuck away from each other, especially during the early lockdown period, and my biggest worry was that some wouldn't engage with others." (George, coach, FP-L). At the start of lockdown, in an attempt to support players as quickly as possible, coaches immediately looked to engage with players on a frequent basis. For some however, it became apparent that this sudden influx of support was too much:

At first there was just so many people involved. . . it was all good intentions, but there were just too many people. . . it just got too much and I just had to say in the end that's its actually really getting to him. . . I think that was just the way people were trying to work it out, because it was all new. No one knew what to do. (Charlotte, parent, YDP-L)

Through trial and error, reflection, and the triad communicating such concerns, coaches began to understand how to best work with players through lockdown and provide them with the support that they and parents perceived the players required.

Participants highlighted that, at times, players struggled being away from their teammates and the academy environment, "I've missed the team. Like, seeing my teammates, bonding and laughing and just being with them. I've also missed just training with people and because they're good players and they help me improve, I've missed that to be honest." (Frank, player, YDP-L). One parent raised concerns as to whether the potential

²The Football Association (FA) 4 Corner Model suggests that player development needs to be looked at from a technical, physical, psychological and social point of view.

lack of communication would prove difficult for players and the development of those relationships, upon returning to the academy, “I don’t know if that has carried on. Is he still talking to those now via whatever it is, snapchat or Instagram, or have those relationships in some way stopped? It might be sort of having to restart again.” (John, parent, YDP-L). Understanding these concerns, coaches provided activities to maintain contact including group training sessions, quizzes, and cook offs. Players recognized the benefits of such contact with regards to their wellbeing:

My mates have become my stress release now, and I think that’s been a big part of coping with it. I wouldn’t say I’ve not coped well, but I think sometimes when you’re in a mood, or you just want to be by yourself, your mates can cheer you up. (Daniel, player, YDP-E)

Despite missing their friends within the academy setting, players within the younger age groups enjoyed the extra time they got to spend with their parents, time normally delimited during a regular season, “It’s been a lot nicer to spend time with my family. . . normally we don’t get to spend that much time with each other. . .but it has made our relationship better.” (Isaac, player, FP-E).

Parents also referred to the benefits of the activities set out by coaches in attempting to maintain the social connection amongst players, “I think those zoom sessions with the yoga, and the ball mastery. . .he looked forward to doing them as he could see his friends and the coaches were there. . . so he liked it.” (Alice, parent, FP-L). Players within the older age groups also took ownership of connecting with their friends not just within soccer, but also with friends outside of the academy environment. Much of this engagement occurred on games consoles, which provided a space for all players to spend time with friends, independent from their parents and coaches, “I think having an Xbox and facetimeing my mates and speaking to them helps that I can still communicate with people.” (Daniel, player, YDP-E). Parents, who noted that they would typically try and limit their child’s use of gaming, discussed the benefits that this provided during the lockdown period, “He has that interaction, and we don’t stop that interaction because in this period of COVID, that’s good, because you can hear him laughing and talking to them and playing . . . so we’ve not tried to stop that.” (Andrew, parent, YDP-L).

The majority of participants highlighted that the space to connect provided by coaches and players would prove valuable in maintaining the cohesiveness of the team when players returned to training:

It has helped. Especially when we come back, it’s not like we haven’t seen each other for six- months, we’ve already seen each other through it, so it won’t be that much of a shock when we get back really. . . If we hadn’t seen each other in a long time, everyone might be a bit disjointed really. (Zane, player, FP-L)

In addition, one parent highlighted that through the athletic triangle regularly connecting, their child was able to adapt to the difficulties faced at the start of the pandemic. This led to effective future working amongst the triad, as well as increased levels of player wellbeing:

I remember the coaches saying, ‘look is he alright?’ . . . they’d noticed he wasn’t very happy. I said, ‘that is exactly how he is at the moment, and we’re really struggling with him. He’s moody, he’s hard to motivate, and he doesn’t really want to do anything’. They realized that as well, so we had that discussion. A week or two after that he started to get better and within a couple of weeks me and the coaches were just saying that he was a different boy. He’s motivated, he’s more positive, his mood had lifted, and since then he is just doing everything that he needs to be doing and enjoying it again. (Charlotte, parent, YDP-L)

To conclude, this theme illustrates how members of the athletic triangle used various means of communication to connect with and support each other during the lockdown period.

“Now They See Me as a Normal Person”: Increasing Understanding of Each Other Beyond Soccer

This theme captures how interaction with others in the athletic triangle during lockdown helped participants understand one another beyond just soccer. Specifically, two sub-themes emerged from the data: getting to know the person and awareness of roles and responsibilities.

Getting to Know the Person

Participants suggested that through interactions between the different members of the athletic triangle that they were able to gain a deeper understanding of the person in front of them, including aspects of their personality, home life, and interests outside of soccer:

It showed us a lot of character traits of some of the boys. Some of the players have surprised us . . . we’ve got to know the boys socially. . . you know the name of the dog, you know they’ve got two sisters, and you’re asking them how they are and how’s this going . . . you’ve found out a lot about the kids. (Tom, coach, YDP-E)

A consideration reinforced by one parent, who through her interactions with their son’s coach, stated:

They’ve learnt so much more about the boys individually because of lockdown, rather than just seeing them in their academy kit playing football. They feel they know them as different people now, and to me, that can only be a good thing. (Alice, parent, FP-L)

In attempting to understand why this pattern emerged amongst coaches, it was highlighted that time freed up during lockdown was more challenging to find within the pre-lockdown academy environment, “You don’t usually have lots of time for those little conversations, but they’re the most important bits, and we’ve had loads of time over the last few months.” (Tom, coach, YDP-E).

As a result of this increased understanding of individuals, participants believed such interactions during lockdown have served to enhance the relationship between the coach and player, as one player stated:

Where they’re calling us to see how we are, what we’ve done, how schoolwork is getting on . . . I think it’s helped with your

coaches; you've become closer. You understand each other better, when you communicate with them, you can speak to them more. (Daniel, player, YDP-E)

This was a view supported by one coach, who when asked about his relationship with players during the lockdown, remarked, "I've really made an effort to really get to know what he likes, what he doesn't like, what he's doing. Hopefully when we go back, because he's quite standoffish and withdrawn, I'm hoping we've got a bit more connection." (David, coach, YDP-L). One coach provided an example of how, through further questioning, he was able to gain a greater understanding of the home life of one of his players, "I thought, 'I've got to do a little bit of digging deeper here' . . . I found out that the parents worked nights, and they had been struggling to get in contact during the day because they'd been sleeping" (George, coach, FP-L). This in turn informed how coaches may best work with this individual moving forward:

"This boy is going to be hard to get hold of when he comes into your age group, but this is what I found worked and put those in place, and these are the reasons why he is going to be hard to get hold of'. I would have hated him to go into that age group, and then this new coach can't get hold of him, and then already they're off on a bad foot without understanding why. (George, coach, FP-L)

Interestingly, one player went as far as to state that were it not for the pandemic, he did not think his relationship with his new coach would have flourished to the extent that it has:

If we were still at [names club] we wouldn't have done that, because we would be at training . . . but I think we've done well over zoom to get to be able to know each other more before we go back into training. . . if you know them well, it will boost your confidence." (Zane, player, FP-L).

As a result of the interactions parents had to facilitate during the lockdown, coaches believed parents had also developed a greater understanding of them as people, not just solely someone who coaches their son:

It has been a lot more individualized and personalized. They've sort of seen us as people and not just their coach. . . we have families, we have the same stresses that you're having. . . it has changed a bit over the last few months. . . which I'm sure will have its benefits this year.

(Tom, coach, YDP-E)

This increased understanding was particularly notable among parents of younger age group children, where parents continued to play a more active role in their child's development. One coach believed that this understanding would lead to parents potentially changing how they behave and interact with their coach, "By them understanding that you are actually a human being, and that you have got feelings and emotions as well, that they will think about what they're doing before they do it." (George, Coach, FP-L). This development becomes increasingly important when considered alongside a quote from a parent with regards to the relationship some parents seem to have had with their coaches during the regular season:

They're scared because they think they're going to cut their son from the academy. Even if they've got a good or a genuine concern. . . Oh, I wouldn't say scared, but they don't know how to approach them. . . There are still parents in some age groups who haven't got the coach's number. They haven't got a clue. They don't know. They just drop them off, pick them up, and they're gone. (Andrew, parent, YDP-L)

Lastly, responses indicated that this period has raised coach's awareness of the importance of engaging with and understanding parents. In discussing the workings of the triad, one coach stated, "It's not just working with the individual player, it is understanding the parent values and the messages that are being reinforced at home. Having some level of understanding around them is so important to me." (Liam, coach, YDP-L). Supporting this, it was mentioned that the past few months have allowed coaches to develop that understanding, "you've got to know their parents and the importance of that, connecting with them on a sociable or a more personable level. I think there has been lots of learning to do around that." (Tom, coach, YDP-E). Players recognized how the enhanced interaction and understanding between their coach and parent had led to benefits within the coach-parent relationship, "For them [parents] it's also becoming confident in being able to talk to your coaches as well. I think that's important and I think that's been built over lockdown." (Zane, player, FP-L).

Overall, it became evident that the period in lockdown has provided parents and coaches with greater knowledge of one another, "it's probably the biggest thing for me that I've taken from the lockdown is gaining and forming better relationships with the first layer of the players family." (Oliver, coach, FP-E).

Awareness of Roles and Responsibilities

It became apparent during the pandemic that those within the athletic triangle were carrying out more roles than would usually be the case. Some coaches felt they were taking up the role of not just a coach, but also a friend and/or an educator. In contrast, parents started playing the role of a coach by facilitating soccer sessions and providing feedback to their son. Through this, participants felt they have become a lot more aware and understanding of the role that one another plays. One coach remarked:

Lots of parents have said to me 'I actually now understand how hard you work and how difficult it is to coach them throughout the weeks and months and giving them the right detail and understanding them.' It's helped with their understanding of how much work goes in for their boys. (Oliver, coach, FP-E)

Parents, particularly among younger age groups where they are more involved in supporting their child's sporting development, described how they sought to facilitate training with their son. Specifically, it was fathers who facilitated the technical, tactical, and physical aspects of training, "Watching the clip, going out and practice, and then when I've finished work, we can go and refine some of the things that from a technical perspective that he needed to work on." (Kyle, parent, FP-E). Players also commented on how parents, particularly fathers, had been helping them with their soccer objectives:

He told me to watch De Bruyne and his crossing technique, and then we would go to the park or something, and we would do it, and then he would be like, ‘what did you do well? and what do you need to work on?’. (Zane, player, FP-L)

Undertaking such roles has meant that fathers have become more informed and understanding of their son’s sporting development. In facilitating this, coaches played the role of an educator to both player and parent when communicating aspects of the training program during the lockdown, “We have to educate them as to why, even to kingdom come they might not still value it, but I think our jobs now is to help and support and educate, rather than be the enforcer” (Liam, coach, YDP-L). This quote highlights how the potential role of a coach has changed over time, and that the current pandemic has highlighted this. This increased understanding allowed parents to provide the necessary informational support, alongside the emotional support alluded to in the first theme, that was needed during the lockdown period:

When we’re explaining to the boys their new programs, they’re on the calls, and they’re supporting. . . then they’re also able to nudge their lad a bit because they are aware of the program. They have been quite supportive in getting the boys to do the stuff. (Tom, coach, YDP-E)

Similarly, one parent highlighted that having such knowledge about technical and physical training programs helped him to learn more about aspects of his son’s development. He believed this allowed all members of the athletic triangle to feel a part of the development process:

It’s been a huge advantage for me in this process. Being able to hear it and understand it, because Oliver won’t just talk about the successes, he will talk about the things you need to work on . . . the feedback triangle was complete. (Kyle, parent, FP-E)

Additionally, players believed that the increased involvement that parents have shown over the lockdown period would facilitate their parents understanding of the way they played the game, leading to more agreement across the athletic triangle. When asked if he believed that lockdown might have given his parent more of an idea about how he and his team play, one participant responded:

I think he’s [my dad] started to understand my playing style and that will help . . . if his opinion on something was different to mine, he might understand maybe how I would think of playing that ball would be different to his because of how my playing style is different or how [names club] have taught us differently. (Daniel, player, YDP-E)

Lastly, in line with the sub theme ‘facilitating player independence’, it became clear that players were undertaking the role of a coach within their own development during the lockdown as one coach stated, “they’ve understood and took ownership of what their needs are to develop and get better and they’ve gone about their own training.” (Oliver, coach, FP-E). One player described how, on the back of increased analysis sessions, he wanted to continue understanding and developing his skillsets, “they’re the main ones I want to carry on doing,

looking at previous games. . . analyzing what I did well and what I didn’t and just practicing it outside of [names club] as well.” (Zane, player, FP-L).

In summary, this theme highlights how increases in engagement amongst those within the athletic triangle, as highlighted in the first theme, have helped participants develop a greater understanding of others within the triad. Also, it emphasizes how interactions have led to an enhanced awareness of the roles one another plays and have subsequently adopted, which participants think will aid in the holistic development of the player as they progress through the academy.

“We Need to Move With the Times”: Adapting Practice to Facilitate Player and Triad Development During COVID-19 and Beyond

The last theme captures how lockdown led parents and coaches to provide an increased sense of independence within players. Furthermore, participants discussed how interactions during COVID-19 enhanced the interaction of the triad and the importance of learning from this when moving out of lockdown. Specifically, two sub-themes emerged from the data: facilitating players’ independence and enhancing the triad moving forward.

Facilitating Players’ Independence

Participants discussed how players were provided with opportunities to take ownership over their development and how they would look to continue to enhance independence within players post-lockdown.

Parents and coaches discussed how they looked to encourage independence within players, through providing them with greater ownership over their development through lockdown, “When we have done zoom sessions online, and ball mastery sessions, I would give a lot of ownership to them, getting them to show what they can come up with rather than me leading it.” (George, coach, FP-L). Another coach shared a similar example, “Tomorrow is a player-led session. So, the players have got to come to the session with a 1-min activity, and they will become the coach for 1 min.” (Oliver, coach, FP-E). Within the YDP, parents discussed how they were already allowing their son to take control over of their development, “I have less interaction now with Frank . . . we have to make him stand on his own two feet and find out himself what it is all about without me having to remind him all of the time” (Andrew, parent, YDP-L). Similarly, in talking about their son’s relationship with his coach, Rachel stated, “I feel like it’s his space . . . he is coping with it all. He tells me if he wants me to help him or dib in if you like . . . He’s old enough to do it all himself.” (Rachel, parent, YDP-L).

There were similar responses from parents who were committed to allowing their children to take ownership of particular elements at home:

I’m full-time [working], so he has to do his dinner himself, which he has never done before. He has learnt how to do beans on toast and things. . . he has learnt how to help himself independently . . . he’s just developed a lot of independence skills, and self-management, and he’s a lot happier. (Charlotte, parent, YDP-L)

Reflecting on his practice, one coach believed the opportunity for players to develop independence was not provided enough during the regular season:

We are a little bit guilty of that, especially in this environment, where we do absolutely everything for them. We schedule everything. We transport them, we email them, we call them, we text them, we put plans in place, we take them on tour . . . we do absolutely everything for them. (Tom, coach, YDP-E)

Another coach discussed how he will look to use some of ways he has worked during lockdown upon returning to the academy:

It's the way that we speak to them in terms of coaching engagement and coaching behavior. Not being so commanding with them. . . Do you know what, these boys have a lot of knowledge, and using things like question and answer and guided discovery and allowing them to solve problems a little bit more will help develop independence in terms of thinking. (George, coach, FP-L)

Comments from players supported the notion that they had become more independent with regards to their soccer development during the lockdown. As a result, this led to them making their own decisions, and taking more responsibility for their soccer development:

I woke up three times in a row at 6 o'clock to go up to the field when it wasn't boiling hot. They gave us responsibility to be like, 'you can manage it how you want. If you want to go out in the boiling heat, it's up to you, but if you want to make the effort to get up when it's still cool, you can do'. Instead of being like you've got to do your run between 11 and 1, it gave you the responsibility to do whatever you wanted. (Daniel, player, YDP-E)

This increased independence during lockdown enhanced players' levels of motivation with one player stating that this would impact their approach to their development post-lockdown, "I've got time to focus, and work on my own improvements. . . it's given me the motivation. . . when I go back, I want to be flying. . . it's given me more time and more thinking to make myself as good as I can be." (Frank, player, YDP-L).

Furthermore, through placing more ownership on players, as well as placing them into a variety of situations, participants described increases in players levels of confidence, as one coach described:

There was a boy in the last age group, and he would come on to the first call, and he wouldn't say a lot with a lot of people in there. You would speak to him and get like a couple of word answers. Then, it was in an analysis task, when he was presenting back some clips, and he was on fire. You couldn't get him to stop talking, and you could tell that he felt a lot more comfortable and confident doing it. (George, coach, FP-L)

This increase in confidence was also supported by one parent, who remarked, "His confidence has grown from that, confidence around talking on facetime. . . talking on zoom calls with no football. All those confidence levels have gone up." (Kyle, parent, FP-E). Subsequently, it was hoped that this developed independence and newfound confidence would continue as players returned to training following the lockdown, "I hope he's

able to box it and take it back into the training ground, but I suppose that's down to how the coach takes all of these learnings and brings them back into the training ground" (Kyle, parent, FP-E). A thought reinforced by one coach, who wanted to make sure this focus on player independence continued to be applied post-lockdown, "it's making sure that we're still autonomy supportive, and we're still allowing them to be independent when they come back in." (George, coach, FP-L).

Enhancing the Triad Moving Forward

Participants made reference to how the period in lockdown has given them time to reflect on how they might apply what has been learnt during COVID-19 to support workings within the triad post-lockdown. For instance, coaches discussed how utilizing new means of communication like video calls, as alluded to in the first theme, could act as a way of increasing parents' understanding of their son's development process. Participants referred to particular issues faced within the regular season when it came to reviews and parents evenings, "I remember driving there and you get a text from one of the parents saying, 'don't worry about putting your foot down to get here, they're running 45 min late' (John, parent, YDP-E). Making reference to such issues, coaches highlighted the practical benefits that using such means of communication would bring in the future:

I've been able to share screen with parents and the players and do their reports from home. I don't have to drag them to [names club] to have a 15-min meeting with them. So, I think, when its report night, instead of dragging them in, we can give them the option, 'do you want your report night over Zoom, or do you want your report night face-to-face?' (Tom, coach, YDP-E)

This was a view supported by parents, who when asked what practices they would like to see continue, stated, "Definitely these kinds of communications. You know via Zoom, Teams, Skype whatever it is. I think those things would be really good to continue with and having reviews via that" (John, parent, YDP-L). Parents believe utilizing such means of communication would lead to stronger relationships between the coach and player and that such interactions have allowed players to feel more comfortable giving feedback to coaches than they might have done pre-lockdown, "I think that would be a really good thing thinking about that personal relationship with them . . . and on a zoom meeting I think they [players] probably give more information out." (John, parent, YDP-L).

Coaches suggested that moving forward, information gathered about individuals within their age group would prove valuable in supporting varied aspects of their soccer and psychosocial development, "I now know why some boys are the way they are and what I might need to do to get them better and improve them in the psych corner and the social corner." (Oliver, coach, FP-E). Coaches stated that this would help shape work with players following their return to the academy, "we've found out a lot about the boys, about their drive, their self-motivation, their work ethic. So that has helped shape their individual plans." (Tom, coach, YDP-E). Returning to the regular season, coaches discussed how they might look to integrate such interactions more intentionally into their practice:

There is a lot of time when, say a boy gets in early, you'd ask them to use their time wisely and go and practice. Whereas actually, using your time wisely might just be having a chat with them. It might just be generally finding out a little bit more about them, 'what have you been up to today?', and then just having a bit more of a laugh, which we do anyway, but having a bit more of a conscious effort to it. (George, coach, FP-L)

When training schedules do not allow coaches enough time to have individual conversations with players to gather such information, again the use of video calls could prove useful:

Because of the back-to-back nature of our job, doing back-to-back sessions, the boys come in and they're working all the way through, you hardly get to speak to people. So, organizing a time where we can go and chat to players over zoom, like we have now over an individual level, to see how they're getting on. (George, coach, FP-L).

This view was supported by parents, who believed that this form of communication had already benefitted the triad and could be used to help coaches further develop relationships with players and parents when the time does not permit within the academy environment:

Maybe use these zoom calls as a catch up with parents and the children, to see how things are . . . because obviously, it is difficult to speak to a coach on training night during football. It might be something to think about, to have that interaction with the parent and the child outside of football just to sort of catch up with them. (Alice, parent, FP-L)

One parent highlighted how using such means of communication could be of benefit during other adverse events to help coaches maintain connection with players, "it can also be a perfect way of coaches keeping touch with players when they're injured. To see how they're doing and to Skype them" (Andrew, parent, YDP-L).

As this theme highlights, it is important that coaches, and other stakeholders within the organization use what has been learnt during the lockdown to help facilitate the future workings of the athletic triangle. It was clear from participants responses that there was a willingness to make use of the positive aspects to come out of the pandemic, "I think it will be taking a sideward step if we went back to normal and we just ditched it all. We need to move with the times." (Oliver, coach, FP-E).

DISCUSSION

The overall purpose of this study was to explore the perceptions of players, parents, and coaches regarding how they adapted their interaction and collaborations during the COVID-19 lockdown and how such adaptations can be used as English soccer academies, and other youth sports clubs and organizations, return from lockdown. It should be noted that although the authors aim was to examine triadic interactions, what became evident from the data was that there was actually limited triadic engagement. For instance, few stories or experiences appeared to be shared between, and subsequently discussed by, all members of the athletic triad. The absence of triadic interactions and

collaborations was, in itself, an interesting finding and points to the potential challenges of trying to facilitate interactions between three parties when such interactions have to happen remotely. Nevertheless, the data provided substantial insights regarding the functioning of dyadic relationships within the broader triad, as well as perceptions of what was deemed to be helpful by different triad members during the pandemic.

Findings from the current research highlight the positive adaptations observed by those within the athletic triangle over the lockdown period. Interaction between particular dyadic relationships within the athletic triangle increased, which as a result, led to the development of stronger relationships. Furthermore, such interaction allowed for an increased understanding of other members of the athletic triangle and their roles within the players' holistic development. Lastly, participants described the importance of utilizing such adaptations as the club moved out of lockdown. Through adapting and continuing to interact, all members of the athletic triangle were able to support the wellbeing of each other and facilitate their personal and professional development.

In line with the notion that dyadic relationships begin, grow, and are maintained within a larger social network (Sprecher et al., 2002), the current findings support previous research by Jowett and Timson-Katchis (2005) who suggested that more involvement from parents may be beneficial for player-coach relationships. Increased interaction allowed parents to provide coaches with key information about their child's mood, wellbeing, and general progress, as well as feedback from the player on sessions that were being delivered. Not only did this information allow coaches to adapt their way of working for certain individuals, it also provided the opportunity for the coach-athlete relationship to grow.

The importance of support provided by those during the lockdown, and the connections developed with each other, can be understood through the model of thriving through relationships (Feeney and Collins, 2015). It is well recognized that close relationships are linked to health and wellbeing across an individual's life (Pietromonaco and Collins, 2017). During adverse events, such as COVID-19, close relationships can protect individuals from the negative effects of stress (Uchino, 2009). In their model, Feeney and Collins (2015) argue that people will emerge from adverse life events stronger than they were before the event through the support of others who help people strengthen and assist them in rebuilding. They suggest that social connection, a critical factor within the current research, helps individuals maintain a positive effective balance, facilitate emotional regulation, and build resilience. Furthermore, the researchers argue that close relationships can alter the way in which individuals appraise a situation or event, and ultimately cope with perceived stressors (Feeney and Collins, 2015). Findings highlighted how the support received from others in the athletic triangle had a positive impact on how individuals managed the lockdown period. The implications of these findings become particularly pertinent when considered alongside the many potential adverse events those in the athletic triangle may experience during their academy journey (i.e., release, deselection, and team performance; Reeves et al., 2009;

Harwood et al., 2010; Dixon and Turner, 2018). The current research gives support for the importance of close relationships and the support provided during the COVID-19 pandemic. The findings highlight the benefits that social connection can provide an individual as they attempt to navigate their way through potentially stressful events. Future research should examine the influence of triadic relationships on the performance and wellbeing outcomes of players following adverse events in academy environments.

The findings also offer further support for the importance of shared and communicated goals between parent and child (Knight and Holt, 2014). The increased interaction between the parent and coach dyad allowed coaches to regularly provide information on aspects of the training program to parents. Parents highlighted that increased communication allowed for an enhanced understanding of their child's current soccer experience and goals, a key factor underpinning optimal parental involvement within sport (Knight and Holt, 2014). Previous research has highlighted that parents can feel excluded by coaches, meaning they feel they are unable to facilitate their sons' development (Harwood et al., 2010). Existing literature has also suggested that parents lack of knowledge of the sporting system they are involved in limits the support they can provide their children and speak of a need for more guidance and support from organizations and coaches (Harwood and Knight, 2009; Knight and Holt, 2013). Within the current research, parents described an increased understanding of their child's sporting development, such as understanding the reasoning behind certain sessions. Parents stated the information provided from coaches allowed them to feel a part of the communication loop, enhancing their understanding of what their sons' current goals were and how they might help support these.

Existing literature has highlighted the uncertainty parents have in approaching coaches as another potential stressor (Clarke and Harwood, 2014). Parents within the current research made reference to such uncertainty occurring during the regular season. However, it was emphasized that the increased interaction between the coach and parent during the lockdown had allowed parents to feel more comfortable making contact with their sons' coach and that this would continue to be the case as they returned to regular training. From a coaches' perspective, coach stressors identified within youth tennis highlighted the lack of respect parents have for the role of the coach as a substantial stressor (Knight and Harwood, 2009). Current findings suggest that increased interactions between coach and parent allowed parents to better appreciate their coaching role, and also their identity as a human being who experiences similar emotions to themselves (Knight and Harwood, 2009). Coaches anticipated that parents have become more aware of the impact their behavior and interactions have on a coach's emotional state and will demonstrate greater respect. The current pandemic has forced coaches and parents to actively engage with each other, leading coaches and parents to become more aware of how they treat one another. Through enhancing awareness of those people around the player, such as their parents, coaches will become more sensitive to the ecology of the player (Henriksen et al., 2010), which should facilitate players' holistic development.

The current findings highlighted how coaches and parents facilitated players' desires to remain socially connected. Existing literature has revealed that those in late childhood require interaction with other young children to develop their socioemotional wellbeing (Thomson and McLanahan, 2012; Hastings et al., 2015). Furthermore, adolescents are at a period in their lives where there is an increased need for peer interaction (Lam et al., 2014), which is important for crucial functions in mental health (Orben et al., 2020). Despite concerns raised by parents and coaches, players used digital technology (i.e., video games, Facetime, WhatsApp) as a means of maintaining connection. The use of such technology has been linked to increases in wellbeing as well as helping to maintain personal relationships (Burke et al., 2010; Ellison et al., 2014). In their review of the impact of COVID-19 on adolescents' mental health, Orben et al. (2020) argued that the use of digital technologies may mitigate some of the negative effects of physical distancing. The findings from the current study provide evidence for the benefits of digital technology in maintaining social connection among adolescents. Therefore, it is suggested that, in line with safeguarding measures within academies, the use of such technology to maintain connection may prove beneficial when players are experiencing a lack of physical interaction within certain relationships (e.g., long-term injury). Findings highlighted that means of communication was adapted for, and differed between, age groups. For example, in line with psychosocial development, interactions between younger players (e.g., FP-E) occurred through parents, whereas older players (e.g., YDP-L) organized their own interactions with their peers and coaches. It could be argued that through their increased desire for, and development of independence (Steinberg and Silverberg, 1986), as well as their increased confidence and enhanced communication skills, that adolescents were able to organize such interactions themselves. However, connection to parents continues to be of great importance for those in late childhood, as they continue to learn how to initiate and maintain friendships (Rice, 1998). It became apparent that those within the FP required further support from their parents in initiating such interactions. Furthermore, in line with previous findings, parents within the younger age groups took on a more active role in their child's soccer development during lockdown (Fraser-Thomas et al., 2008) compared to parents in the older age groups whose involvement was limited (Knight et al., 2010).

Furthermore, the findings identified that players developed an increased motivation toward their development as a player during the lockdown. According to Deci and Ryan's Self Determination Theory (SDT; Deci and Ryan, 2000), the quality of an individual's motivation, in this case the player, is influenced by the satisfaction of three basic psychological needs (BPN): autonomy (the need to experience choice), competence (the need to feel competent and have capacities to accomplish goals), and relatedness (the need to experience interpersonal connection and caring; Deci and Ryan, 2000). The findings highlight that players BPNs were fulfilled during this period in lockdown. For example, players discussed having control over their development (autonomy), were able to meet challenges set by coaches (competence), and that they felt valued and connected

to others (relatedness). Satisfaction of such needs has been shown to positively predict self-determined motivation, leading to enhanced wellbeing (Jowett et al., 2017). Therefore, coaches and parents alike should seek opportunities to support the players' experience of the BPNs to nurture the most high-quality forms of motivation and engagement in their development, to enhance both wellbeing and performance. For instance, coaches could look to provide increased independence within development plans or provide choice to players over particular aspects of training by allowing players to have their say on particular training drills.

Lastly, previous research has highlighted that fathers are perceived as being more involved and more influential in their children's sports participation than mothers (Babkes and Weiss, 1999; Lavoie and Stellino, 2008). In the current research, participants described that fathers took on the role of facilitating technical, tactical, and physical aspects of training. However, it must be noted that half of the parents in the current study, who labeled themselves as the most involved parent, were mothers. This could be due to the increased female role models and popularity of the women's game (Wrack, 2019). Therefore, organizations should be encouraged to further involve female parents when discussing technical, tactical, and physical aspects of a player's sporting development.

Limitations

There are certain limitations to the study that should be considered when applying findings or looking to extend them. Firstly, there have been varied responses of soccer clubs in the face of the COVID-19 pandemic. For example, as of April 20th, many clubs placed staff on 'furlough'³ following announcement of the British government coronavirus job retention scheme, while others continued to pay employees their full salary. The club from which the participants were obtained did not place employees on furlough, and unlike those who did, were able to continue to communicate with players and their parents throughout the lockdown. Therefore, the experiences of those interviewed would differ greatly from those at clubs who experienced furlough. Secondly, there were difficulties in interviewing players who were of a younger age which, at times, led to less insightful responses. The open-ended nature of the questions may have proved confusing or overwhelming for the younger participants who are in the midst of developing cognitive skills such as considering hypothetical situations, and realizing others have views that are different to their own (Mack et al., 2009). As highlighted, triadic interactions and experiences were limited within the data collected. On reflection, it was apparent that trying to capture triadic interactions proved challenging. A singular interview with each participant meant it was not possible to gain further insight from a member of the triad once they had already had their interview. Carrying out multiple interviews would have allowed the researcher opportunities to build on information given in previous interviews and to further explore

interactions and experiences with each member of the triad to help better capture triadic workings over a period of time (Byrne, 2001). Furthermore, utilizing alternative methodologies such as daily diaries (e.g., written journal entries or audio voice notes) would have allowed for participants to reflect upon interactions with other members of the athletic triangle as they occurred and provided data in real time (Swainston et al., 2020). Despite seeking variation in the sample of participants, those that volunteered to take part in the study may share common characteristics different to those parents who chose not to take part or who did not respond to the invitation sent out by the lead author. Therefore, further research utilizing participants from different populations of parents, coaches, and youth soccer players, as well as those from other sports, may provide further knowledge of the discussed experience. Lastly, it became apparent that there were nuances between the younger and older age groups. Understanding this, future research could look to investigate the differences between age groups as they experience similar transitions.

Applied Implications

Research examining parent-coach interactions in sport is limited (Knight and Gould, 2017). This study extends the current literature examining those relationships within athletic triangle, by providing an understanding of how parent and coaches can positively work together to facilitate players' holistic development. Implications can be drawn from this study that are of central importance to parents, coaches, and organizations when looking at how to enhance the workings of the athletic triangle to facilitate enhanced wellbeing and performance. Such implications are suggested:

1. Continued communication: Findings highlighted that the more parents and coaches interact, and the more information that is subsequently shared, the more consistent messages will be across the athletic triangle. This in turn will provide clarity of message for the player with regards to their soccer and psychosocial development. Therefore, opportunities for parents and coaches to regularly engage with one another should be encouraged and various means should be used to facilitate such communication.
2. Getting to know the individual: Players, coaches, and parents all discussed the benefits of getting to know one another as individuals beyond their sporting role. Coaches should use opportunities before and after training to get to know those they are working with, in turn developing these relationships, and understanding how to best work with each individual. Inductions at the start of every season introducing parents to key members of staff, including coaches, will allow parents to start developing their relationship with their son's coach. The development of relationships will provide the support required to thrive during adversity.
3. Reflect and utilize the key skills learnt: The pandemic has led to the development of skills across all participants. Understanding how, and why, to use new tools,

³For further information on furlough arrangements please see <https://www.gov.uk/guidance/claim-for-wage-costs-through-the-coronavirus-job-retention-scheme>.

like Zoom, can be important for coaches in allowing regular communication to continue (e.g., player reviews). Players should be encouraged to reflect back on key skills learnt (e.g., confidence in speaking in front of their peers, increased independence, leadership skills) and how these can be used both inside and outside of soccer. Similarly, reflecting with parents and coaches on how these were developed during lockdown, and then providing joint educational support in how to develop such psychosocial skills, would be worth considering.

CONCLUSION

Overall, the present study highlights the way in which those within the athletic triangle collaborated with one another over the COVID-19 pandemic. The study focused on the adaptations made throughout the COVID-19 lockdown and the importance of continuing the enhanced means of working as academy soccer returns from the pandemic. The findings highlight the importance of parents and coaches regularly interacting in order to provide relevant information regarding players' holistic development and to build relationships. Further research could look to understand how parents and coaches apply what has been learnt during the lockdown moving forward, to positively influence a player's development through their academy journey.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Wolverhampton University Faculty of Education Health and Wellbeing Ethics Panel. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

JM was responsible for collecting the data, leading data analysis, and the process of writing the manuscript. TD and CK were responsible for supporting the development of the research question, the data analysis process, and the writing of the manuscript. All authors contributed to the article and approved the submitted version.

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Comparing Mental Health of Athletes and Non-athletes as They Emerge From a COVID-19 Pandemic Lockdown

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Athletes going through transition periods such as injury or retirement have previously reported feelings of depression and anxiety, especially when feeling unsupported. Cessation of competitive sport during the pandemic has forced athletes through a non-normative transition and has reduced many opportunities to satisfy their basic psychological needs increasing the risk of poor wellbeing and loneliness. Whilst athletes are often praised for their resilience—a trait that serves to support them during tough times—the inability to play sport can be particularly challenging for those with strong athletic identities. An online cross-sectional survey ($n = 744$) was conducted to capture adult athlete and non-athlete mental health factors (specifically wellbeing, depression, anxiety, loneliness) during emergence from a COVID-19 lockdown. Results showed that resilience was positively correlated with mental health but was no higher in athletes than non-athletes. Furthermore, athletes reported greater anxiety than non-athletes, a difference mediated by negative affectivity—a subfactor of athletic identity. We present evidence that after a temporary transition away from sport, athletes' resilience is comparable to non-athletes leaving them just as likely to suffer poor mental health. Moreover, athletes with strong athletic identities are likely to experience anxiety symptoms above and beyond those reported by non-athletes. Findings have implications for the development of self-management guidance for athletes as the COVID-19 pandemic and restrictions on sport participation continue.

Keywords: athlete, athletic identity, resilience, wellbeing, depression, anxiety, loneliness

INTRODUCTION

Mental health is defined by the World Health Organisation (WHO) as, “a state of well-being in which an individual realises his or her own abilities, can cope with the normal stresses of life, can work productively, and is able to make a contribution to his or her community” (World Health Organisation, 2018). In a time when the world is on high alert due to the uncertainty and distress caused by a global pandemic, research into mental health and self-management has become increasingly important. Due to the rapid spread of COVID-19, the United Kingdom's government announced a national lockdown on 23rd March 2020 signifying a major step in a monumental

transition from normal daily living to a world where mask wearing, social distancing and perpetual uncertainty have become the norm. A significant feature of “the COVID experience” (Samuel et al., 2020) has been the abrupt and repeated halting of competitive sport due to national lockdowns or outbreaks of the virus in sport teams and/or their respective institutions. The stop-start nature of many leagues and competitions that has existed over the course of the pandemic has presented a multitude of stressors detrimental not only to the personal lives of both amateur and professional athletes, but also to the development of their sporting careers.

The pandemic has constituted a long and enduring transitional period in the life and career of an athlete (Stambulova et al., 2020). Transitions constitute critical phases for athletic development wherein stressors must be responded to positively to facilitate continued success, both within and out with sport (Stambulova, 2017; Stambulova et al., 2020). The predictability of a transition period can determine how successfully an athlete adapts and responds to stressors during this time with normative transitions typically being associated with more positive mental health outcomes than non-normative transitions (Wheaton, 1990; Stambulova, 2003, 2017). The most commonly observed mental health outcomes associated with non-normative transitions in sport (e.g., injury, de-selection, premature retirement) include feelings of depression and anxiety (Wylleman et al., 2004; Appaneal et al., 2009; Rice et al., 2016). Due to its non-normative nature, it was expected that similar outcomes would arise due to COVID-19. Moreover, during the pandemic athletes have had fewer opportunities to meet their basic psychological needs (Ryan and Deci, 2017) and/or benefit from sport-related social support networks (Ntoumanis et al., 2009; Biddle et al., 2015) which can contribute to poor wellbeing and loneliness (Lippke et al., 2021).

Often cited as a key determinant of an individual’s mental health when faced with adversity is their level of resilience (Fletcher and Sarkar, 2013, 2016). To this end, it is possible that athletes may have an advantage over non-athletes given sports’ long-standing association with the development of this beneficial psychological trait (Caddick and Ryall, 2012). Some studies support this notion finding athletes to be more resilient than non-athletes (Guillén and Laborde, 2014; Laborde et al., 2016). Considering this, it could be argued that athletes may be better equipped to deal with the psychological burden of the pandemic than non-athletes as a result of their conditioning to thrive in challenging environments and competition. That being said, existing resilience studies have investigated samples of athletes regularly participating in sport and so findings may not be representative of those undergoing a period of transition. Therefore, there is a need for further exploratory research in this area.

Another key determinant of athlete mental health during transitions is often their athletic identity (Ronkainen et al., 2016). Athletic identity can be understood as a multidimensional construct within the self-concept comprising of self-related information garnered from psychosocial factors that accompany the athlete role (Brewer et al., 1993; Murphy et al., 1996; Ronkainen et al., 2016). Brewer and colleagues propose a

three-factor model for understanding athletic identity. *Social identity* considers the extent to which an individual identifies themselves as an athlete; *exclusivity* considers the degree to which the individual’s self-worth depends on their athletic identity in comparison to other roles they fulfil (e.g., parent, student); and *negative affectivity* assesses the negative emotions that occur due to non-participation (Brewer et al., 1993). For some athletes, extensive involvement in sport over time can cause the athlete role to become deeply entwined in their personal identity, engulfing their sense-of-self, social life and/or career. These individuals are often the most at risk for suffering poor mental health when going through a transition at which time the opportunity to participate in sport is unavailable (Grove et al., 1997; Alfermann et al., 2004; Wylleman et al., 2004; Sanders and Stevinson, 2017).

The aim of the current study was to investigate the relationships between resilience, athlete identity and mental health during transition periods. Specifically, the study aimed to identify whether associations existed between athlete identity, resilience, wellbeing, anxiety, depression and/or loneliness as we emerged from a national lockdown to better understand the impact of the pandemic. Hypothesis one was that resilience would be positively correlated with mental health. Hypothesis two was that athlete identity would be negatively correlated with mental health. Hypothesis three was that resilience would be higher in athletes than non-athletes. As this is an exploratory piece of research, in the event we came across unexpected results, we planned to conduct mediation and/or moderation analysis to ascertain why our findings might have occurred.

METHOD

Recruitment and Participants

Ethical approval for the study was granted by Ulster University. All participants provided informed consent and were free to withdraw at any time. No personal identifying data was collected to ensure confidentiality. A cross-sectional survey research design was used. Data was collected between 23/06/2020–13/07/2020 (i.e., 14–16 weeks from the start of lockdown, 2 weeks after restrictions were lifted for those shielding in their homes). All data was collected via SurveyMonkey. A total of 20 sporting organisations and governing bodies of sport from across the United Kingdom and Republic of Ireland were contacted via email to take part. Sporting associations publicly shared a link to the survey via their Twitter page, website and/or members mailing lists. Non-athlete participants were recruited by word of mouth and via an article published in a Northern Ireland online newspaper. A total of 753 participants over the age of 18 were recruited. Of these, nine respondents resided outside the United Kingdom or Ireland during lockdown thus, were not considered in final analysis. This left 744 participants over the age of 18 to be included of which 558 lived in the United Kingdom and 186 in the Republic of Ireland (male athletes = 199, female athletes = 161, male non-athletes = 148, female non-athletes = 236). Descriptive data for the gender and age split of the sample is provided in **Figure 1**. Of the 360 athletes recruited, 351 reported their level of participation (243 non-elite; 64 semi-elite; 44 elite)

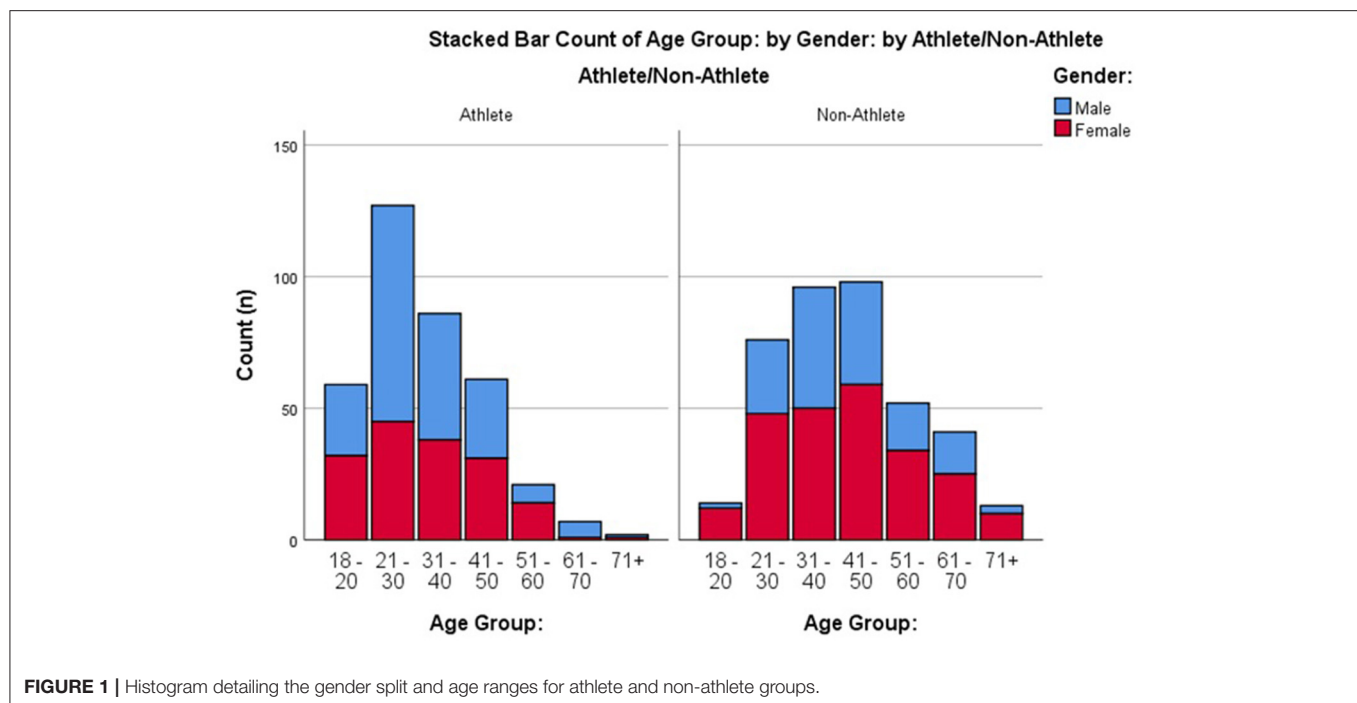


FIGURE 1 | Histogram detailing the gender split and age ranges for athlete and non-athlete groups.

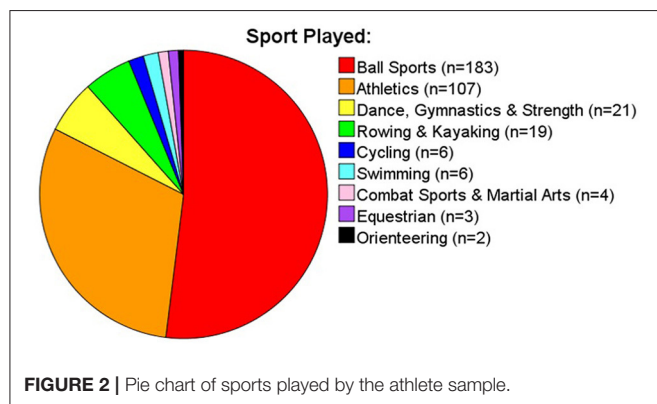


FIGURE 2 | Pie chart of sports played by the athlete sample.

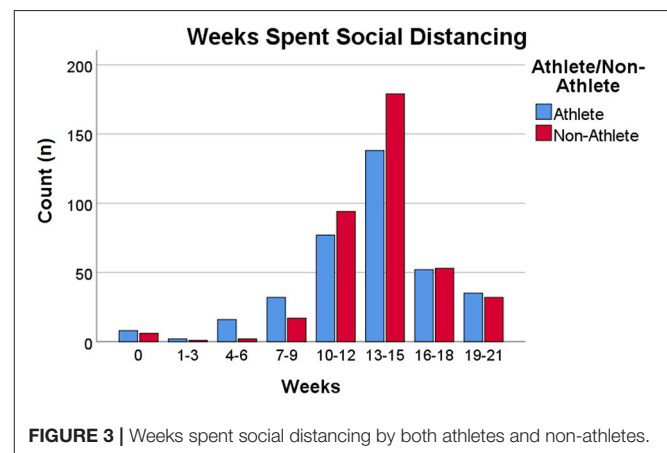


FIGURE 3 | Weeks spent social distancing by both athletes and non-athletes.

and which sport they primarily played (see **Figure 2**). When the survey was conducted, 38% of athletes and 47% of non-athletes had been practising social distancing for 13–15 weeks all of which, except for 1 or 2 weeks depending on their response date, was spent in lockdown (described in greater detail in **Figure 3**). A roughly equal proportion of athletes (8%) and non-athletes (10%) had been shielding since the beginning of the pandemic. Participants also reported the size of their lockdown bubbles. Bubbles comprised of people in the immediate household plus all those from another household with whom they were allowed to mix with whilst social distancing. The size of participants' lockdown bubbles were largely consistent across both athletes ($M = 3.52$, $SD = 1.44$) and non-athletes ($M = 3.20$, $SD = 1.40$).

Measures

All participants reported their gender, age range, occupation, marital status, smoking status, diet, number of weeks spent social

distancing and the size of their social isolation bubble. The following question, taken from an operational definition of sport (Rejeski and Brawley, 1988; Shannon et al., 2019) was used to categorise participants as either athletes or non-athletes: “Are you an athlete involved in a structured, rule-bound, competitive physical activity?” The term “mental health” was used throughout analysis and refers collectively to participants' self-reports of wellbeing, anxiety, depression, and loneliness. Resilience and athletic identity were also surveyed via self-report measures. The following questionnaires were presented:

The Adult Mental Health Continuum–Short Form

The MHC-SF (Keyes, 2005) is a validated three factor 14-item questionnaire measuring wellbeing. The MHC-SF provides a score for overall wellbeing and individual scores for three

subscales: social, emotional, and psychological wellbeing. Using a 7-point Likert scale, the summed score for overall wellbeing and each sub factor was calculated to produce four individual variables. The MHC-SF also includes a measure of whether participants are flourishing, languishing or are moderately mentally healthy (for thresholds see Keyes, 2009). The scale had high internal consistency (Cronbach's $\alpha = 0.93$) as do the social ($\alpha = 0.84$), emotional ($\alpha = 0.87$), and psychological ($\alpha = 0.88$) subscales.

The Hospital Anxiety and Depression Scale

The HADS (Zigmond and Snaith, 1983) is a two-factor 14-item scale used to rate the severity of anxiety and depressive symptoms. Responses were recorded on a Likert scale ranging from 0 to 3 with the sum of participant responses providing individual scores for anxiety (HADS-A) and depression (HADS-D). Scores of 0–7 are considered within the normal range, 8–10 are evidence of mild symptoms, and 11–21 are suggestive of moderate/severe symptoms (Snaith, 2003; Breeman et al., 2015). Cronbach's α was 0.89 for the scale overall, 0.86 for HADS-A and 0.81 for the HADS-D subscales.

The Brief Resilience Scale

The BRS (Smith et al., 2008) contains 6-items that provide a single score for resilience measured on a 5-point Likert scale. The sum of participant responses gave their level of resilience. The scale had a high level of internal consistency (Cronbach's $\alpha = 0.89$).

The Short Loneliness Scale

The SLS (De Jong Gierveld and Van Tilburg, 2006) is a two-factor scale containing 6-items measuring overall (Lone-O), social (Lone-S), and emotional loneliness (Lone-E). The measure has been validated cross-culturally and had an acceptable level

of internal consistency in the current sample ($\alpha = 0.70$). Scores were measured on a 5-point Likert scale. For negatively worded items (e.g., I often feel rejected), neutral and positive answers (i.e., more or less, agree, strongly agree) were counted. For positively worded items (e.g., there are enough people I feel close to) the neutral and negative answers were counted. A score of 0 infers complete social embeddedness whereas a score of six (or three for either subscale) is evidence of extreme loneliness.

The Athletic Identity Measurement Scale

The three factorial AIMS (Brewer et al., 1993), a 7-point Likert scale, is a measure of athletic identity in which three individual factors—social identity (AIMS-SI), negative affectivity (AIMS-NA), and exclusivity (AIMS-E)—are subordinate to one higher order factor—overall athletic identity (AIMS-O). Participants' summed scores offered a measure of their athletic identity. The AIMS had a high level of internal consistency ($\alpha = 0.89$) as did each subscale: AIMS-SI ($\alpha = 0.84$); AIMS-E ($\alpha = 0.86$); and AIMS-NA ($\alpha = 0.78$).

DATA HANDLING

The mean or sum of participants' responses were calculated as per the scoring criteria for each measure. Analysis was conducted using Statistical Package for the Social Sciences 26 (copyright IBM corp., NY, USA) with the alpha level set to $p < 0.05$. Pearson's correlations were considered weak, moderate and strong when $r = 0.20$, 0.50 , and 0.80 , respectively. Effect sizes for t -tests were interpreted using Cohen's d where small, medium and large effects were classed as 0.20 , 0.50 , and 0.80 , respectively. Effect size for univariate analysis was interpreted using partial eta squared where small to large effect sizes = 0.01 , 0.06 , and 0.14 , respectively (Field, 2013). Given the sample size was large

TABLE 1 | Descriptive statistics for the severity of anxiety and depressive symptoms, and the rate of flourishing, languishing, and extreme loneliness in athletes and non-athletes.

Mental health		Athlete		Non-athlete	
		<i>n</i>	%	<i>n</i>	%
Anxiety	Normal range	153	47.2	187	55.2
	Mild	83	25.6	65	19.2
	Moderate/Severe	88	27.2	87	25.7
Depression	Normal range	242	74.7	247	72.9
	Mild	59	18.2	61	18
	Moderate/Severe	23	7.1	31	9.1
Overall loneliness	No evidence of loneliness	9	2.8	16	4.9
	Extremely lonely	29	9.1	38	11.6
Emotional loneliness	No evidence of loneliness	24	7.6	27	8.2
	Extremely lonely	79	24.9	82	24.9
Social loneliness	No evidence of loneliness	135	42.6	141	42.9
	Extremely lonely	55	17.4	55	16.7
Wellbeing	Flourishing	32	9.7	45	12.9
	Moderately mentally healthy	290	87.9	290	83.1
	Languishing	8	2.4	14	4

TABLE 2 | Descriptive statistics and correlations for athletes.

Athletes	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Resilience	319	21.32	4.77	-													
2. AIMS: Overall	353	5.48	0.83	-0.103	-												
3. Social identity	353	5.73	0.89	0.036	0.744**	-											
4. Exclusivity	353	5.01	1.39	-0.093	0.821**	0.431**	-										
5. Negative affectivity	353	5.58	1.16	-0.188**	0.658**	0.190**	0.355**	-									
6. Overall wellbeing	330	43.31	13.13	0.479**	-0.044	0.162**	-0.086	-0.192**	-								
7. Emotional wellbeing	330	10.65	2.79	0.468**	-0.115*	0.118*	-0.172**	-0.216**	0.789**	-							
8. Social wellbeing	330	12.62	5.83	0.346**	0.013	0.154**	-0.030	-0.107	0.884**	0.611**	-						
9. Psychological wellbeing	330	20.03	6.40	0.461**	-0.052	0.140*	-0.075	-0.202**	0.902**	0.625**	0.635**	-					
10. Anxiety	324	8.09	4.31	-0.558**	0.166**	-0.007	0.158**	0.234**	-0.555**	-0.578**	-0.448**	-0.477**	-				
11. Depression	324	5.12	3.59	-0.520**	0.075	-0.127*	0.116*	0.195**	-0.661**	-0.653**	-0.532**	-0.584**	0.645**	-			
12. Overall loneliness	317	2.66	0.71	-0.478**	0.163**	-0.059	0.161**	0.280**	-0.681**	-0.614**	-0.556**	-0.620**	0.560**	0.635**	-		
13. Emotional loneliness	317	2.96	0.79	-0.442**	0.146**	-0.048	0.134*	0.258**	-0.597**	-0.605**	-0.479**	-0.524**	0.576**	0.588**	0.814**	-	
14. Social loneliness	317	2.36	0.90	-0.366**	0.129*	-0.050	0.136*	0.216**	-0.549**	-0.437**	-0.457**	-0.518**	0.377**	0.485**	0.861**	0.406**	-

*Correlation significant at the 0.05 level (2-tailed).

**Correlation significant at the 0.01 level (2-tailed).

TABLE 3 | Descriptive statistics and correlations for non-athletes.

Non-athletes	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Resilience	334	20.53	4.99	-													
2. AIMS: Overall	160	3.83	1.46	0.152	-												
3. Social identity	160	3.73	1.51	0.192*	0.915**	-											
4. Exclusivity	160	3.61	1.70	0.176*	0.879**	0.725**	-										
5. Negative affectivity	160	4.21	1.82	0.022	0.856**	0.654**	0.638**	-									
6. Overall wellbeing	349	44.03	14.31	0.516**	-0.053	0.010	-0.040	-0.123	-								
7. Emotional wellbeing	349	10.77	3.08	0.517**	0.080	0.118	0.081	0.001	0.844**	-							
8. Social wellbeing	349	13.21	5.94	0.389**	-0.107	-0.061	-0.073	-0.156	0.906**	0.660**	-						
9. Psychological wellbeing	349	20.05	6.73	0.519**	-0.060	0.018	-0.061	-0.132	0.941**	0.755**	0.742**	-					
10. Anxiety	339	7.50	4.35	-0.589**	-0.112	-0.161	-0.101	-0.020	-0.554**	-0.602**	-0.430**	-0.522**	-				
11. Depression	339	5.13	3.87	-0.532**	-0.162	-0.227**	-0.109	-0.069	-0.682**	-0.714**	-0.555**	-0.632**	0.645**	-			
12. Overall loneliness	329	2.62	0.75	-0.497**	-0.070	-0.149	-0.051	0.037	-0.635**	-0.639**	-0.524**	-0.594**	0.649**	0.709**	-		
13. Emotional loneliness	329	2.88	0.80	-0.508**	-0.077	-0.139	-0.103	0.052	-0.612**	-0.649**	-0.482**	-0.578**	0.686**	0.668**	0.848**	-	
14. Social loneliness	329	2.36	0.93	-0.368**	-0.050	-0.129	0.005	0.017	-0.502**	-0.477**	-0.433**	-0.465**	0.461**	0.573**	0.890**	0.513**	-

*Correlation significant at the 0.05 level (2-tailed).

**Correlation significant at the 0.01 level (2-tailed).

($N = 744$), central limit theorem inferred the data was normally distributed. Levene's tests inferred homogeneity of variances for all statistical tests henceforth. Mediation analysis was carried out in line with Newsom's (2020) method using a series of linear regressions and Sobel tests. An initial regression was conducted to compute the unstandardised coefficient for the relationship between the predictor variable and the mediator. A second regression was then conducted to obtain the unstandardised coefficient for the path between the mediator and the outcome variable when the predictors were also included in the model. Partial mediation was observed when Sobel tests returned a positive result but the relationship between a predictor and an outcome variable remained significant after controlling for the potential mediator. Full mediation occurred in instances where Sobel tests were positive but the relationship between a predictor and dependent variable became non-significant when controlling for the mediator (Newsom, 2020).

RESULTS

Table 1 describes the prevalence of anxiety and depressive symptoms, extreme forms of loneliness, flourishing, languishing and moderately mentally healthy athletes and non-athletes as per the criteria of the HADS, SLS, and MHC-SF, respectively.

Testing Hypothesis 1: Resilience Will Be Positively Correlated With Mental Health

Pearson's product moment correlations were conducted for athletes and non-athletes to measure the relationship between resilience and mental health. Findings showed that resilience was moderately positively correlated with all four MHC-SF variables (i.e., overall, social, psychological, and emotional wellbeing) and moderately negatively correlated with all SLS variables, HADS-A and HADS-D. These relationships were observed in both athletes and non-athletes which supports our first hypothesis. See **Tables 2, 3** for descriptive statistics.

Testing Hypothesis 2: Athletic Identity Will Be Negatively Correlated With Mental Health

All athletes and a subgroup of non-athletes ($n = 160$) were presented the AIMS. Whilst there was no correlation between non-athletes' AIMS-O and their mental health, athletes' AIMS-O a weak negative correlation with emotional wellbeing and weak positive correlations with HADS-A and each SLS variable which supports our second hypothesis. Each subfactor of AIMS was also significantly related to different aspects of mental health and illness (see **Table 2** for descriptive statistics). Interestingly, AIMS-SI had a conflicting relationship with mental health and illness compared to the other AIMS variables. This meant that where significant relationships existed, increased AIMS-SI was related to better mental health whereas increased AIMS-O, AIMS-E and AIMS-NA scores were related to poorer mental health. A weak negative correlation also emerged between non-athletes' AIMS-SI and HADS-D: $r(140) = -0.23, p = 0.007$.

Pearson's correlations revealed that athletes' AIMS-NA and non-athletes AIMS-SI scores were related to both resilience and mental health. Therefore, a series of linear regressions (Newsom, 2020) and subsequent Sobel tests for mediation were conducted to identify whether the relationship between aspects of athletic identity and mental health remained after controlling for potential mediation from resilience (see **Figures 4, 5** for regression path diagrams). Sobel tests revealed that resilience partially mediated the relationship between athletes AIMS-NA and overall wellbeing ($z = -3.19$, std. error = 0.30, $p = 0.001$), HADS-A ($z = 3.26$, std. error = 0.11, $p = 0.001$), HADS-D ($z = 3.23$, std. error = 0.09, $p = 0.001$), and Lone-O ($z = 3.03$, std. error = 0.03, $p = 0.002$) and fully mediated the relationship between non-athletes' AIMS-SI scores and their HADS-D ($z = -2.17$, std. error = 0.13, $p = 0.030$).

Testing Hypothesis 3: Resilience Will Be Higher in Athletes than Non-athletes

A two-way ANOVA was conducted to explore potential differences between males and females, athletes and non-athletes. No significant interaction was observed between the independent variables nor was there a difference between athletes and non-athletes. However, a gender difference emerged with males having greater resilience ($M = 21.42$, $n = 301$, $SD = 4.89$) than females ($M = 20.48$, $n = 352$, $SD = 4.87$): [$F_{(1, 649)} = 4.37, p = 0.037$, partial $\eta^2 = 0.007$].

Athlete and Non-athlete Differences

Independent sample's t -tests were conducted to test differences in athletic identity between athletes and non-athletes. As expected, there was a large effect with athletes scoring significantly higher than non-athletes on AIMS-O [$t_{(206.39)} = 13.34, d = 1.63, p < 0.001$ two-tailed]; AIMS-SI [$t_{(210.36)} = 15.60, d = 1.92, p < 0.001$ two-tailed]; AIMS-E [$t_{(259.77)} = 9.15, d = 1.15, p < 0.001$ two-tailed]; and AIMS-NA [$t_{(219.16)} = 8.78, d = 1.17, p < 0.001$ two-tailed]. These results survived Bonferroni adjustment for multiple comparisons (adjusted alpha level = 0.013).

Two-way ANOVAs reported no differences in mental health other than for HADS-A where there was an effect of group (athlete/non-athlete): [$F_{(1, 659)} = 6.05, p = 0.014$, partial $\eta^2 = 0.009$]; gender: [$F_{(1, 659)} = 15.16, p < 0.001$, partial $\eta^2 = 0.022$]; but no interaction between the two: [$F_{(1, 659)} = 0.09, p = 0.767$]. Athletes ($M = 8.10$, $n = 324$, $SD = 4.31$) were more anxious than non-athletes ($M = 7.50$, $n = 339$, $SD = 4.35$) and females ($M = 8.32$, $n = 359$, $SD = 4.35$) were more anxious than males ($M = 7.15$, $n = 304$, $SD = 4.25$). A final series of regressions were conducted to test whether the difference in athlete and non-athlete HADS-A was mediated by AIMS. **Figure 6** depicts the regression path diagram for these relationships. After controlling for the confounding effect of gender, there was no evidence that AIMS-O, AIMS-SI or AIMS-E mediated the difference in athlete and non-athlete HADS-A. However, the difference in athlete and non-athlete HADS-A went from significant to non-significant when AIMS-NA was added to the model. A significant Sobel test confirmed this was evidence of complete mediation by AIMS-NA ($z = -2.82$, Std Error = 0.20, $p = 0.005$).

DISCUSSION

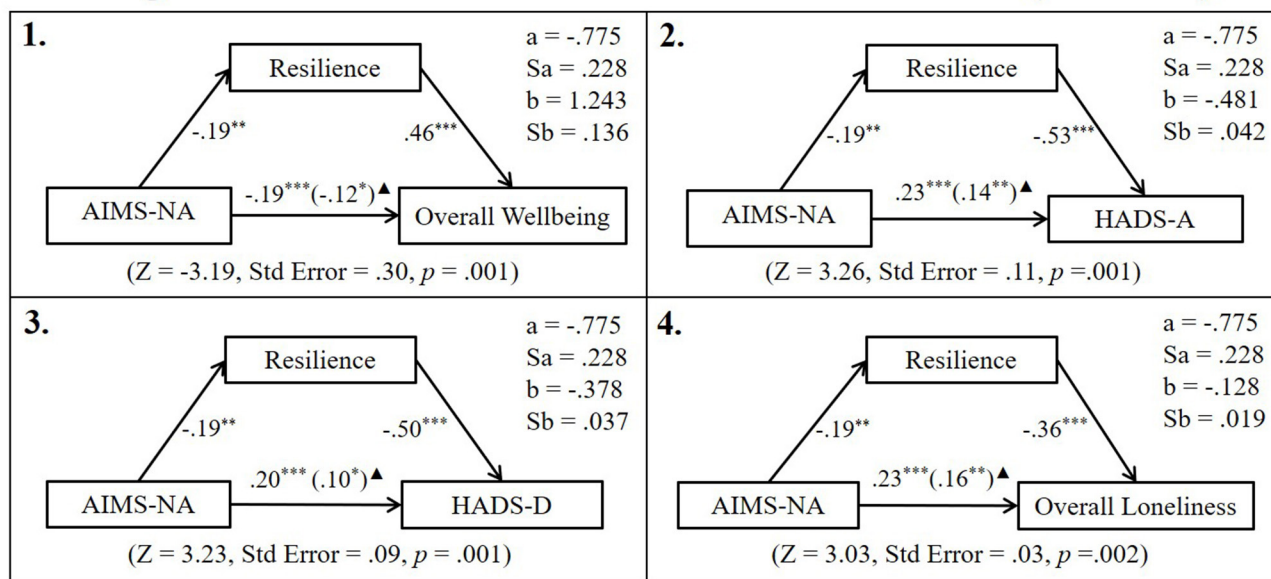
The current study investigated resilience and athletic identity to improve our understanding of athlete mental health as we emerged from a COVID-19 lockdown. The findings support the first hypothesis—resilience would be positively correlated with mental health. For athletes, overall athletic identity was weakly positively correlated with anxiety and loneliness but had no relationship with wellbeing or depression, which partially supports the second hypothesis. Finally, there was no difference observed in the resilience levels of athletes and non-athletes, meaning the third null hypothesis was not rejected.

Until now, there was a dearth of research on athlete resilience during non-normative transitions. Existing studies of athlete resilience have used samples of athletes who finished training shortly prior to data collection or who otherwise had regular and ongoing involvement in sport (Guillén and Laborde, 2014; Laborde et al., 2016). As such, the resilience reported by these athletes may not have been representative of those going through a transition away from sport. We present evidence that during transitional times such as COVID-19, there is no significant difference between the resilience of athletes and non-athletes. Instead, we propose that athlete resilience is circumstantial and may fluctuate depending on their current level of involvement in sport. The high prevalence of depression and substance abuse seen in athletes (particularly those performing at an elite level)

during injuries or post-retirement would offer support to this claim (Alfermann et al., 2004; Appaneal et al., 2009). As well, the stigma toward mental health in sport and the sport-ethic demanding that athletes “put on a brave face” prevents some of those who are struggling from speaking out thus masking the true extent of mental illness in this population (Caddick and Ryall, 2012; Hilliard et al., 2020). We urge caution when advocating that sport participation develops resilience as there are evidently times when this is not the case.

The comparable levels of resilience between athletes and non-athletes were reflected in their mental health. Athletes reported similar levels of depression, loneliness and wellbeing as non-athletes. Alternatively, whilst males reported greater resilience and less anxiety than females, athletes had greater levels of anxiety than non-athletes despite having more males in the sample which signals that athlete specific stressors likely influenced their mental health. Specifically, 53% of athletes reported experiencing at least mild anxiety symptoms compared to 45% of non-athletes (see Table 1). These statistics are substantial enough to be a cause for concern for both athletes and non-athletes alike with social determinants likely contributing to why these figures are so high. The pressure of having to provide for children or care for those suffering from COVID-19 amid an unprecedented economic crisis has placed an incredible burden on the population. Concomitantly, job security has been drastically reduced with many individuals still facing the threat

Testing Resilience as a Mediator for Mental Health (Athletes)



All values are standardised betas with mediated effect in brackets.

* $p < .05$

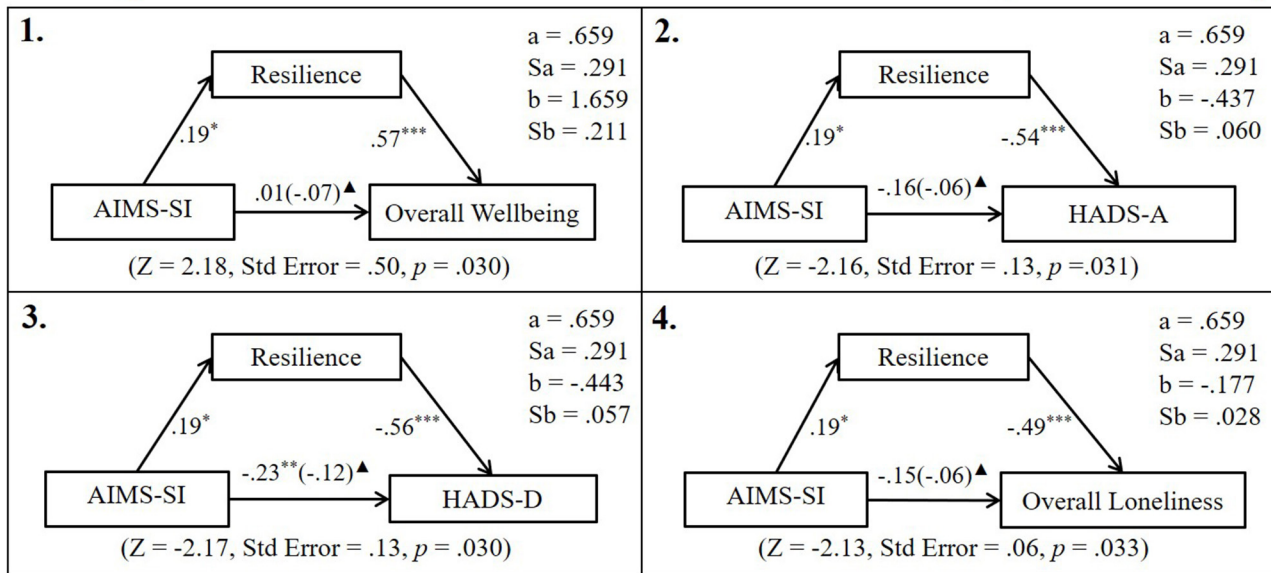
** $p < .01$

*** $p < .001$

▲ Sobel test found significant mediation.

FIGURE 4 | Regression path diagram testing resilience as a mediator for athlete sample.

Testing Resilience as a Mediator for Mental Health (Non-athletes)



All values are standardised betas with mediated effect in brackets.

* $p < .05$

** $p < .01$

*** $p < .001$

▲ Sobel test found significant mediation.

FIGURE 5 | Regression path diagram testing resilience as a mediator for non-athlete sample.

of redundancy. Indeed, when this survey was conducted, around 25% of the UK workforce were enrolled on the furlough scheme (Office for National Statistics, 2020)—an indication that job security was a wide-spread concern shared by athletes and non-athletes alike. However, these social pressures are not unique to athletes, and so cannot explain the significant difference in athlete and non-athlete anxiety. Instead, a psychological basis for the difference in athlete and non-athlete anxiety is more likely—a difference we attribute to their heightened athletic identity.

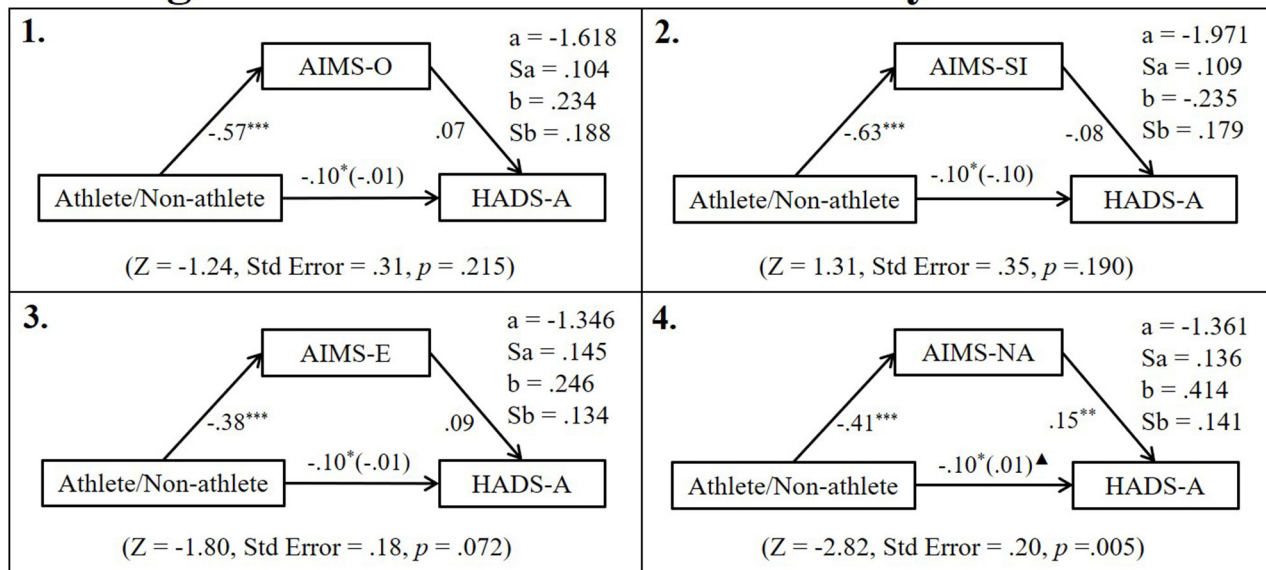
Research has shown that over-reliance on one's status as an athlete, can cause identity foreclosure (Murphy et al., 1996) and restrict the formation of a balanced and well-rounded sense-of-self causing some athletes psychological difficulties when they cannot compete in their sport. Our findings, depicted in **Figure 6**, provide evidence that after controlling for gender, negative affectivity—a subfactor of overall athletic identity—fully mediated the relationship between athletic status and anxiety. This finding infers that pandemic lockdown posed a significantly greater risk for athletes than non-athletes due to the high level of negative affectivity that comes with the athlete role. Alas, the cross-sectional nature of our study and lack of comparison data from before the lockdown limits the extent to which we can attribute these findings explicitly to the pandemic. To validate this evidence, future research should aim to follow athletes over time to try and capture athletic identity and mental health as

athletes move from a period of uninhibited participation through a non-normative transition away from sport.

Another interesting finding was that whilst negative affectivity and exclusivity were associated with poor mental health, greater social identity was associated with more positive outcomes. Exclusivity and negative affectivity consider the degree to which an athlete's self-worth and emotional state are dependent on their ability to excel at sport (Brewer et al., 1993; Murphy et al., 1996). Moreover, an athlete's self-worth and their emotional state are more heavily influenced by the ability to play sport when they are intrinsically rather than extrinsically motivated to do so through social or societal pressures (Pelletier et al., 1995; Ryan and Deci, 2017). It is possible that athlete motives influence which aspects of athletic identity are developed thus causing different athletes to experience transitions differently. Research investigating the impact of motivation for athletic identity development would greatly enhance our understanding of athlete mental health and the risk factors for poor adaptation to transitions.

Our study comes with a number of limitations. First, we relied heavily on the use of self-report measures which in the past has led to under-reporting of disorders due to the stigma surrounding mental health in sport (Bauman, 2016; Hilliard et al., 2020). We mitigated this risk by preserving participant anonymity throughout making under-reporting of symptoms unlikely. Concurrently, collecting a large sample supports the likelihood that these findings offer an accurate and reliable representation

Testing AIMS as a Mediator for Anxiety



All values are standardised betas with mediated effect in brackets.

* $p < .05$

** $p < .01$

*** $p < .001$

▲ Sobel test found significant mediation.

FIGURE 6 | Regression path diagrams testing aims as mediators for the difference in athlete and non-athlete anxiety.

of athlete mental health. Nevertheless, an additional (virtual) face-to-face interview would have improved the reliability of our findings. Second, it is possible that highly active non-athletes may have experienced some benefits of exercise for mental health and as such could have obscured significant differences between groups. Our ability to capture highly active individuals in the non-athlete group was limited as non-athletes were not asked how frequently they exercised. Having said that, these individuals were likely few in number and by strict definition, not athletes in sport and are therefore beyond our research questions. Finally, without pre-pandemic data for comparison, we cannot explicitly say that mental health has been significantly affected since the outbreak of COVID-19. Also, the dynamic nature of mental health means these statistics are liable to have changed in the months since the lockdown and will continue to change in perpetuity. Despite this, our findings make an important contribution to the field by “time-stamping” athlete mental health as the country emerged from an unprecedented national lockdown situation.

CONCLUDING COMMENTS

This research contributes to the growing body of literature on sport participation and mental health, with the novel addition of capturing demographic and psychological factors during emergence from a national lockdown. Contrary to existing literature, athletes did not have greater resilience than

non-athletes, possibly explained by the complex and likely uncomplimentary role that a narrow athletic identity with high negative affectivity serves during transitional periods. Given social distancing measures are being intermittently eased and reinstated, the fate of both professional and amateur sport still hangs in the balance. Our findings have shown that it is now particularly important for research to continue to monitor and support the mental health of athletes.

EQUATIONS

Cohen's d was calculated using the following formula (Howell, 2002):

$$d = \frac{(M_1 - M_2)}{\text{square root of the pooled variance (sprv)}}$$

The square root of pooled variance was calculated using:

$$\text{sprv} = \sqrt{\frac{(n_1 - 1)SD_1 + (n_2 - 1)SD_2}{n_1 + n_2 - 2}}$$

Sobel tests used the following formula presented by MacKinnon and Dwyer (1993) where a = raw, unstandardised regression coefficient for the relationship between the IV and mediator; Sa = standard error of a ; b = raw coefficient for the relationship

between mediator and DV when controlling for all other IVs; Sb = Standard error of b :

$$z \text{ value} = \frac{a \times b}{\text{SQRT}(b^2 \times s_a^2 + a^2 \times s_b^2)}$$

DATA AVAILABILITY STATEMENT

The data has been made available on Figshare online repository. The following DOI can be used to access the data: <https://doi.org/10.6084/m9.figshare.14501361.v1>.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ulster University Research Ethics Filter Committee. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

CK, GB, and SS conceptualised the study with the same authors conducting early pilot work and data collection. CK processed

the data. Analysis was conducted by CK and GP. All authors contributed to writing the paper.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fspor.2021.612532/full#supplementary-material>

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Development of a Salutogenesis Workshop for SPPs to Help Them, Their Athletes, and the Athlete's Entourage Better Cope With Uncertainty During the COVID-19 Pandemic

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The COVID-19 pandemic is also called a crisis of uncertainty because of so many unforeseeable events like canceled qualification competitions, loss of training facilities, and postponement of the Olympic games. Athletes and their entourage experience this uncertainty as stressful. Sport psychology practitioners (SPPs) are in a key position to support athletes in coping with these unforeseeable stressors. However, SPPs are similarly affected by the COVID-19 pandemic and simultaneously have to cope with stress. Salutogenesis, which describes how to manage stress and to stay well, provides a theoretical approach to how to cope with uncertainty. The salutogenetic approach aims at strengthening individuals' sense of coherence (SoC) and consists of three components, namely comprehensibility, manageability, and meaningfulness. Although it is known that the SoC can be enhanced via psychological skills training, so far, this approach has not been systematically applied to the elite sport context. Athletes have been advised to see SPPs for help; thus, the question of how SPPs handle the time of uncertainty while supporting others emerges. The aim of this contribution was to outline how the salutogenetic approach can be applied to strengthening SPPs' SoC via a single-day four-part workshop. Additionally, we applied the workshop to $N = 26$ volleyball coaches and evaluated the workshop's effects on participants' psychological aspects [i.e., the Sense of Coherence—Leipziger short version (SoC-L9), resilience (RS-13): coping with uncertainty, affective response, and stress via semantic differentials] and the workshop's quality ratings (i.e., Quality Questionnaire for Sport Psychological Coaching, QS-17). The evaluation provides results that show a positive impact on a descriptive level of the participants' SoC, uncertainty, affect, and stress perception; however, the results show no significant main effect of time [$F(8, 10) = 1.04, p = 0.467, \eta_p^2 = 0.454$]. Workshop quality (on average, 3.60 ± 0.35 out of 4.00) and skill acquisition (on average,

3.00 $\pm$ 0.64 out of 4.00) were positively evaluated; 82.00% of the participants would use the learned tools in the future. Thus, we outline how this workshop might help strengthen SPPs' SoC and at the same time empower them to strengthen their athletes' SoC. Overall, we add a theoretical (i.e., salutogenesis in sports) and a practical perspective (i.e., coping techniques based on salutogenesis) on how to cope with the COVID-19 pandemic for SPPs, athletes, and their support network.

Keywords: mental health, resilience, staff, stress, psychological counseling

INTRODUCTION

For the first time in the history of the modern Olympic Games, the Olympics were postponed from 2020 to 2021 due to the COVID-19 pandemic. The regular 4-year cycle was interrupted and impacted the systematic planning, controlling, and performing at a top level in elite sports. No one had anticipated that an international health crisis would have such tremendous effects on the athletes and their entourage, such as the postponement of the Olympic Games, changes in scheduled qualification competitions, or limited training possibilities. The athlete's support network is a combination of different stakeholders who provide support for peak performances in sports. Athletes play a central role in this network because they are the performers; however, they are surrounded by a large staff network [e.g., coaches and sport psychology practitioners (SPP)] who support them in achieving their peak performance. During COVID-19, it has become even more important to support athletes and especially also to reduce the effects of uncertainty. This support can, for example, help foster athletes' identities and help manage their careers (Andreato et al., 2020). SPPs are crucial to how the athletes and their support network deal with the unforeseen effects of COVID-19, which can also be called a crisis of uncertainty (Andreato et al., 2020). Studies have already shown an increase in perceived stress and in dysfunctional psychobiosocial states (Di Fronso et al., 2020). Further expected negative mental reactions are anxiety, depression, and maladaptive behavior (Andreato et al., 2020). This uncertainty can have an immense impact on athletes' careers, such as problems with investing the effort to continue their training, the pausing of all routines, or the retirement from sports (Samuel et al., 2020; Stambulova et al., 2020). One important function of SPPs is to keep athletes on track for the Olympic Games 2021 and to support their mental well-being during this crisis of uncertainty by planning ahead despite all obstacles they might encounter due to the current global health crisis (e.g., Papaioannou et al., 2020).

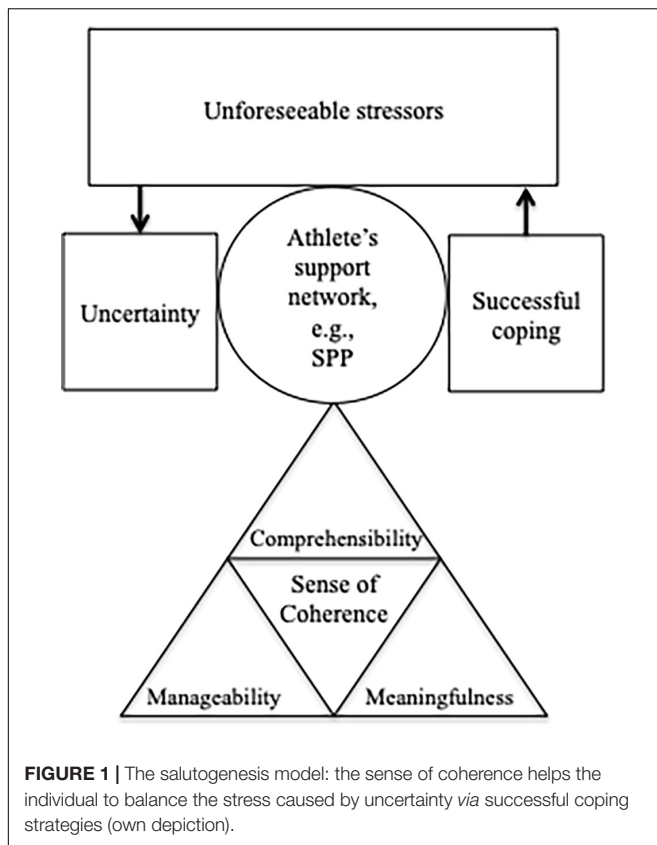
In peak performance sports, the athlete's support network tries to anticipate and plan everything as intricately as possible, e.g., with training logs, season planning, specialized nutrition, etc. However, the COVID-19 pandemic shows that very little can be planned or controlled, which increases the vulnerability of athletes' physical and mental well-being (Taku and Arai, 2020; Mehrsafari et al., 2020). Athletes may feel lost or stuck since they have limited access to training facilities and competitions,

which are the center of their daily lives as sportswomen and sportsmen. This negative effect especially on athletes with a highly developed athletic identity who show cognitive and emotional maladaptations (Costa et al., 2020) can also be seen in similar situations like injuries (Spielmann et al., 2019), changes in rules (Lobinger et al., 2010), or boycotts of important competitions (Crossman and Lappage, 2002). It is important for athletes to successfully get through injury rehabilitation, to quickly adapt to rule changes, or to feel supported when one is not permitted to participate in the most important competition of one's life. The athlete's support network and especially SPPs are in charge of supporting athletes to deal with these situations (Lim and Pranata, 2020). SPPs—as counselors for athletes who are normally not directly involved in the athlete's situation as such—generally support athletes in coping with challenging situations. Yet, SPPs are simultaneously affected by the COVID-19 pandemic. The entire athlete's support network has to struggle with the unforeseeable during the next year of preparation for the Olympic Games in 2021. The question therefore arises of how to best cope with this situation of uncertainty.

SPPs play an important role in the athlete's support network to improve the mental health of others—mainly athletes (Henriksen et al., 2020). The question, therefore, arises asking how SPPs can support athletes if they are struggling with uncertainty. The salutogenetic approach could be one avenue to answering this question, as it focuses on building up inner resources against unforeseen obstacles (Antonovsky, 1993b). Salutogenesis is an approach that explains which factors favor mental and physical health, in contrast to factors that cause disease. Salutogenesis relates health, stress, and coping. We argue that helping SPPs to strengthen their inner resources to overcome the unforeseeable of the COVID-19 pandemic will support them in empowering others, such as athletes, to stay on track for the Olympic Games 2021. We, therefore, propose and describe a workshop for SPPs aimed at developing specific coping techniques to teach athletes how to cope with the unforeseeable. At the same time, this workshop is also an intervention for SPPs to enhance their inner resources against the unforeseeable.

THEORY AND EMPIRICAL DATA ON SALUTOGENESIS

In salutogenesis, stressors, such as unforeseen events, might imbalance the continuum of well-being and ill-being (Antonovsky, 1993a,b). Individuals' well-being can be secured



via effectively coping with such stressors. Successful coping strategies can be derived from the sense of coherence (SoC), a central element of the salutogenetic approach.

The SoC defines an individuals' world view as an extensive but flexible confidence to cope with stressors. In other words, an individual with a high SoC is confident that life itself makes sense, is good, and that even though challenges and problems occur, they can be handled. The SoC consists of three components (Antonovsky, 1993b): comprehensibility, manageability, and meaningfulness (in **Figure 1**, depicted as triangles forming the SoC). Comprehensibility means that individuals can integrate the perceived stressor into their individual world view as an explicable, structured, and predictable stimulus (Eriksson, 2017). Comprehensibility refers to the cognitive component of the SoC and helps in managing stressors (Hochwälder, 2019). It encompasses being able to identify stressors correctly and choosing an appropriate coping strategy. If comprehensibility is well developed in an individual, the individual is able to encounter stressors with suitable coping strategies in a predictable way. Thus, individuals with high comprehensibility know and understand how to manage stressors. Manageability refers to the behavioral component of the SoC and describes the belief in individually realizable coping skills (Hochwälder, 2019). It relates to a feeling of self-efficacy and illustrates a feeling of trust in one's coping skills to effectively manage stressors. Here, individuals rely on resources to cope with a stressor and trust in themselves to use helpful resources adequately in order to control upcoming stressors (Eriksson and Mittelmark, 2017; Mittelmark

et al., 2017). Meaningfulness describes a motivational–emotional drive to actively deal with stressors as meaningful challenges in one's life with the adaptation of manageable coping strategies (Hochwälder, 2019). It supports individuals in using coping strategies to recognize stressors as meaningful challenges. In doing so, coping with these challenges leads to a feeling of satisfaction and increased confidence in the ability to take care of oneself.

Individuals that have high comprehensibility, manageability, and meaningfulness are very resourceful in seeking out coping strategies. Such strategies could include seeking out valid news sources (comprehensibility), employing successful time management (manageability), or feeling social belonging and support (meaningfulness). The stronger the SoC, the more likely it is to stay resilient (Eriksson and Lindström, 2005).

During the COVID-19 pandemic, athletes are confronted with different concrete stressors that they need to cope with. A strong SoC supports athletes and their entourage in order to maintain equilibrium. This equilibrium can be visualized as a scale that ranges from uncertainty due to unforeseeable stressors to successful coping (see **Figure 1**). Among these are the unforeseen postponement of the Olympics, unforeseeable competition procedures, or unforeseen questions that arise concerning athletes' ongoing careers (see more detailed stressors in Lautenbach et al., 2021). The sum of stressors can lead to an imbalance in the ill- and well-being continuum, which is described as the crisis of uncertainty (**Figure 1**). According to the salutogenetic approach, it is easier for individuals who have a well-developed SoC to cope with these stressors. Yet, to our knowledge, there is currently no explicit salutogenetic approach that is applied in sport psychology even if selected strategies exist and might already be implicitly taught.

In these times, however, it seems difficult to assess uncertainty as a comprehensive, manageable stressor that can be accepted as a meaningful challenge by athletes and their entourage. An uncertain future infiltrates comprehensibility, manageability, and meaningfulness to various extents: the uncertainty regarding the effects of the COVID-19 pandemic on the world of sports seems to be incomprehensible since its determinants and consequences are unpredictable. By that, it is difficult to find a structure of uncertainty when its determinants remain unclear or when knowledge about COVID-19 changes rapidly due to the ongoing publication of new research results. Finally, uncertainty seems to be unpredictable *per se* as no one knows what might happen next. Thus, the question arises, what athletes and their entourage can do to satisfactorily understand and appropriately predict the current pandemic situation, which is accompanied by uncertainty to deal with the current uncertain situation in sports. It is difficult, but not impossible, to manage this time of uncertainty. For example, athletes face an entirely new interruption of their preparations for the 2020 Olympics due to the pandemic situation, but still, many athletes know how to manage similar interruptions (e.g., injuries) to come back again. Last but not least, uncertainty can force athletes and their entourage to question whether it is meaningful to cope with the current situation when the future of training and competition is rather vague (i.e., “Why prepare for the Olympics if it is unclear whether they

can take place in 2021?”). However, salutogenesis provides a suitable approach in sport psychology practice on how to use psychological skills to empower athletes and their support network in order to cope with uncertainty as a critical time in an athletic career.

Especially in critical times of an athletic career, research shows that a strong SoC is associated with many benefits. Generally, a higher SoC in elite athletes correlates with more positively developed mental skills (Fallby et al., 2006) and higher subjective well-being (Mayer and Thiel, 2014). Comparisons between students who are regularly physically active and those who are not indicate that regular physical activity enhances individuals' SoC and lowers mental disturbances (Jindo et al., 2018). This relation between being active and an enhanced SoC seems to be more intense when individuals participate regularly in successful competitive sports (Jindo et al., 2018). Additionally, a stronger SoC seems to prevent competitive athletes from displaying morally questionable behavior, such as doping (Sheykhmaghshe et al., 2020). However, athletes' SoC can vary throughout their careers. Unforeseen negative experiences like injuries, which lead to a long recovery break or even to a career termination, challenge athletes' SoC (Mayer and Thiel, 2014). Taking into account that a high SoC has many benefits but may be dynamic, it is important to ask how the SoC can be strengthened.

Overall, although the SoC is seen as a stable construct, research indicates that highly stressful events such as the COVID-19 pandemic may decrease the SoC, as has been shown for other destabilizing life situations (Schnyder et al., 2000; Volanen et al., 2007; Mayer and Thiel, 2014). Therefore, a focus on developing and reinforcing athletes' and their entourages' world views (i.e., SoC) is not only relevant for their mental health (Mayer and Thiel, 2014) but also has the potential to support them in their sporting career (e.g., Jindo et al., 2018). However, athletes need to be supported during that process (Henriksen et al., 2020), and thus, the athletes' entourage needs to initiate the development and reinforcement of the SoC within the COVID-19 pandemic. Therefore, the idea is to strengthen the athletes' support network's stress responses so that they can better deal with the uncertainty themselves. At the same time, the aim is to empower the athletes' support network themselves so that they can then pass on their knowledge and experiences to the athletes they are working with.

In the following, we illustrate coaching techniques aimed at strengthening the SoC in the athletes support network (i.e., SPPs and coaches) during the COVID-19 pandemic. SPPs play a key role in providing psychological support to athletes and also to all other members of the athlete's support network. At the same time, the SPP is also challenged by the effects of the pandemic. Therefore, our intervention focuses, first of all, on strengthening the SPPs' SoC so that they, in a second step, can help reinforce and develop their athletes' SoC.

SOC WORKSHOP FOR SPPS

Aims of the Workshop

The aim of the workshop for SPPs is to enhance their SoC by strengthening their feelings of comprehensibility, manageability,

and meaningfulness. This workshop aims at helping them to cope with the unforeseen they experience during the pandemic. Once SPPs have strengthened their SoC, they are better equipped to cope with unforeseen events and can also transfer their knowledge to help athletes and their support network to deal with uncertainty.

Time, Venue, and Workshop Presenter

The workshop “Coping with Uncertainty” is designed as a 1-day workshop and can be conducted either online or in person. The workshop should be conducted by SPPs with an expertise in salutogenetic approaches. After attending the workshop, participants should be able to conduct their own workshops on SoC with their athletes and the athlete support network.

Online Versus In-Person Workshop

One might not have the choice of whether to teach the workshop online or in-person, and the format might also have to change at the last minute during the pandemic. In general, online workshops need more preparation time, sometimes face technical difficulties (e.g., poor Internet connection), and have motivational challenges (Rapanta et al., 2020). However, during the pandemic, they are sometimes the only way to conduct a workshop (Carr-Chellman and Duchastel, 2000).

Digital workshop software, such as Zoom, Skype, or BigBlueButton, can be used to conduct the workshop. However, one should be aware that, in some cases, only a professional or licensed version provides access to all of the tools' features. The tool should be able to subdivide the group into different smaller groups (e.g., breakout rooms or breakout sessions) and provide features, such as whiteboard or shared notes. Furthermore, the tool should enable conducting little surveys. These surveys are useful for assessing the explicit learning objectives and for enhancing the participants' motivation. It is recommended to thoroughly test the selected tool prior to the workshop both from the role as presenter and the role of participant.

Be sure to conduct a technology check for all participants at least 15 min before the workshop starts so that the participants can become familiar with the online tool and can check their cameras and microphones. We also recommend setting up a few rules regarding manner and communication during online workshops. We suggest the following rules as examples:

- Mute your microphone when you are not speaking.
- Diminish background noises and mute your mobile phone.
- Speak loudly, more clearly, and more slowly than usual.
- Do not use the keyboard when unmuted.
- Use the chat to ask questions or to communicate.

During online workshops, it is recommended to monitor the chat box regularly to ensure that every participant has the opportunity to respond to the presenter's statements. We also recommend employing additional digital tools during the workshop, like word cloud or mind map tools, to enhance the participants' motivation. However, it is advisable to only use a limited number of different additional tools.

After the workshop, we suggest leaving the workshop room open for an additional 20 min so that the participants can talk afterward.

In-person workshops foster personal interactions; yet, in times of a pandemic, it is important to pay attention to strict hygiene rules and the obligatory policies aimed at preventing infections. It is, therefore, necessary that you clarify which hygienic standards (e.g., air ventilation, regular disinfecting, and distance between participants) need to be adhered to during the workshop.

In an in-person workshop, it is important to create a communicative space and room for interactions between the workshop participants. Therefore, we recommend setting up several work spaces for single-participant exercises or discussions in smaller groups. Before the workshop starts, participants should have the opportunity to get to know the workshop environment, which can be supported by having some extra welcome time prior to the start of the workshop. Providing snacks and drinks can create a comfortable atmosphere if the hygiene rules allow this.

Furthermore, communication rules should be discussed at the beginning of the workshop. We suggest the following rules as examples:

- Switch off all mobile phones.
- Interference first: Barriers that limit the participants' focus should be addressed.
- Ask for clarifications, if something is unclear.
- Take notes for raising open questions that could be answered at the end of the workshop.
- Clarify feedback rules.
- Present the rules for how to give feedback.

In-person workshops benefit from using a variety of didactical methods (i.e., single-participant exercises, discussions in smaller groups, and role play) and materials (i.e., flip charts, whiteboards, and moderation cards). A good balance between different didactical methods and a focus on the workshop's goals should be kept to ensure that the materials fit the workshop activities.

At the end of an in-person workshop, it is helpful to allow extra time for additional or individual questions or personal consultations.

Target Group and Learning Objectives

The target group are SPPs with an interest in applying new approaches. We expect the participants to be familiar and to follow professional ethical standards (e.g., European Federation of Sport Psychology)¹. In order to provide the best learning environment, we suggest that the total number of participants does not exceed 15 (Carr-Chellman and Duchastel, 2000). This way, all participants have the opportunity to actively contribute to the workshop, but also to gain knowledge and experience.

This workshop's aim was to contribute to participants' explicit and implicit learning processes. Explicit learning refers to learning the actual content (e.g., knowledge and know-how), whereas implicit processes are how content is related to individual perceptions (e.g., experiences, evaluations, meaning, and emotions). Both processes interrelate and support achieving

the twofold aim of this workshop (i.e., SoC development in SPPs and transfer to the athlete's support network). Thus, we define explicit learning (el) objectives to describe what SPPs will know and which skills they will have acquired after attending the workshop. We define implicit learning (il) objectives to describe participants' ability to reflect on their experiences, values, meaning, and emotions regarding the workshop content.

Explicit learning objectives are as follows:

SPPs are able to

- describe and define the salutogenetic approach.
- identify SoC's relevance for health promotion and performance enhancement.
- differentiate between the three SoC components.
- identify strategies that can be applied to strengthen the SoC components.
- check and evaluate psychological counseling guidelines and strategies (e.g., Bertollo et al., 2020) published during the COVID-19 pandemic for completeness.
- develop coping strategies based on the salutogenetic approach.
- identify and explain differences in coping strategies according to the SoC components.
- apply the developed strategies to the elite sport setting.
- put themselves in the place of the athlete/the learner and to consider different barriers during the learning process.

Implicit learning objectives are the following:

SPPs are able to

- reflect on their own situation during the COVID-19 pandemic.
- reflect on their own emotional reactions during the COVID-19 pandemic.
- empathize with participants' emotions and affective states.
- reflect on their own experienced strategies and their effectiveness according to the salutogenetic approach (backspin to introduce self-reflection).
- reflect on their emotional reactions and evaluate different coping strategies.

Preparation and Material

The following preparation is needed to conduct the workshop:

- (1) We suggest preparing slides or handouts (see **Supplementary Material**) about the salutogenetic approach and current research regarding the crisis of uncertainty due to the COVID-19 pandemic.
- (2) Participants are provided with a compendium of guidelines and best practices published by sport psychology organizations during the pandemic. This compendium provides a basic collection of possible salutogenetic approaches that can be applied in their sport psychology practice.
- (3) Additional materials to prepare for the workshop parts are:
 - Papers.
 - Pencils.
 - Highlighters.

¹<https://www.fepsac.com/wp-content/uploads/2019/02/ethics.pdf>

- Index cards.
- Flip chart marker.
- Flip chart paper.
- Strips (to attach flip charts and sorting cards to a wall).

Didactics and Organization

Different didactical approaches and organizational forms can be applied in order to ensure that the learning objectives are achieved. The suggested didactical approaches and organizational forms are related to a salutogenetic education (Felbinger, 2010; further description in Section “The Workshop as an Intervention on Participants’ SoC”). Examples are:

- Individual self-reflection about coping during the pandemic.
- Silent reflections on mind maps regarding experiences and coping with uncertainty.
- Lectures about the theory of salutogenesis and related research.
- Brainstorming with the entire group or in small groups, e.g., to collect coping strategies that are based on the salutogenetic model.
- Exercises in small groups, especially evaluation of sport psychological guidelines and strategies developed for the pandemic (e.g., Bertollo et al., 2020) and the development of further coping strategies and techniques.
- Group reflections/flashlights to recapitulate workshop content.
- Group discussions about potentials and barriers of a salutogenetic approach in sport psychology.
- Role plays to apply coping strategies in sport psychological practice.

Procedure of the Workshop

The workshop comprised four parts:

- (1) Knowledge acquisition.
- (2) Knowledge transfer.
- (3) Knowledge application.
- (4) Perspective taking.

In the first part, the workshop leaders present the workshop’s basic theoretical foundation, namely Antonovsky’s model of salutogenesis, and provides a short research overview of similar research on possible crises of uncertainty (e.g., Stambulova et al., 2020). The second part focuses on transferring the knowledge acquired in the first part of the workshop, i.e., participants apply the salutogenetic theory to the applied setting in elite sports. For this, they receive a compendium of possible salutogenetic approaches that can be applied in their sport psychology practice. Building on this compendium, the participants then develop their own toolbox with their most promising coping strategies and techniques to overcome uncertainty.

The workshop should initiate a process of brainstorming and the discussion of different approaches that could be used in sport psychology practice or that could be applied by athletes and their entourage to foster their SoC to cope with uncertainty. **Table 1** lists examples of the compendium of possible salutogenetic

approaches SPPs can use in their sport psychology practice to develop and to reinforce the SoC, which can be added to their toolbox.

- During the workshop, SPPs can discuss and develop approaches to enhance comprehensibility by strengthening resources that influence individuals’ world views as explicable, structured, and predictable (see **Table 1**). One approach to make the pandemic and its uncertain consequences explicable could be to only retrieve information from highly credible sources (e.g., national and international health organizations) and to avoid constantly following the news and consulting sources that are not credible (e.g., blogs on the Internet). Adjusting plans and goal setting techniques that change individual training schedules, but not the overall goal, can give structure in this time of uncertainty. As mentioned, predictability is difficult to address in times of uncertainty, and yet, paradoxical interventions, such as contrasting best- and worst-case scenarios, might help individuals.
- SPPs elaborate approaches of manageability to build individuals’ trust in their coping strategies (i.e., resource-oriented coaching approach). Here, the workshop may focus on techniques to improve self-efficacy, self-reflection, social support, and volitional processes. Self-efficacy can be fostered by teaching techniques to adjust affective states or by successfully overcoming training barriers (e.g., integrating governmental restrictions of social distancing into daily training). Self-reflection can enhance self-efficacy, for example by thinking of challenging situations in the past in which successful coping was implemented and how these coping strategies that were successful in the past can be adapted to the current situation.
- Meaningfulness can be defined as accepting the uncertainty of the COVID-19 pandemic as an entirely new challenge for training and competition. Thus, SPPs should focus on holistic approaches when supporting athletes in the challenge to cope with uncertainty. This could be achieved by satisfying individual needs or by creating a supportive social network in which athletes and members of the athlete’s entourage take responsibility for each other. Additionally, investing in mindfulness practice can help individuals to accept the current situation (e.g., mindfulness-based exercises and mindfulness–acceptance–commitment theory; see Stambulova et al., 2020).

These examples are not a complete list, but give an idea of how SPPs can support athletes and their entourage to enhance comprehensiveness, manageability, and meaningfulness when having to cope with uncertainty (see Stambulova et al., 2020 for further approaches).

The third part focuses on knowledge application, during which participants actively apply their new knowledge, for example in role plays, and then discuss possible obstacles they might encounter. In the last part, the participants are asked to reflect on their acquired knowledge and the implicit learning processes that took place during the workshop. The workshop

TABLE 1 | Collection of sense of coherence (SoC) enhancing resources for sport psychology practitioners (SPPs) when coping with uncertainty.

SoC components	Enhancement by following resources	Example
Comprehensibility		
<i>Explicability</i>	Information and explanation	Retrieving information from sources of high credibility ^a Regular communication with others (e.g., team mates and coaches)
<i>Structure</i>	Cognitive approaches	Keeping the domestic environment well organized (hygiene, food, fresh air, etc.) supports an athletic lifestyle. ^a Domestic training might be boring: Brainstorming ideas to keep training at home interesting (e.g., watching TV shows and virtual challenges with team mates) ^a Regularly repeated psychoeducation to achieve a mental health literacy within the athlete's support network ^b
<i>Structure</i>	Planning and goal setting	Adapting the timetable, not the goals ^c Setting time slots when to search for information to avoid being overwhelmed by information about the pandemic ^a Keeping physical training constant during COVID-19 limitations; adaptation of training routines to limitations by training professionals ^d Developing strategies to reduce too much calorie consumption during a lockdown/training limitations ^d
<i>Predictability</i>	Paradoxical intervention	Juxtaposing best- and worst-case scenarios
<i>Manageability</i>	Improving self-efficacy	Developing strategies to incorporate authorities' restrictions into training and daily life ^a Teaching relaxation techniques ^{a,b}
	Self-reflection	Exploration of what keeps athletes effective and disciplined in training ^a Using self-reflection on strategies that helped you in the past to trigger a pleasant state ^a Keeping an athletic lifestyle! Relying on all routines, diets, etc., as they still are important and effective to stay healthy, fit, and ready for performance ^a Technique of circular questioning
	Social networking for support and help	Offering social support and informing when to ask and who to ask for help ^a Connecting with the athlete's support network to achieve help to manage upcoming challenges ^{b,d} Creating of a professional mental health support network ^b Including family and friends in the social-emotional support network ^b
<i>Meaningfulness</i>	Satisfaction of needs and motives	Investing time into the neglected but important things that support their goal achievement ^c
	Impact on the athlete's support network	Trusting in and relating to your social network. You need them; they need you. ^a Sharing your successful coping strategies with others (in the athlete's support network). Relating actively to them ^a Creating a safe environment (social and spatial) where it is accepted to declare mental challenges ^b Developing a mental health policy ^b Finding spokespersons for mental health in athletes ^b
	Optimism and positivism	Gratitude exercises and mindfulness-based exercises

^aBertollo et al. (2020).^bHenriksen et al. (2020).^cThe Open University (2020); <https://www.open.edu/openlearn/health-sports-psychology/coronavirus-how-can-athletes-getthrough-period-isolation>.^dAndreato et al. (2020).

ends with an evaluation of its content and execution and the effect it had on the participants' SoC. Please see **Table 2** and the **Supplementary Material** for a detailed description of the workshop content and the four parts.

The Workshop as an Intervention on Participants' SoC

The workshop is designed in such a way that it simultaneously addresses and achieves the two goals of (1) strengthening SPPs' SoC and (2) empowering SPPs' to strengthen their athletes' SoC. This goal is achieved by dividing the workshop into four parts. The first three parts aim at teaching SPPs not only about the salutogenetic theory but also how to apply it in practice and which obstacles they might encounter. The first three parts (i.e., knowledge acquisition, knowledge transfer,

and knowledge application) target SPPs' comprehensiveness and manageability skills. The last part (i.e., change of perspective) aims at strengthening meaningfulness. By changing perspective, SPPs can identify how meaningful the approach is and also how meaningful it could be for the athletes and their support network in dealing with uncertainty.

Connecting Sport Psychology Practice With Salutogenesis Through Meaningfulness

Table 2 presents the workshop's structure, the learning objectives, and the didactical methods. The last part is crucial for developing a meaningful relationship with the workshop's learning objectives by reflecting on which sport psychological techniques support athletes in a salutogenetic sense. During the last part of the workshop, the participants change their perspective to that of their athletes and are asked about the barriers their athletes might

TABLE 2 | Workshop procedure: schedule, learning objectives, content, didactical methods, and material.

Workshop phase	Learning objectives (el vs. il): Participants are able to:	Didactical method/organization
Welcome and introduction	<i>il</i> : Create a meaningful relevance by – reflecting on their own situation during the COVID-19 pandemic. – reflecting on their own emotional reactions during the COVID-19 pandemic. – empathizing with participants' emotions and affective states.	Individual self-reflection about coping during the pandemic Silent reflections on mind maps regarding experiences and coping with uncertainty
Knowledge acquisition	<i>el</i> : Enhance comprehensiveness by – describing and defining the salutogenetic approach. – understanding its relevance for health promotion and performance enhancement. – differentiating the three SoC components.	Lectures about the theory of salutogenesis and related research
Knowledge transfer	<i>el</i> : Enhance comprehensiveness by – assigning different strategies to the SoC components. – checking psychological counseling guidelines and strategies (e.g., Bertollo et al., 2020) published during the COVID-19 pandemic for completeness.	Exercises in small groups, especially evaluations of psychological counseling guidelines and strategies
Knowledge application	<i>el</i> : Enhance comprehensiveness by – developing new coping strategies based on the salutogenetic approach. – identifying and explaining differences in coping strategies according to the SoC components. – discussing the usefulness of the developed strategies for the elite sport context. <i>il</i> : Enhance SoC manageability by reflecting their own experienced strategies and their effectiveness according to the salutogenetic approach (backspin to self-reflection during the introduction).	Brainstorming with the entire group or in small groups, e.g., to collect coping strategies according to salutogenesis Exercises in small groups, especially development of further coping strategies Group discussions about potentials and barriers of a salutogenetic approach in sport psychology
Perspective taking	<i>el</i> : Enhance manageability by putting themselves in the place of the athlete/learner by considering different barriers during the learning process. <i>il</i> : Enhance meaningfulness by reflecting on their own emotional reactions and evaluations of the coping strategies discussed in the workshop.	Role plays to apply coping strategies in sport psychological practice Silent reflections on mind maps regarding experiences and coping with uncertainty
Conclusion		Group reflections/flashlights to recapitulate workshop parts

el, explicit learning: “comprehensiveness”; *il*, implicit learning: “meaningfulness”, SoC, sense of coherence.

experience when learning salutogenetic skills. In this part of the workshop, SPPs have to conscientiously reflect on what it means for athletes to apply salutogenetic sport psychology practices. This part of the workshop—connected to Beeler's (1991) stages of learning—fosters SPPs' learning about which sport psychological techniques are meaningful for their work with athletes.

According to Beeler (1991), learners (here, SPPs) pass through four different but interrelated stages of learning, namely unconscious incompetence, conscious incompetence, conscious competence, and unconscious competence, and different learning processes occur in each stage. Due to participants' advanced professional knowledge and experiences, SPPs most probably have already reached Beeler's fourth stage of unconscious competence with regard to dealing with stress (i.e., highly competent routines in practice that are unconscious for the SPP). However, in order to help athletes to develop and learn new coping strategies, SPPs need to consciously reflect on their own learning process. Making the unconscious competence explicit means that the participants are asked to reflect out loud on their emotional reactions and evaluations throughout the workshop. Whenever participants refer to their implicit processes (e.g., claiming “this strategy works really well for my athletes” with no reference to salutogenesis), the workshop leader should pick up on this and ask participants to reflect out loud so that others

can learn from their experiences. Making the implicit processes explicit by asking SPPs to reflect on their current learning processes supports the empowerment of SPPs' manageability and meaningfulness according to the SoC. This means that SPPs are provided with time during the workshop to emotionally reflect on the coping strategies they like or dislike in their applied work with athletes.

Salutogenetic–Education Approach

During the four-part workshop, we follow a salutogenetic–educational approach (Felbinger, 2010) to support the workshop's psychoeducational aim. Therefore, the workshop uses methods related to the SoC components. In the first three phases, we focus on comprehensibility and manageability. Comprehensibility is enhanced by using cognitive approaches (i.e., lectures), networked learning strategies (i.e., group exercises), a focus on combining knowledge–understanding–developing (i.e., evaluation and further development of COVID-19 pandemic guidelines), hands-on methods (i.e., application of salutogenetic strategies in role plays), and reflections on emotional reactions (i.e., self-reflection at the beginning). Manageability is realized by creating resources *via* self-reflection on comparable situations and one's own biography (i.e., brainstorming potential salutogenetic approaches out

of self-reflection of SPPs' practical work), as well as social networking and team work (i.e., group exercises). In the fourth phase, we lay a foundation for the development of meaningfulness by reflecting on the workshop's impact on participants' SoC regarding coping with uncertainty. We ask about the way the workshop might change their applied work (i.e., flashlights and self-reflection at the end of the workshop). Last but not least, by also asking them to take the athletes' perspective, we hope to enhance the know-how transfer to the athletes and their support network (i.e., perspective taking).

APPLICATION AND EVALUATION OF THE WORKSHOP

The present workshop was conceptualized with already existing sport psychological techniques, and the goal was to rearrange them based on the theoretical framework of salutogenesis. The workshop achieves a twofold educational and psychological aim: on the one hand, workshop participants learn and develop sport psychological approaches they can apply when working with athletes (educational aim). On the other hand, participants develop and reinforce their own SoC (psychological aim). To test whether this twofold aim is successful, we conducted and evaluated a workshop. The target group of the workshop were volleyball coaches and not SPPs. This target group is also highly important for athletes' welfare and, in addition, also in need of support when major sporting events occur (e.g., 1980s Olympic boycott; Crossman and Lappage, 2002). The workshop content was adapted accordingly.

Workshop Participants

In a single-day online workshop, $N = 26$ German volleyball coaches participated. Data from 18 coaches (14 males and 4 females) were analyzed. Sixteen coached at local and two at the regional level. They were on average 46 years old ($SD = 13$ years) and had an average coaching experience of 16 years ($SD = 13$ years).

Evaluation Instruments and Procedure

Prior to the workshop, all participants were informed about the content and the goals of the workshop, as well as the evaluation process. Participants volunteered and accepted data assessment, analysis, and anonymous reporting after having received all information and before answering any evaluation questions.

To evaluate the workshop, its effect on SoC, as well as the perception of dealing with uncertainty, participants were asked to answer questionnaires before and after the workshop. For pre- and post-measurement, the questionnaire contained the Sense of Coherence—Leipzig short version (SoC-L9; Schumacher et al., 2000) with three subscales on comprehensibility (two items, $\alpha = 0.87$), manageability (three items, $\alpha = 0.84$), and meaningfulness (four items, $\alpha = 0.68$); a resilience questionnaire (RS-13; Leppert et al., 2008) including 13 items that are answered on a seven-point Likert scale ranging from 1 = *I do not agree* to 7 = *I completely agree* ($\alpha = 0.73$); and a semantic differential to assess coping with uncertainty (instruction: "How do you

evaluate your individual coping with the current situation of uncertainty in training and competition?"; semantic differential: 0 = *very poor* to 100 = *very good*), affective response: valence (0 = *negative* to 100 = *positive*) and arousal (0 = *tense* to 100 = *relaxed*), as well as stress (0 = *stressed* to 100 = *not stressed at all*). Finally, we assessed the workshop quality and the perceived acquired skills by the participants at post-measurement with the Quality Questionnaire for Sport Psychological Coaching (QS-17; Kleinert and Ohlert, 2014). In addition, we asked how likely it is that they will use one of the tools that they have learned during the workshop. Questback was used as a software to collect evaluation data.

Workshop for Volleyball Coaches

Before the workshop day, the participants were asked to fill out the evaluation questionnaire at pre-measurement. The workshop was adapted to the target group of sport coaches by omitting the fourth phase of the workshop "perspective taking." Therefore, the workshop had three parts.

- (1) Knowledge acquisition: At the beginning, the participants were welcomed and asked to brainstorm current issues when thinking of uncertainty in everyday training. Then, an input session regarding salutogenesis followed.
- (2) Knowledge transfer: In a subsequent work phase, the volleyball coaches were asked to brainstorm what they are currently doing with their athletes to address the challenge of uncertainty in training and competition. A second input session regarding SoC enhancers then followed.
- (3) Knowledge application: In the third phase, the participants were asked to adapt enhancers of the prior work phase to their own training. Then, the participants discussed these enhancers with a colleague and shared what they want to achieve when interacting with their athletes with the entire group. Finally, the participants reflected on the workshop and were asked to answer the evaluation questionnaire for a second time.

Data Analysis and Results

The collected data were analyzed using SPSS version 25.0.0. Data were checked for normality and outliers. Two outliers were detected and analyses were run with and without outliers. As the same pattern of results was present, we will report all analyses including outliers. After the descriptive statistics, a multivariate analysis of variances (MANOVA) with repeated measures (pre and post) was calculated to test for changes in the dependent variables (comprehensibility, manageability, meaningfulness, resilience, perception of coping: uncertainty, valence, arousal, and stress).

Descriptive data of all the dependent variables are shown in **Table 3**. The results show no significant main effect of time [$F(8, 10) = 1.04$, $p = 0.467$, $\eta_p^2 = 0.454$]. Still, for a detailed analysis, the univariate results can be seen in **Table 3**, showing a decrease in arousal and a tendency for a decrease in uncertainty after the workshop. The descriptive data, even though not overall statistically significant, show that relevant dependent variables can be positively impacted even during a 1-day workshop.

TABLE 3 | Descriptive statistics of the dependent variables from pre and post workshop, including univariate test results.

	Pre (SD)	Post (SD)	<i>p</i>	η_p^2
Comprehensibility	5.44 (1.38)	5.69 (1.44)	0.537	0.023
Manageability	5.93 (1.20)	5.98 (0.82)	0.841	0.002
Meaningfulness	5.69 (0.82)	6.00 (0.78)	0.190	0.099
Resilience	75.61 (7.68)	77.28 (6.16)	0.356	0.050
Uncertainty	56.67 (35.60)	68.94 (26.31)	0.084	0.165
Valence	63.61 (27.63)	70.83 (25.17)	0.314	0.059
Arousal	66.17 (25.57)	78.44 (16.08)	0.048	0.210
Stress	75.06 (17.60)	77.11 (15.34)	0.641	0.013

Comprehensibility, manageability, and meaningfulness can range between 1 and 7. Resilience can range between 13 and 91. Higher scores mean higher values. Uncertainty, valence, arousal, and stress can range between 0 and 100. The higher the number, the more certain, more positive, more relaxed, and less stressed participants feel about the current situation of uncertainty.

Overall, these changes show that the SoC, uncertainty, affect, and stress perception can be positively impacted on a descriptive level, even though coaches had not even applied what they had learned yet. Thus, we would carefully interpret that the workshop provides an added value.

Participants rated the workshop quality on average 3.6 (out of 4, SD = 0.35) and rated the skills they acquired on average as 3 (out of 4, SD = 0.64). On average, the participants believe that they are very likely to use the learned tools in the near future (82%, SD = 24%).

OUTLOOK

Practical Perspective on Athletes' Support

Planning and conducting a workshop to empower one's SoC in order to better deal with uncertainty in sport psychology practice also is self-help. It allows SPPs to not only empower their athletes but to also reflect on salutogenetic approaches that could be helpful in their own daily life and work. SPPs play a crucial role for athletes when they have to cope with challenging situations (e.g., Papaioannou et al., 2020). The COVID-19 pandemic is such a situation, and it personally affects SPPs as well as athletes and their entire entourage. However, SPPs often do not pay enough attention to their self-care and thereby neglect their mental well-being. SPPs, however, need to be aware of their mental well-being in order to avoid negatively impacting their athletes (Papaioannou et al., 2020). Our workshop provides SPPs with an opportunity to invest in their mental well-being (i.e., to empower their SoC by applying the discussed practices of this workshop to their own lives) as well to further develop tools that they can apply when working with their athletes (i.e., toolbox of salutogenetic strategies and skills) and with other members of the athlete's entourage (Lim and Pranata, 2020).

Our workshop aims to support SPPs to better prepare for the 2021 Olympics and to better deal with the crisis of uncertainty. The more SPPs participate in workshops to enhance their SoC and to develop salutogenetic tools for their practical work, the more support for athletes to keep on track for Olympics 2021

and beyond can be provided. By that, we follow the idea of creating a mental health network for athletes and their entourage (Henriksen et al., 2020). Throughout the following months, athletes should learn to trust in their SoC by comprehending what is going on, managing their challenges, and finding meaning in coping with uncertainty in order to reduce the crisis' negative effects (Andreato et al., 2020). We, therefore, suggest that these skills are taught to athletes directly during the crisis (i.e., the toolbox of salutogenetic strategies and skills developed during the workshop). In addition, the salutogenetic approach might also help in dealing with future uncertainties, like having to terminate an athletic career (Stambulova et al., 2020).

Hence, it is necessary to develop SoC-enhancing strategies for SPPs, athletes, coaches, and others to diminish the effects of uncertainty (Taku and Arai, 2020; Mehrafsar et al., 2020). Based on this first collection, the goal of the workshop could be to develop an even larger toolbox of techniques theoretically based on salutogenesis to better cope with uncertainty.

Theoretical Perspective on Salutogenesis in Peak Performance Sports

Considering salutogenesis as a valuable approach in sport psychology is rather new and advances the research field in two ways. First, the theory of salutogenesis can be integrated as an additional theoretical framework for investigating both peak performance and mental health within the elite athletic community under unforeseen conditions in a normally very planned and controlled environment. Unforeseen changes challenge athletes' perceptions about being able to perform at a top level despite severe changes in their "normal" environment. In line with existing literature (e.g., Fallby et al., 2006; Mayer and Thiel, 2014; Jindo et al., 2018; Sheykhmaghshe et al., 2020), we assume that Antonovsky's (1993b) salutogenetic model of the SoC can support athletes. Yet, having an impact on the SoC may support not only the athletes but also the other members of the athlete's support network. Our workshop proposes that SPPs should empower their own SoC before passing their experiences on to their athletes. Thus, we would like to motivate other researchers in the field of sport psychology to investigate the salutogenetic approach and the SoC to derive and (empirically) test sport psychological applications for athletes and other target groups, such as coaches and staff members. Secondly, and connecting to the prior argument, we would expect more research on salutogenesis in elite sports. We theoretically designed a workshop that might support SPPs' SoC and, in the long term, even athletes' SoC and thus help them in this crisis of uncertainty. However, evidence for the effectiveness of this approach is lacking. We therefore strongly recommend an evaluation of this workshop with pre and post measurements using standardized psychological questionnaires to assess uncertainty, stress, and the SoC [e.g., Perceived Stress Scale (PSS-10), Reis et al., 2019; Sense of Coherence Scale (SoC-S), Singer and Brähler, 2007]. Similar assessments with athletes who work with SPPs who participated in the workshop should also be conducted.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

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AUTHOR CONTRIBUTIONS

SL and FL came up with the idea and conceptualization. NW and SL planned the workshop. FL and SL conducted and evaluated the workshop. SL wrote the first draft. SL, FL, and NW provided revisions. LK did the literature research and helped with formatting. A-ME proofread the manuscript, contributed to resources, language editing, and supervision. All authors contributed to the article and approved the submitted version.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.612264/full#supplementary-material>

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Emotional Reactions and Adaptation to COVID-19 Lockdown (or Confinement) by Spanish Competitive Athletes: Some Lesson for the Future

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The Coronavirus Covid 19 (SARS-CoV-2) pandemic has produced terrible effects in the world economy and is shaking social and political stability around the world. The world of sport has obviously been severely affected by the pandemic, as authorities progressively canceled all level of competitions, including the 2020 Olympic Games in Tokyo. In Spain, the initial government-lockdown closed the Sports High-performance Centers, and many other sports facilities. In order to support athlete's health and performance at crises like these, an online questionnaire named RECOVID-19, was designed to assess how athletes were living their lives during such periods of home confinement. The main purpose of the questionnaire was to assess the impact of prolonged confinement on athlete's psychological, emotional, and behavioral performance. One thousand, two hundred forty-eight athletes participated in the survey. They had the following characteristics: (Mean age = 22.31 ± 11.49 , Female: 53%), who compete at National ($N: 1017$, Mean age = 21.58 ± 11.42 , Female: 52%) and International level ($N: 231$, Mean age = 25.56 ± 11.22 , Female: 57%). Results showed that during the confinement period, those athletes who lacked motivation reported a higher level of stressful thoughts, more behavioral problems, and greater emotional upheaval (anger, fatigue, tension, and depression). However, those athletes who accepted confinement measures as necessary, and were in favor of respecting the rules of social isolation, fostered positive emotional states such as feelings of friendship. In addition, the availability of some sport equipment together with the ability to continue some training, were (1) protective factors against emotional stress, lack of motivation and behavioral problems; and (2) they were associated with greater respect for, and adherence to, confinement rules. Gender differences, tested by multigroup analysis, revealed that coping activities were more often associated to negative emotional states among women, whereas the ongoing availability of training information and future conditions were equally protective factors for both genders. This study also showed that receiving coaching, support and completing

frequent training routines seem to be valuable tools to prevent or reduce some of the harmful effects of isolation on athlete's emotional well-being. The conclusions derived from this research would possibly help sport authorities to design supporting policies and plans to support athletes and trainers in future disruptive health crises.

Keywords: COVID-19, confinement, training, stress, coping activities, mood/emotion, athletes, sport

INTRODUCTION

As of March 20th, 2021, and according to the Faisier Family Foundation (www.kff.org consulted March 20, 2021), SARS-CoV-2/Coronavirus (COVID-19) has infected 122.315647 million people and has taken 2,701.443 million lives all over the world. The pandemic is still expanding, though growing and effective vaccination programs are beginning to have some modulating effect on the pandemic morbidity and mortality as the proportion of vaccinated populations grow.

The pandemic is also severely affecting the world's economy, causing drastic reductions of Gross Domestic Product, massive loss of employment, and threatening social and political stability in many parts of the world. Spain, with over 3 million reported infections and more than 72 thousand deaths has also been severely affected by COVID-19 which it is causing an unprecedented economic slowdown (Zaar and Ávila, 2020). Drastic mobility restrictions, followed the initial lockdown ("confinement"), in an attempt to control the rapidly rising second wave of COVID-19, and its corollary of hospitals close to collapse, very high rates of infection, high morbidity and mortality among healthcare personnel, intense political polarization, and the growing social controversy and discontent of people who were demoralized by having to face additional mobility limitations, just after completing the prolonged (83 days) lockdown which followed the Spanish Government initial declaration of a State of Alarm on 14 March 2020 (Gobierno de España, 2020). The first 45 days of the state of alarm lockdown were the stricter, basically requiring all but essential workers, to stay at home and worked on-line. Schools, universities, and other educational centers were closed. The state of alarm limited free mobility of Spanish citizen, and it required them to stay home all day, except for essential activities such as food shopping or visiting health services, or working activities defined as crucial. Inevitably, the world of sport has also been severely affected by the pandemic (World Health Organization, 2020a,b).

Following international and national health's recommendations, both international and Spanish sports facilities were closed, including high performance and sports medical centers, specialized training centers, gyms, outdoor and indoor spectator sport activities, and even professional sport leagues. Athletes, trainers, coaches, and other support staff, as well as professionals (physicians, physiotherapists, psychologists, among others) were directed to stay at home as well. Local, regional, and national competitions in all sports were postponed early, and were canceled a short time later (Mann et al., 2020). Uncertainty was a common and popular word to describe the day-to-day situation, and the emotional climate. And not just

among regular citizens, but even more in the sports world, as key decisions were delayed generating further controversy. The International Olympic Committee (IOC) postponed any decision about the celebration of Olympic Games (OG), even when the Canadian Olympic (COC), and Paralympic Committee (CPC) announced that Canadian athletes would not attend the Tokyo 2020 Olympic Games (Donnelly, 2020). This was a move that generated considerable controversy between athletes, the IOC, and many sponsoring companies. Athletes argued for a voice in the decision making, driven by fear of contagion by exposure (Corsini et al., 2020). No one felt immune, despite the obvious general good fitness of such athletes as soccer players.

Finally, when the Olympics Games were postponed until 2021, the consequent emotional impact on the athletes, and their coaches may have been some relief from the confusion, but it surely lead to profound disappointment, frustration, and a broad spectrum of adverse emotional and cognitive reactions such as fear for their future careers as competitive athletes (Taku and Arai, 2020). Previous work on COVID-19 already indicated that athletes might face significant difficulties as a result of the severe training limitations, the adverse impact of canceled competitions and major events, and the loss of the strong motivation that accompanies the chance to compete in such unique events as the Tokyo Olympics Games (Mehrsafar et al., 2020). Compounding the problem, the sport economy was also deeply affected (García-Tascón et al., 2020). Making the future of the athletes financial and career support even more doubtful.

As the pandemic unfolded, we (Sports Psychologists in the Andalusian Center of Sport Medicine's Psychology Unit (ACSMPU) wanted to learn about the effects of the pandemic confinement on the lives of athletes of different specialty sports, and about potentially successful interventions that might modulate the adverse effects detected. The Spanish Rowing and Swimming Federation, and the Andalusian sports authorities, as well as sport clubs and independent coaches, contacted the Andalusian Center, seeking guidance on how to help and support their athletes during the pandemic' confinement. Given the scarcity of precedent guided advise, we found it necessary to get real-time information about the athlete's needs, concerns, and emotional reactions, during and after the period of confinement (World Health Organization, 2020c). The initial literature defined this period as a major stressful period possibly associated with emotional reactions typical of Post-Traumatic Stress Disorder (Sood, 2020); a position soon discarded, as reactions occurring during the confinement period could not, by definition, meet the key temporal criteria of Post-Traumatic Stress Disorder while occurring during the trauma (Jaenes et al., 2020b). So rather than pursued diagnostic entities, we opted to

sample broad, cognitive, amotional, and behavioral parametrs with well-validated nstruments.

The Profile of Mood States (POMS) inventory, developed by McNair et al. (1971, 1992), has been widely used in sport and exercise research (Terry and Lane, 2000; Terry et al., 2003). Following Morgan's Mental Health Model, positive mood states enhance successful sports performance, whereas negative mood states is associated with a poorer performance (Morgan, 1980, 1985; Morgan et al., 1988). Numerous experimental studies and meta-analysis, have shown that athletes' negative mood states predict poorer performance in a wide range of sporting activities (Berger and Motl, 2000; Leunes and Burger, 2000; Lochbaum et al., 2021). However, the relationship between mood and physical activity can go in the opposite direction: the practice of sports activities improves mood, both in professional and amateur athletes (Steptoe and Bolton, 1988). In addition, the improvement of mood after physical activity is observed even in critical situations such as people suffering from a specific ailment or chronic disease (Ensari et al., 2017; Crush et al., 2018). For athletes, it has been observed that the practice of physical activity and sports during the recovery period of a physical injury reduces their negative moods and is thus associated with a more favorable recovery (Hadala et al., 2010).

Just as physical activity can improve mood, other coping activities might also reduce negative mood during a period of recovery or stress, such as leissure activities, social networking, artistic activities or learning activities (Waters and Moore, 2002; Drake et al., 2014; Domuschieva-Rogleva and Iancheva, 2017; Chan et al., 2019). It has been discussed whether the practice of these activities' directly influences mood states, or whether such influence is mediated via the reduction of stressful thoughts and the increase in motivation. A recent study in sport students shows that, among other coping strategies, positive cognitive restructuring of the COVID 19 pandemic situation was associated with positive mood states (Iancheva et al., 2020). Jamieson et al. (2018). These authors have proposed an integrated model showing that stress coping strategies modify stress by changing mindsets about the stressful situation. According to this integrated model, numerous studies reveal that, in acute stress conditions, stressful thoughts are associated with negative emotions, but also, by stimulating positive reappraisal of distress and prompting a different view of stress, can enhance positive emotions as well (Crum et al., 2014, 2017; Yeager et al., 2016; Keech et al., 2018). During the COVID-19 crisis, a study in Olympic and Paralympics athletes claims that neuroticism personalities were associated with negative emotions and, in turn, the confinement have a higher impact in their training routines and performance (Clemente-Suárez et al., 2020). Furhermore, the study in Olympic and Paralympics athletes found that there was a strong positive relation between athletes'agreement with the confinement and the perception of institusional support provided.

Additional variables that may mediate the relationship between physical activity or sport and mood states during periods of recovery or stress may be access to psychological support and the athlete's perception of the need to rehabilitate and suspend sports practice in competitive tournaments for a limited time. In

a study of athletes facing prolonged recovery from injury, it was shown that the perception of illness has emotional consequences; thus, a high perception of the illness's controllability was associated with lower negative mood (van Wilgen et al., 2010). Regarding access to information or psychological support, Kenttä et al. (2006) found that athletes who obtain continuous feedback about their emotional states during the period of recovery from injury manage to reduce their negative mood states. Mohammed et al. (2018). revealed that during an injury, athletes treated with mindfulness-based techniques reduced their negative moods and were more likely to improve in their injury without suffering from psychological stress.

Although the relationship between physical activity and mood states is widely contrasted, there are divergences about the moderating role of gender. Numerous studies have shown greater stress reaction and negative moods in women than in men in a period of prolonged rest such as that due to injury or absence from competitive events (Di Fronso et al., 2013; Reynoso-Sánchez et al., 2020). Rocheleau et al. (2004) found that women may benefit more than men from improving mood states through physical exercise. Other studies have found no such significant differences between women and men (McAuley and Rudolph, 1995; Reigal et al., 2020). Regarding the impact of utilizing available coping strategies, Reigal et al. (2020) found (in beach handball players) that coping skills are differentially associated with mood states by gender; women gained less stress reduction than men through the use of coping activites. Recently, Clemente-Suárez et al. (2020) demonstrated that, during the COVID-19 pandemic crisis, women athletes scored higher in neuroticism and psychological inflexibility than men athletes. Therefore, the issue of gender differences in emotions, being still in need of clarification, it might be important to analyse wich factors and mediator variables might promote positive moods in women and which ones reduce their negative moods.

This study aimed to analyze the effect of the confinement applied in Spain on March 14 2021, to combat the impact of the Covid 19 pandemic, on the behavior thoughts and emotional states of a sample of 1,248 athletes. The main hypothesis was that the maintenance of some training conditions, and the regular performance of coping activities can function as preventive or modulating factors of behavioral and emotional problems, reducing the experience of negative moods in the confinement period. The present study applied a structural equation modeling to examine the relationship between training conditions and coping activities with moods states (anger, fatigue, vigor, feelings of friendship, somatic tension, and depressed moods). The conceptual framework, outlined in **Figure 1**, assesses the mediating role of behavioral problems, stressful thoughts, seeking psychological support, and attitudes toward confinement rules. Furthermore, by applying multigroup analysis, this study tested possible outcome differences by gender.

MATERIALS AND METHODS

Samples and Procedures

One thousand, two hundred forty-eight athletes participated in the study (Mean age = 22.31 ± 11.49, Female: 53%), who

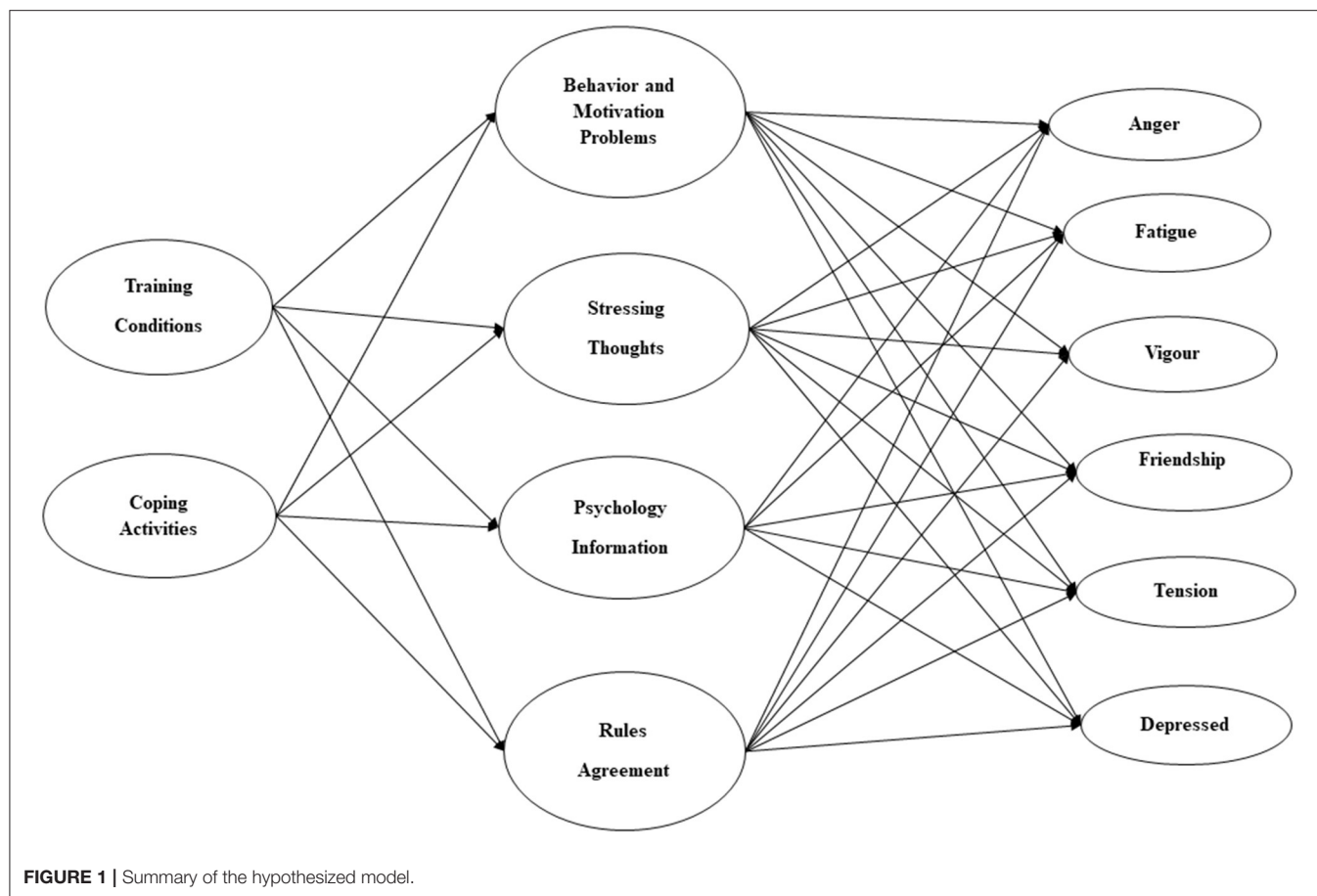


FIGURE 1 | Summary of the hypothesized model.

compete at National ($N: 1,017$, Mean age = 21.58 ± 11.42 , Female: 52%) and international level ($N: 231$, Mean age = 25.56 ± 11.22 , Female: 57%). The sample was drawn from Spanish athletes who compete in individual sports, a detailed description of the athlete's sample grouped by sex, sports and competition level is shown in the **Supplementary Table 1**. The questionnaires were collected between the 10th of April (2 weeks after the national lockdown) and the 1st of May of 2020.

The study was conducted using a descriptive quantitative methodology based on random, non-purposive sampling, and snow-ball effect. An online *ad hoc* questionnaire was designed (Emotional and Adaptive reactions during confinement COVID-19-RECOVID-19; Jaenes et al., 2020a), to assess competitive Spanish athletes of different sports. In addition to sociodemographic and housing characteristics information, the questionnaire collected information on home training conditions and the performance of coping activities during confinement. These measures of training conditions and coping activities were based on previous studies which examined the relationship between physical exercise, leisure activities, and psychological well-being (Im Yi et al., 2015; García-Castilla et al., 2018). Behavior or motivational problems and stressing thoughts were tested in the questionnaire with some items adapted from the Recovery-Stress Questionnaire for Athletes (RESTQ-Sport; Gonzalez-Boto et al., 2008), and adding questions about eating

and sleeping patterns. Following the recommendations of the Association of the Applied Sport Psychology (Byrd et al., 2020) and the World Health Organization (2020a,c) for the prevention of psychological distress among athletes given the COVID-19 Pandemic, some additional items of the questionnaire were elaborated to evaluate the seeking for psychology advice and the acceptance of confinement rules. The short and validated Spanish version of the Profile of Mood States POMS was used to assess emotional states (Andrade et al., 2010).

The questionnaire included an introduction with the aims of the research, specific instructions to fill it out, and the aims of the survey, ethics information for participants, as well an informed consent for adults and parent permission for athletes under 18. It was necessary to use internet and mainstream media, including WhatsAppTM, because of the mobility and personal access limitation imposed during the testing period by the pandemic control efforts. These research methods have been reported as valid and reliable (Díaz de Rada Igúzquiza et al., 2019).

The questionnaire was initially tested on a sample of 10 athletes (50% were females for each sport) to determine that it was appropriate and understandable: four of which were track and field runners (Mean Age = 27.5, $SD = 4.79$), two were rowers (Mean Age = 27, $SD = 1.41$), two were kayakers (Mean Age = 24.5, $SD = 0.70$) and two were triathletes

(Mean Age = 27, $SD = 12.72$). Four coaches and four sport psychologists, blind to the study objectives, were recruited for validation as recommended by Osterlind (1998) with a Likert scale to assess the comprehension and adequacy of the items.

This survey was sent on the Internet using the list of contacts of the Rowing, and Swimming Spanish Federation, Sport and Educations Council of the Andalusian Government, different Andalusian Sport Federations, Andalusian Center of Sport Medicine (CAMD).

Ethical Statement

The present study was approved by the Ethical Committee of the Andalusian Center of Sport Medicine (CAMD) Project CAMD-PSY2020/01, and was conducted according to the Declaration of Helsinki. The CAMD is a public medical center under the direction of Andalusian Council of Education and Sport, and CAMD's objective is to care for the athlete's physical and psychological health. Participants could withdraw from the survey at any moment without providing any justification, or jeopardizing their status in the organization. To encourage the recruitment of potential future participants, Federations will receive information about results in their particular sport. In addition, Rowing and Swimming Federations will organize a meeting (via Streaming) to inform athletes, coaches and officials. Completing the questionnaire was voluntary, anonymous and confidential. No name was registered. Completion times were between 4 and 8 min. Inclusion criteria were being Spanish and compete at National or International level. Exclusion criteria was to compete at local or regional level.

Measures

Sociodemographic Variables

The survey sought information about the following parameters age, gender, competitive level, and education level. Life and training related information with questions about the house size, the availability of terraces or gardens, and the number of training hours per week are shown in **Table 1**.

Training Conditions

Training conditions on confinement were tested by four items, shown in **Table 2**, availability of equipment at home to train properly, coaches follow up, organization timesheet, and their opinion on their ability to keep their physical fitness. Participants were asked to answer on a four-point Likert scale from 1 (Never) to 4 (Very frequently).

Coping Activities Utilization

A list of coping strategies was assessed through gathering information about activities such as reading, watching TV, playing video-games, listening to music, practicing relaxation techniques, using social networks, learning something new like cooking, etc. The 15 items coping activities were coded as "1. yes" or "0. no" The 15 items were combined into three parcels shown in **Table 2**, with five items each to operationalize the latent variable (Ho, 2013). Then the sum of items in each parcel ranked from 0 to 5.

TABLE 1 | Descriptive characteristics of the sample by gender.

	Men <i>n</i> (%)	Women <i>n</i> (%)	χ^2 (df)
Gender	587 (47)	661 (53)	4.38* (1)
Education level			35.487*** (3)
Primary school	35 ^a (6)	100 ^b (15.1)	
Secondary school	125 ^a (21.3)	169 ^a (25.6)	
High school	215 ^a (36.6)	189 ^b (28.6)	
University	212 ^a (36.1)	203 ^b (30.7)	
Competition level			1.986 (1)
National	488 (83.1)	529 (80)	
International	99 (16.9)	132 (20)	
Garden or outdoor terrace at home	366 (62.4)	430 (65.1)	0.984 (1)
Home square meters			1.266 (3)
<70 m ²	57 (9.7)	60 (9.1)	
Between 70 and 90 m ²	176 (30)	190 (28.7)	
Between 90 and 120 m ²	188 (32)	205 (31)	
More than 120 m ²	166 (28.3)	206 (31.2)	
Weekly training hours			8.607 (5)
<5 h	96 (16.4)	81 (12.3)	
Between 5 and 7 h	167 (28.4)	188 (28.4)	
Between 8 and 10 h	123 (21)	175 (26.5)	
Between 11 and 13 h	106 (18.1)	107 (16.2)	
Between 14 and 16 h	57 (9.7)	62 (9.4)	
More than 16 h	38 (6.5)	48 (7.3)	

Percentages (%) displayed refer to column percentages. **p*-value chi-square < 0.05; ****p*-value chi-square < 0.001. ^aand ^bshow significant difference subset groups.

Behavior and Motivational Problems

Three items, **Table 2**, sample the presence of obsessive or compulsive thoughts or behaviors or rituals in confinement, difficulties in maintaining training motivation, and significant variation in food intake from their usual baselines. Participants were asked to answer on a five-point liker scale from 1 (Never) to 5 (Extremely frequently).

Stressing Thoughts

Stressing thoughts during the time confined were assessed through three items, **Table 2**: sleep disturbances, difficulty concentrating, and fear of the death of a family member. Participants were asked to answer on a five-point liker scale from 1 (Never) to 5 (Extremely frequently).

Seeking Psychological Information/Support

Psychological information and support to deal with their responses to confinement was evaluated via three items, **Table 2**, whether the athlete had talked to a psychologist, had received any psychological information, and if they found the psychological advice useful. Participants were asked to answer on a five-point liker scale from 1 (Never) to 5 (Extremely frequently).

TABLE 2 | Item measures mean differences by gender.

	Men Mean (SD)	Women Mean (SD)	t-test (df)
Training conditions			
In confinement, you had material to train properly	2.37 (0.75)	2.35 (0.75)	0.474 (1,246)
In confinement, you had a follow-up from your coach	2.70 (1.05)	2.96 (1.01)	−4.370*** (1,246)
In confinement, you have been able to organize yourself to train	3.13 (0.80)	3.12 (0.77)	0.194 (1,246)
In confinement, you have maintained physical fitness	2.45 (0.92)	2.49 (0.86)	−0.778 (1,246)
Coping activities			
Parcel 1: reading, radio, social networks, and cooking	2.39 (1.01)	2.69 (0.99)	−5.309*** (1,246)
Parcel 2: television, music, mindfulness, videoconferences, languages	2.88 (0.67)	3.08 (0.60)	−5.554*** (1,246)
Parcel 3: video games, study, yoga, learn something new, draw or paint	2.21 (0.99)	2.48 (1.02)	−4.743*** (1,246)
Behavior and motivational problems			
Do you have manias or rituals that you didn't have?	1.42 (0.70)	1.52 (0.81)	−2.303* (1,246)
In general, it has been difficult to stay motivated to train	2.64 (1.19)	2.60 (1.21)	0.602 (1,246)
Have you eaten more than you usually eat?	1.96 (1.05)	2.09 (1.06)	−2.120* (1,246)
Stressing thoughts			
Do you have sleep disturbances/difficulties?	2.46 (1.24)	2.60 (1.19)	−2.043* (1,246)
Is it difficult for you to concentrate?	2.31 (1.10)	2.47 (1.07)	−2.591** (1,246)
Have you been afraid that a family member would pass away?	2.12 (1.10)	2.45 (1.18)	−5.100*** (1,246)
Seek for psychology advice			
Have you talked to a psychologist during this time?	1.08 (0.36)	1.13 (0.47)	−1.964* (1,246)
Have you received any psychological information during this time?	1.31 (0.65)	1.41 (0.76)	−2.561* (1,246)
Has the information or psychological advice been useful to you?	1.45 (0.88)	1.56 (1.01)	−2.021* (1,246)
Agreement to confinement rules			
In confinement, do you think it was necessary for you to have been quarantined?	3.22 (1.00)	3.34 (0.94)	−2.188* (1,246)
In confinement, do you have respected the quarantine rules?	3.88 (0.38)	3.92 (0.31)	−2.161* (1,246)
In confinement, do you think it was right that the Olympics were suspended?	3.68 (0.59)	3.71 (0.56)	−0.900 (1,246)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Acceptance of Confinement Rules

Athletes were asked about their beliefs regarding quarantine, the confinement rules, and if they agreed with the Olympics cancellation (Table 2). Participants were asked

to answer on a four-point liker scale from 1 (Never) to 4 (Very frequently).

Emotion Scale

A short and validated Spanish version of the Profile of Mood States POMS was used (Andrade et al., 2010). This version has 30 items and six subscales: anger, fatigue, vigor, friendship, tension, and depression, with five answer options from 0 (Not at all) to 5 (Extremely).

Data Analysis

Statistical analyses were performed using the R language v.3.5.3 (R Development Core Team, 2017) and the RStudio environment v. 1.3.959 (Rstudio Team, 2019), employing a statistical significance at $\alpha = 0.05$. Descriptive analyses were used to describe the sample characteristics (i.e., sociodemographic). A structural equation model was used to analyze the effect of behavioral, motivation, and stress variables on the emotional states of athletes in confinement, controlling for the effect of age. As multivariate normality distribution of the data, Mardia's coefficient, was statistically significant ($p < 0.05$), the Satorra-Bentler correction of chi-square and standard errors was used (Satorra and Bentler, 2001) and robust versions of CFI, TLI and RMSEA fit indices. The measurement model was tested using a Confirmatory Factor Analysis (CFA), shown in Table 5, reaching good levels of fit indices, higher than 0.95 for the comparative fit index (CFI) and Tucker-Lewis index (TLI) and <0.05 for the square root error of approximation (RMSEA), and the standardized root mean square residual (SMRS) (Hooper et al., 2008), after allowing the correlation between the residuals of some indicators of the scale of emotional states using as criteria the index modification values (Byrne et al., 1989). Previous studies have shown measurement and configural invariance after allowing residuals correlation for the Profile of Mood States (POMS; Terry et al., 2003 Kim and Smith, 2017), and it has a theoretical driven consensus given that some of the subscales measures positive mood states and the others negative mood states (Boyle et al., 2015; Echemendia et al., 2019).

RESULTS

Descriptive Statistics and t-Tests/ χ^2 -Test

Table 1 shows the sociodemographic data for men and women separately. There were differences by gender in age and educational level: the mean age of women was lower ($M_{\text{women}} = 20.02$, $SD = 9.16$) than that of men ($M_{\text{men}} = 24.88$, $SD = 13.17$), and there was a significantly higher percentage of women with a primary education level (15.1%) than men (6%).

Women, see Table 3, performed coping activities more frequently during confinement ($t = -7.33$, $p < 0.05$), used consultation with a psychologist or sought psychological information ($t = -2.56$, $p < 0.05$), and they exhibited higher compliance with confinement rules more ($t = -2.47$, $p < 0.05$). Women suffered greater stress symptoms ($t = -5.175$, $p < 0.05$). On the scale of emotional states, compared to men, women showed significantly higher ratings of negative emotional states.

TABLE 3 | Age and scales mean differences by gender.

	Men Mean (SD)	Women Mean (SD)	t-test (df)
Age	24.88 (13.17)	20.02 (9.16)	7.63*** (1,246)
Coping activities	7.47 (1.83)	8.25 (1.88)	-7.33*** (1,246)
Training conditions	2.66 (0.62)	2.72 (0.58)	-1.946 (1,246)
Behavior and motivational problems	2.00 (0.67)	2.07 (0.70)	-1.573** (1,246)
Stressing thoughts	2.18 (0.73)	2.41 (0.79)	-5.175*** (1,246)
Seek for psychology advice	3.83 (1.61)	4.09 (1.92)	-2.56** (1,246)
Agreement to confinement rules	3.59 (0.47)	3.65 (0.44)	-2.47* (1,246)
Emotion Scale			
Anger	1.91 (0.75)	2.13 (0.81)	-4.96*** (1,246)
Fatigue	1.90 (0.85)	2.10 (0.89)	-3.98*** (1,246)
Vigor	2.49 (0.89)	2.47 (0.85)	0.46 (1,246)
Friendship	2.89 (0.83)	2.97 (0.82)	-1.70 (1,246)
Tension	2.18 (0.98)	2.43 (0.99)	-4.31*** (1,246)
Depressed	1.87 (0.87)	2.08 (0.93)	-4.06*** (1,246)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Correlation Analyses

Table 4 displays the partial correlation, by gender, between the behavioral variables and emotional states, controlling for age, with women on the diagonal and men below the diagonal; and the Cronbach's α for men and women in the diagonal. Across gender, the coping activities were positively associated with anxiety symptoms ($r_{\text{all}} = 0.068$, $p < 0.05$), compliance with the rules of confinement ($r_{\text{all}} = 0.78$, $p < 0.01$), and with the need to seek psychological support ($r_{\text{all}} = 0.204$, $p < 0.01$). Coping activities were positively correlated with both emotional states of vigor ($r_{\text{all}} = 0.134$, $p < 0.05$) and friendship ($r_{\text{all}} = 0.171$, $p < 0.05$), as well as with emotional states of tension ($r_{\text{all}} = 0.102$, $p < 0.01$) and depression ($r_{\text{all}} = 0.060$, $p < 0.05$).

Those athletes who had adequate training materials and more monitoring and information from their coaches and federation, reported lower levels of perceived stress ($r_{\text{all}} = -0.387$, $p < 0.01$) and had fewer behavioral and motivational problems ($r_{\text{all}} = -0.300$, $p < 0.01$). For women and men, the training conditions were positively correlated with the negative moods, and negatively correlated with the positive moods. Whereas, for women and men, motivation and behavior problems, stressful thoughts, and symptoms were negatively correlated with positive

TABLE 4 | Summary of partial correlation, controlling for age, between measures by gender.

	1	2	3	4	5	6	7	8	9	10	11	12
α Women												
α Men												
Coping activities	0.486 0.400	0.059	-0.003	0.044	0.214***	-0.017	0.026	0.048	0.130**	0.120**	0.109**	0.055
Training condition	0.068	0.651 0.624	-0.352***	-0.266***	0.120**	0.029	-0.171**	-0.199**	0.325**	0.160**	-0.173**	-0.225***
Behavior and motivation problems	-0.026	-0.427***	0.419 0.390	0.513***	-0.059	-0.027	0.374***	0.413***	-0.276***	-0.073	0.341***	0.390***
Stressing thoughts	0.049	-0.342***	0.506***	0.614 0.485	0.008	-0.119**	0.607***	0.564***	-0.229***	-0.078*	0.534***	0.567***
Seek for psychology advice	0.171**	-0.045	0.003	0.079	0.765 0.732	0.003	-0.020	-0.012	0.129**	0.098*	0.049	-0.021
Agreement to rules	0.151**	-0.060	-0.112**	-0.033	0.031	0.385 0.379	-0.149**	-0.064	0.024	0.088*	-0.044	-0.060
Anger	0.003	-0.260***	0.467***	0.606***	0.078	-0.065	0.889 0.886	0.552***	-0.137**	-0.121**	0.547***	0.638***
Fatigue	0.014	-0.211***	0.449***	0.481***	0.111**	-0.045	0.549***	0.897 0.896	-0.160**	0.075	0.550***	0.581***
Vigor	0.153**	0.374***	-0.344***	-0.258***	0.040	0.013	-0.166**	-0.213**	0.869 0.876	0.512***	0.043	-0.131**
Friendship	0.214***	0.196**	-0.206**	-0.132**	0.008	0.073	-0.136**	-0.009	0.571***	0.888 0.894	0.139**	0.027
Tension	0.063	-0.111*	0.352***	0.508***	0.039	-0.071	0.587***	0.500***	0.018	0.102*	0.891 0.900	0.606***
Depressed	0.029	-0.218**	0.403***	0.499***	0.051	-0.037	0.607**	0.527**	-0.161	-0.061	0.545***	0.821 0.817
Age Women	-0.074	-0.289***	0.001	-0.008	0.038	0.048	-0.100*	-0.027	-0.084*	0.006	-0.088*	0.015
Age Men	-0.091*	-0.247***	-0.067	-0.149**	-0.052	0.137**	-0.184**	-0.189**	-0.027	0.062	-0.203**	-0.124**

Men are down of the diagonal and Women are up of the diagonal. Chronbach's Alpha are displayed on the diagonal (Women are up and Men are down). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

TABLE 5 | Summary of model fit indices for CFA and Structural nested models.

Models	S-B χ^2	df	R-CFI	R-TLI	R-RMSEA	SRMR	Δ CFI
CFA	1,906.838***	906	0.956	0.950	0.032	0.042	
SM	2,380.032***	960	0.940	0.932	0.037	0.055	−0.016
MSM	3,371.723***	1,920	0.938	0.930	0.037	0.057	−0.002
MSMER	3,574.363***	1,964	0.932	0.925	0.038	0.058	−0.006

***(*p*-value chi-square < 0.001); CF, Configural model; SM, Structural model; MSM, Multigroup Structural model; ST, Strict model; ERMSM, Equality of regression path and intercepts in MSM; S-B χ^2 , Satorra-Bentler chi-square; df, degrees of freedom; R-CFI, Robust CFI; R-TLI, Robust TLI; R-RMSEA, Robust RMSEA.

emotional states, and positively correlated with experiencing negative moods. The need to seek psychological support was positively associated, in both women and men, with emotional states of friendship ($r_{\text{all}} = 0.062$, $p < 0.05$), and vigor ($r_{\text{all}} = 0.086$, $p < 0.01$). Agreement with the rules of confinement was negatively correlated with the perception of behavioral and motivational problems ($r_{\text{all}} = -0.065$, $p < 0.05$), stress symptoms ($r_{\text{all}} = -0.068$, $p < 0.05$), and with the emotional state of anger ($r_{\text{all}} = -0.099$, $p < 0.01$), and positively correlated with the emotional state of friendship ($r_{\text{all}} = 0.086$, $p < 0.01$).

Structural Equation Model Analyses

The structural equation model, see **Table 5**, reached an acceptable model fit, exceeding 0.9 for CFI, TFI, and <0.05 for RMSE and SMRS <0.06 (Kline, 2013).

The age of the athletes, shown in **Table 6**, was negatively associated with behavioral or motivational problems ($\beta = -0.209$, $p < 0.01$) and levels of perceived anxiety in confinement ($\beta = -0.255$, $p < 0.01$). In contrast, the age of the athletes was positively related to the respect of the confinement rules ($\beta = 0.147$, $p < 0.01$). Also, the negative emotional states decreased significantly with the age of the athletes.

Controlling for age, shown in **Table 7**, adequate training conditions and follow-up by a coach were associated with a reduction in lack of motivation or the presence of behavior problems ($\beta = -0.877$, $p < 0.01$) and anxiety levels ($\beta = -0.634$, $p < 0.01$). Coping activities were associated with higher stress symptoms ($\beta = 0.179$, $p < 0.01$) and the need to search for information or psychological support ($\beta = 0.336$, $p < 0.01$). Those athletes who performed a higher number of coping activities showed greater compliance with confinement rules ($\beta = 0.165$, $p < 0.01$).

Controlling for age, the stress symptoms of the athletes, shown in **Table 8**, were associated with a greater perception of negative emotional states. The highest frequency of behavior and motivation problems, was positively associated with the negative emotional states of anger ($\beta = 0.159$, $p < 0.01$), fatigue ($\beta = 0.450$, $p < 0.01$), and depression ($\beta = 0.455$, $p < 0.01$); and, in turn, motivation or behavior problems significantly reduced positive emotional states of vigor ($\beta = -0.484$, $p < 0.01$) and friendship ($\beta = -0.178$, $p < 0.01$). Those athletes who sought more information or psychological support reported higher levels of positive vigor emotions ($\beta = 0.075$, $p < 0.01$) and friendship ($\beta = 0.068$, $p < 0.05$). Agreement with the rules of confinement was positively related to the perception of emotional states of

TABLE 6 | Summary of path coefficients from age among male and female.

	All β (S.E.)	Women β (S.E.)	Men β (S.E.)	Z-score
Age to				
Behavior and motivational problems	−0.209*** (0.029)	−0.171*** (0.042)	−0.240*** (0.041)	−1.158
Stressing thoughts	−0.255*** (0.025)	−0.132*** (0.035)	−0.322*** (0.034)	−3.926***
Seek for psychology advice	0.016 (0.025)	0.085* (0.040)	−0.034 (0.035)	−2.259*
Agreement to confinement rules	0.147*** (0.037)	0.086 (0.055)	0.241*** (0.052)	2.045*
Anger	−0.080** (0.025)	−0.086** (0.031)	−0.050 (0.041)	0.687
Fatigue	−0.064* (0.026)	−0.043 (0.036)	−0.065 (0.040)	−0.414
Vigor	−0.075* (0.034)	−0.086 (0.044)	−0.108* (0.052)	−0.321
Friendship	−0.006 (0.033)	−0.012 (0.045)	−0.021 (0.052)	−0.132
Tension	−0.098*** (0.026)	−0.091** (0.034)	−0.094* (0.043)	−0.042
Depression	−0.003 (0.028)	0.016 (0.035)	0.002 (0.046)	−0.246

Z-score displayed differences by gender (Men vs. Women). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

friendship ($\beta = 0.145$, $p < 0.01$) and negatively associated with the emotional states of anger ($\beta = -0.116$, $p < 0.01$).

The total indirect effects, shown in **Table 9**, of the training conditions and the frequency of use of coping activities on the subject's emotional states, were analyzed using a mediation model. Adequate training and monitoring conditions by the trainer were associated with a lower reported experience of negative emotional states. Men and women reported that the training conditions and the monitoring of their coaches were positively associated with the positive emotional states of vigor and friendship. However, the frequency of use of coping activities was associated with higher negative emotional states.

Two nested models were used to compare the path coefficients between men and women, differences in the χ^2 ($\Delta\chi^2$) and the degree of freedom (Δdf) were used to compare the models with the goodness of fit to determine the model that best fit the data (Satorra, 2000; Byrne and Stewart, 2006). The multigroup model not constrained by gender represented a

TABLE 7 | Summary of path coefficients from coping and training by gender.

	All β (S.E.)	Women β (S.E.)	Men β (S.E.)	Z-score
Coping activities to				
Behavior and motivational problems	0.053 (0.044)	0.077 (0.065)	0.011 (0.059)	-0.757
Stressing thoughts	0.179*** (0.044)	0.231*** (0.063)	0.069 (0.061)	-1.857
Seek for psychology advice	0.336*** (0.044)	0.327*** (0.056)	0.302*** (0.074)	-0.264
Agreement to confinement rules	0.165** (0.060)	-0.048 (0.084)	0.426*** (0.082)	4.024***
Training conditions to				
Behavior and motivational problems	-0.877*** (0.032)	-0.897*** (0.045)	-0.843*** (0.044)	0.861
Stressing thoughts	-0.634*** (0.033)	-0.641*** (0.047)	-0.595*** (0.044)	0.712
Seek for psychology advice	0.043 (0.0335)	0.093* (0.046)	0.009 (0.054)	-1.194
Agreement to confinement rules	0.012 (0.051)	0.085 (0.068)	-0.104 (0.074)	-1.876

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

significant change concerning the constrained model assuming equal coefficients regression path and intercepts between the gender groups ($\Delta\chi^2 = 202.64$, $\Delta df = 44$, $p < 0.01$). To check the differences of the structural path coefficients between genders, we used the z-score test for the critical ratio differences (Clogg et al., 1995; Paternoster et al., 1998; Yan et al., 2013), the differences between coefficients were reported as significant for $p < 0.05$, using two-tailed hypothesis (Hair et al., 2010).

There were differences by gender on the path of age to stressing thoughts ($z = -3.926$, $p < 0.001$), seek for psychology advice ($z = -2.259$, $p < 0.05$), and agreement to confinement rules ($z = 2.045$, $p < 0.05$). With age, women were more likely to seek psychological advice than men; whereas, with age, men more likely to agree with confinement rules and less likely to experience stress than women. Controlling for age, the results showed that the structural path from coping to rules compliance was significantly different by gender ($z = 4.024$, $p < 0.01$). The coping activities were positively associated with respect and agreement with the rules of confinement among men ($\beta = 0.426$, $p < 0.01$) but not among women ($\beta = -0.048$, $p = 0.56$). The effect of the behavior problems on anger was significantly different by gender ($z = 2.051$, $p < 0.05$); the men who reported having behavioral and motivational problems presented greater feelings of anger ($\beta = 0.256$, $p < 0.01$), while this association was not observed among women ($\beta = 0.087$, $p = 0.14$). Also, there were differences by gender in the association between the search for psychological information with the reported states of anger ($z = 2.051$, $p < 0.05$). Men who sought more psychological support were likely to report a greater feeling of anger ($\beta = 0.108$, $p < 0.01$), whereas, this relationship was not observed in women ($\beta = -0.011$, $p = 0.78$). The seek for psychological support was associated

TABLE 8 | Summary of direct path coefficients to mood states by gender.

	All β (S.E.)	Women β (S.E.)	Men β (S.E.)	Z-score
Behavior and motivational problems to				
Anger	0.159*** (0.042)	0.087 (0.059)	0.256*** (0.058)	2.051*
Fatigue	0.276*** (0.045)	0.246*** (0.060)	0.325*** (0.062)	0.914
Vigor	-0.484*** (0.046)	-0.485*** (0.065)	-0.449*** (0.062)	0.397
Friendship	-0.178*** (0.047)	-0.153* (0.068)	-0.182** (0.060)	-0.317
Tension	0.046 (0.042)	0.061 (0.058)	0.065 (0.059)	0.038
Depression	0.236*** (0.044)	0.231*** (0.062)	0.241*** (0.058)	0.116
Stressing thoughts to				
Anger	0.508*** (0.041)	0.535*** (0.053)	0.461*** (0.062)	-0.911
Fatigue	0.450*** (0.044)	0.504*** (0.055)	0.369*** (0.065)	-1.580
Vigor	-0.068 (0.048)	-0.008 (0.066)	-0.174** (0.064)	-1.808
Friendship	-0.021 (0.047)	0.032 (0.065)	-0.112 (0.064)	-1.580
Tension	0.489*** (0.043)	0.519*** (0.054)	0.422*** (0.064)	-1.163
Depression	0.455*** (0.044)	0.486*** (0.058)	0.410*** (0.064)	-0.875
Seek for psychology advice to				
Anger	0.046 (0.028)	-0.011 (0.041)	0.108** (0.042)	2.051*
Fatigue	0.046 (0.026)	-0.031 (0.035)	0.139*** (0.041)	3.154**
Vigor	0.068* (0.031)	0.107* (0.041)	0.027 (0.038)	-1.414
Friendship	0.075** (0.029)	0.107* (0.043)	0.000 (0.042)	-1.787
Tension	0.068* (0.031)	0.060 (0.043)	0.043 (0.040)	-0.281
Depression	0.053 (0.030)	-0.003 (0.044)	0.068 (0.042)	1.154
Agreement to confinement rules				
Anger	-0.116** (0.042)	-0.184** (0.062)	-0.091 (0.057)	1.107
Fatigue	-0.060 (0.041)	-0.078 (0.053)	-0.073 (0.065)	0.058
Vigor	0.014 (0.041)	0.008 (0.059)	0.071 (0.056)	0.773
Friendship	0.145*** (0.042)	0.130* (0.057)	0.197** (0.064)	0.775
Tension	-0.045 (0.042)	-0.025 (0.060)	-0.062 (0.063)	-0.424
Depression	-0.069 (0.042)	-0.077 (0.059)	-0.092 (0.062)	-0.176

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

with the state of fatigue significantly different by gender ($z = 3.154$, $p < 0.01$); seeking psychological support was related to higher levels of fatigue in men ($\beta = 0.139$, $p < 0.01$), but

TABLE 9 | Summary of indirect path coefficients to mood states by gender.

	All β (S.E.)	Women β (S.E.)	Men β (S.E.)	Wald test
Coping activities to				
Anger	0.096*** (0.029)	0.136*** (0.041)	0.028 (0.044)	2.968
Fatigue	0.101*** (0.029)	0.129** (0.043)	0.040 (0.045)	2.209
Vigor	-0.010 (0.024)	-0.005 (0.034)	0.022 (0.037)	0.279
Friendship	0.034 (0.018)	0.025 (0.024)	0.074* (0.035)	1.405
Tension	0.100*** (0.026)	0.146*** (0.040)	0.016 (0.037)	5.701*
Depression	0.093** (0.029)	0.133** (0.043)	0.012 (0.043)	4.103*
Training conditions to				
Anger	-0.462*** (0.027)	-0.438*** (0.038)	-0.480*** (0.037)	0.665
Fatigue	-0.526*** (0.027)	-0.553*** (0.038)	-0.485*** (0.037)	1.634
Vigor	0.472*** (0.030)	0.450*** (0.042)	0.475*** (0.042)	0.267
Friendship	0.174*** (0.031)	0.138** (0.045)	0.200*** (0.041)	1.115
Tension	-0.349*** (0.029)	-0.385*** (0.039)	-0.299*** (0.043)	2.439
Depression	-0.495*** (0.029)	-0.526*** (0.041)	-0.437*** (0.040)	2.262

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

it was not associated with fatigue in women ($\beta = -0.043$, $p = 0.23$).

To compare the indirect effects by groups, we performed a multiple mediator model with multiple groups by gender, using the Wald test for testing the group difference in the indirect path effects (Ryu and Cheong, 2017; Klopp, 2019). In the group of women, the frequency of coping activities was significantly associated with the increase in negative emotional states among women; however, in men, no significant relationship was observed between coping activities and emotional states. The frequency of coping activities was positively related to the emotion of friendship among men ($\beta = 0.074$, $p < 0.01$), while they were not associated in women ($\beta = 0.026$, $p = 0.60$). The indirect effect of the frequency of coping activities was significantly different between men and women on the emotional states of tension (Wald = 5.701, $p < 0.05$) and depression (Wald = 4.103, $p < 0.05$). The indirect effect of training conditions on negative emotional states were not significantly different between genders; that is, equally among women and men, the better the training conditions, the lower the experience of negative moods. Likewise, there were no gender differences in the indirect effect of the training conditions on the level of friendship and vigor. The training conditions were positively associated, equally for women and men, with the positive moods.

DISCUSSION

Due to the severe health impact of the COVID-19 pandemic in early 2020, the Spanish government-imposed (via State of Alarm Declaration) a radical confinement of the Spanish population at their homes from March 14, 2020, until June 21, 2020. The emotional impact of the associated mobility restrictions and social isolation measures on athletes was especially significant. Along with the difficulty of living in isolation at home, athletes had to radically break with their usual training routines (Chirico et al., 2020) and thus possibly threaten the viability of such effort demanding careers.

Emotional Risk and Protective Factors

The main purpose of this study was to obtain trustworthy, real-time information about the risk and protective factors that can influence emotional symptoms and disorders potentially caused by the confinement of these Spanish athletes who compete nationally and internationally. We collected information about the following parameters:

Socio-Demographic and Living Variables

We evaluated the socio-demographic characteristics and the actual living conditions of the athletes during confinement. By gender, we found that women athletes had a lower level of education than men, a difference that was partially explained by the fact that the women were younger on average and so they were more likely to be in primary and secondary education than men. According to Fuentes-García et al. (2020) in a sample of chess players during the COVID-19 confinement, those who had a higher academic level of education scored lower in level of anxiety. Probably the age of the participants could help explain some differences between men and women in the educational level and the appearance of emotional disorders as a consequence of the lockdown (Brooks et al., 2020). As the results of the correlation analyses showed a significant association between age and the behavioral and emotional measures, all the further analysis were controlled by age.

Training Conditions

We found no significant difference between male and female athletes, in terms of weekly training frequency, or in the basic space (in square meters) available to them in their confinement residence, or in whether or not they had additional space in the form outdoor patio or terrace. During the confinement at home, men and women had similar conditions of space and training routine. In our sample, neither having or not having a terrace nor access and use of training hours did not seem to explain the differences found in the athletes mood states. Recent studies show that having even minimal physical activity was positively associated with the quality of life during the confinement by COVID-19 (Slimani et al., 2020). Such findings supported the many recommendations made to engage in physical activity during the COVID-19 situation with home-based exercises being always included (Chtourou et al., 2020; Hammami et al., 2020).

Coach-Athlete Interactions

Our results show that Spanish coaches maintained a positive ongoing follow-up with their trainees, and monitored equally the training of men and women. This coach follow-up, along with the provision of a necessary minimum of sports equipment, helped athletes to feel less stress, avoid behavioral and motivational problems, and reduce negative emotional states and increase their positive states in both, men and women. It had already been demonstrated that providing clear and accessible information, clear action guidelines and ongoing transparent information about the COVID-19 situation, reduced stressful reactions on the general population (Brooks et al., 2020).

Stress Risk Factors

Brooks et al. (2020), in a systematic review of the psychological impact of quarantine in non-athletes, found some critical stressors: inadequate supplies, and insufficient information, among others, made difficult to cope with the confinement. Similarly, our findings show that suitable training materials, coach follow up and the provision of information, were protective factors against behavioral, motivational, and stress problems. German studies show that at the beginning of the COVID-19 pandemic, maintaining a healthy lifestyle might have a preventive effect on the development of anxiety disorders (Petzold et al., 2020). A recent meta-analysis found that, regardless of age and sex, people with higher exercise levels. Had a reduced risk of depression (Stubbs et al., 2016). Our study shows that, as hypothesized, training conditions had a great capacity to modulate negative mood states and increase positivity in competitive athletes (Jaenes et al., 2020b).

Coping Activities: Gender Differences

There were differences by gender in the number and type of the coping activities that athletes engaged in during the confinement. Women made greater use of coping activities, such as using social networks, accessing the internet, watching television, or listening to music, among others. However, the multigroup SEM analysis shows that, in women, the use of coping activities was associated with increased anxiety, stress, fatigue, tension and depression. It might be that, at least for women, the increase in the use of coping activities was an attempt to reduce their elevated negative moods (Shechter et al., 2020) found that, during the COVID-19 pandemic, healthcare workers who screened positive for stress and depressive symptoms reported engaging in more coping behaviors.

Psychological Counseling

Results about seeking psychological advice show that those who looked for psychological information, and tried to consult with psychologists, increased their state of vigor and decreased anger. As different authors recommend (Reardon et al., 2020; Schinke et al., 2020), it has been shown that including in the disaster situation's help package a First Psychological Aid simple protocol which helps affected individuals by (1) looking at practical ways to support people suffering from serious distress reactions, (2) listening to needs and concerns and (3) linking people with social

support, information and professional help is very effective in populations under stress (Mehrsafar et al., 2020).

Response to the Cancellation of the 2020 Tokyo Games

In our study, both women and men reported a highly agreement with the cancelation of the 2020 Games due to the coronavirus crisis. Clemente-Suárez et al. (2020) also found a high agreement on the suspension of the Games in a sample of Spanish Olympic and Paralympic athletes. Bear in mind that the rules of forced confinement to private homes for the Spanish population severely limited the practice of outdoor activities, and training in sports centers. In our study, women showed greater respect and acceptance the rules of confinement than men, in line with what was found in Spanish population by De La Vega et al. (2020). Our study shows that the agreement with, and acceptance of the rules of confinement decreased symptoms of stress and anger, and increased feelings of friendship. Besides, respect for the rules increased with age; which also acts a modulator of states of fatigue and tension.

Conclusions

In conclusion, the condition of confinement during the COVID-19 had a high emotional impact on Spanish athletes. Women suffered more significant anxiety, stress, fatigue, tension and depression than men; but there were no significant differences in terms of the positive states such as friendship and vigor. Similar findings have been reported in a sample of Spanish Olympic and Paralympic athletes facing the 2021 Tokyo Olympiad in the COVID-19 pandemic (Clemente-Suárez et al., 2020), women scored higher in negative emotions (neuroticism and inflexibility) than men. These results fit those found in a sample of Spanish competitive swimmer, where women also scored higher on negative mood states such as anger, fatigue, tension and depression (Jaenes et al., 2020a). Again, no significant differences were found in terms of positive mood states. As in our current study, the negative mood states were associated with a lack of motivation to train, the presence of some behavioral disorders, and experiencing stressful thoughts (Jaenes et al., 2020a).

Lessons for the Future

As the initial global impact of the COVID-19 pandemic, gets to be widely known sports organizations and authorities at all levels of competition should be encouraged to develop guidelines to confront adverse mass situations like the COVID pandemic. This study provides evidence that suggests some measures that may reduce the psychological and emotional burden of athletes. Initiatives such as: (1) providing adequate equipment for indoor training, (2) giving clear guidance about potential actions, (3) supporting the value of public health measures such as confinements, (4) and facilitating access to psychological information and consultations (Reardon et al., 2020) have demonstrated efficacy and effectiveness in a robust number of studies.

This study also shows that coaches follow-up decreases behavioral and motivational problems. Such connection between coaches and athletes during confinement periods, should

provide realistically and trustworthy information about training, health, and psychological support. Transparent, and clear communication from clubs and/or federations helps athletes to maintain psychological stability, it increases their motivation, decreases negative emotions and sensations, and enhances vigor as a positive factor. Our study also shows that the use of coping strategies helped athletes accept the rules of confinement, the loss of mobility and freedom, and the restrictions caused by the atypical situation. In turn, the acceptance confinement rules helps to improve positive emotional states and reduces anger symptoms. Thus, psychologists, coaches, and sports authorities would be vital in providing media and social media with rapid access to valid information about confinement rules and coping resources. Information about the proper use of social media, and of easily available coping activities to mitigate negative moods should be essential. Moreover, equally important is an ongoing and transparent discussion of both the negative and positive consequences of WhatsApp, Twitter, Instagram, and other popular networks among athletes and young people. Throughout social media, coaches, and trainers could be creative, in challenging and encouraging athletes to compete among them in different skills-based games, designing positive environments within the athletes' communities.

The gender specific findings of our study, support additional gendered actions by sports authorities. Women's higher scores in negative emotional states, and willingness to seek and accept psychological support could encourage clubs, federation or sport authorities in general to provide psychological information and guidelines and easy access to psychological consultation to manage their negative emotions. Blogs or online-chat channels might be used to provide peer support and to share additional information uploaded by the sports federations and health authorities.

There are some lessons from our study that could provide a framework to deal with the emotional consequences for large populations, of the additional crises that globalization, climate change, other pandemics, mass migrations environmental catastrophes etc. will undoubtedly bring about. Our study helped us move from the common idea of expecting some form of post-traumatic stress disorder to an actual description of a matrix of risk and protective factors that could be addressed in real-time with high yields for relatively moderate investments. A strategy worth replicating in the many crises of contemporary life emerges from our findings that should be replicated. In the many mass adverse events that contemporary life brings about: (1) Do real-time early assessment and repeat them so you can modify your intervention package from real data. (2) Integrate the response of the different level involved authorities so that to the maximum degree possible information is frequent, consistent, clear, and communicated by people close to the population at risk. In our study, the value of the coach's follow-up may have been determined by their familiarity with their subjects, and the credibility of their information, as much as for their attention to equipment and training needs. (3) Provide some training equipment, this simple resource had a huge impact in maintaining the morale of athletes very frightened about their professional futures. (4) Promote easy, familiar conventional

community strategies and resources as coping strategies; they might not prevent stress but help people (in our case) to cope with higher levels of emotional upheaval. Reading, TV, music, learning new things, relaxation techniques which can be easily disseminated through social media. (5) Use of professional resources (psychological consultation for example) should be provided, but maybe not as a standard prescription for all. In our study, women sought and made better use of such resource than men. It is worth digging into this finding in search of ways to make it easy for all to access it if and when needed. There is no question in our minds that better methods of emotional protection of people in crises will be one of the enduring silver linings of this otherwise devastating pandemic.

Limitations

The main limitation of this study is the lack of follow-up of the initial survey findings over the confinement and post-confinement periods. The cross-sectional design used in this study has potential bias such as differences in the characteristics of responders and non-responders. Hence, the results of this study should not be interpreted in causal terms, but this cross-sectional analytical study can provide information on the association between risk factors and psychological health outcomes. Future research would require a longitudinal study to analyze changes in emotional states throughout the confinement period and—more importantly—its connection with athletic performance. Adequate experimental designs would allow to assess the impact of the above-mentioned measures on athletic performance and contrast the relative effect of each intervention or group of interventions. Future research should compare the psychological and emotional effects of confinement on individual and team athletes, as well as the differences between different sports specialties, in search of an evidence-based set of intervention for each sport specialty.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Centro Andaluz de Medicina del Deporte. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

JJ conceived the study, designed the questionnaire, collected the data, and wrote the initial manuscript. DA analyzed the data, wrote the results and discussion, and provided critical revisions on the successive drafts. MT provided a final critical edit, reorganized the linking and definition of variables, analyses and findings, and additional meanings of findings added recommendations and did a complete English revision. RG, AC, FG, and FL analyzed initially the data and review the proposed

model. AM provided critical revisions on the final drafts. All authors read and approved the final manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.621606/full#supplementary-material>

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Effects of Physical Activity and Training Routine on Mental Health During the COVID-19 Pandemic and Curfew

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This research aimed to explore the effects of physical activity and training routine on mental health during the COVID-19 pandemic and the proclaimed emergency state and curfew. To measure the mental health components of psychological distress and subjective well-being, two studies were conducted on different samples: Study 1 during the beginning of curfew in Serbia ($N = 678$) and Study 2 during the ending phase ($N = 398$). The results of Study 1 showed that elite athletes as well as those with high level of physical activity experienced the lowest distress. Furthermore, effects of the changes in the training routine on distress among physically active individuals depended on the level of sports participation with elite athletes who reduced trainings showing lower anxiety compared to recreational athletes who reduced trainings as well or kept the same training routine. Thus, we could conclude that in the early stage of the pandemic, elite athletes showed better mental health and adaptability to the crisis situation. Results of Study 2 showed that although all the participants had decreased well-being during the curfew, compared to the period before the pandemic and the curfew, there were no differences in well-being between elite and recreational athletes, who had higher well-being compared to non-athletes. However, this effect held both before and during the curfew showing that physically active individuals did not additionally benefit from this decrease compared to the non-active. Furthermore, athletes who became physically inactive showed lower well-being compared to those who kept the same training routine. Thus, in the later stage of the pandemic, prolonged physical inactivity had negative effects on mental health.

Keywords: coronavirus, COVID-19, training routine, athletes, distress, well-being, mental health

INTRODUCTION

Formally declared as a public health emergency of international concern, the outbreak of novel coronavirus (COVID-19) originating in Wuhan, China has spread worldwide and reached the level of a pandemic. To date (April 18th 2021), more than 139 million people have been infected and more than 2.9 million have lost their lives due to COVID-19 (WHO, 2020a). In order to

face the spread of coronavirus, authorities in almost all countries worldwide proclaimed health-protection measures. In Serbia, the first case was officially confirmed on March 6th. Due to the rapid spread of coronavirus, a nationwide state of emergency was declared on March 15th. Soon, additional measures were introduced, such as curfew and prohibition of all gatherings in public places and sports courts. The emergency state and lockdown were dismissed on May 6th. Measures such as social distancing remained while prohibition of sports events was canceled and then introduced again.

Many studies have pointed out that the COVID-19 pandemic represents not only a major medical and economic crisis, but also a challenge to mental health. According to WHO (2018), mental health is “more than just the absence of mental disorders or disabilities” such as anxiety and mood disorders for example, and it also refers to “a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community.” Thus, mental health includes both absence or low distress symptoms and indicators of emotional, cognitive, and social well-being. Although health-protection measures help reduce infection rates, changes in the daily routine, social distancing, and reduced physical contact with close people cause increasing mental issues like anxiety and depression (Pappa et al., 2020). Widespread outbreaks of coronavirus are associated with psychological distress and symptoms (for a review see Rajkumar, 2020). A longitudinal study in Germany showed that life satisfaction and positive and negative affect did not change between December 2019 and March 2020, but did decrease in the period of March–May 2020 (Zacher and Rudolph, 2020). The authors explained the surprising decreasing effect on negative affect by a decrease in affective experiences due to demanding situations. However, over time, people adapt to novel circumstances. For example, in one study in Serbia, it was shown that worry, fear, anger, and boredom decreased during the emergency state and curfew, from March 21st till April 24th (Sadiković et al., 2020).

While, up to a certain extent, fear, worry, and stress are considered normal responses to perceived or real threats in the face of uncertainty (WHO, 2020a), prolonged circumstances of chronic stress and quarantine can lead to long-term adverse mental health outcomes. For example, the previous crises and times of uncertainty (e.g., SARS, H1N1 influenza) made us aware of long-term mental health issues (e.g., Liu et al., 2012; Sprang and Silman, 2013), which is aligned with more and more evidence stemming from the current pandemic (e.g., Wang et al., 2020; John et al., 2020). In Serbia, the existing data shows moderate to extreme levels of stress, depression, and anxiety among one third of the participants during the emergency state and the curfew (Popov et al., 2021), as well as a significant proportion of those seeking mental health help due to anxiety (Stasević-Karličić et al., 2020). Moreover, it was shown that a diagnosis of COVID-19 itself, and consequential physical distancing, was associated with feelings of isolation and loneliness (Galea et al., 2020).

Physical activity is most often regarded as an effective coping strategy (Schaal et al., 2011). Unsurprisingly, it is at the top of the list of WHO recommendations, especially when dealing

with stressful situations and/or periods, such as COVID-19-induced distress (WHO, 2020b). In this study, we explored the effects of physical activity on mental health during the COVID-19 pandemic.

Physical Activity and Mental Health

To date, physical activity has been systematically associated with mental health benefits (for a review see White et al., 2017) and reduced symptoms of psychological distress, specifically, depression and anxiety (e.g., Lawlor and Hopker, 2001; Jonsdottir et al., 2010; Ekkekakis, 2015). To name a few, exercise has been found to reduce negative mood and improve self-esteem and cognitive function (Callaghan, 2004), as well as to moderately reduce state and trait anxiety (Stubbs et al., 2017a,b). A mere hour of exercise of any intensity per week has been found to be effective in preventing depression (Harvey et al., 2018). Furthermore, aerobic exercise has emerged as an effective antidepressant intervention (Morres et al., 2019).

That, however, does not mean that individuals highly engaged in sports, i.e., athletes, are immune to mental health problems. As Rice et al. (2016) reported in the first systematic narrative review based on several national studies, generalized anxiety was the highest prevalent disorder found in both male and female athletes (e.g., 8.6% among French athletes, see Schaal et al., 2011; 15% among Australian athletes, see Gulliver et al., 2015). In the case of depression, results suggesting lower rates for the prevalence of depression, but they were somewhat inconsistent (from less than 3% among French, see Schaal et al., 2011; to 15% among all-sports German athletes, see Nixdorf et al., 2016; to 26% in European athletes, see Gouttebauge et al., 2015; and 27.2% in Australia, Gulliver et al., 2015). However, an association was found with several sport-specific factors, such as overtraining, injury, and attribution after failure in a competition (Nixdorf et al., 2016). While frequent anxiety symptoms are not surprising, given the pressures inherent to a competitive environment and high-standard goals (Schaal et al., 2011), lower rates of depression, present to a non-negligible extent, provide further support to the already known effectiveness in the prevention and treatment of depressive symptoms (e.g., Lawlor and Hopker, 2001; Ekkekakis, 2015).

White et al. (2017) went a step further in explaining these inconsistencies, suggesting that, based on their meta-analytic study, engaging in different levels of physical activity is not inevitably associated with better mental health indicators and/or reduced symptoms, but that contextual factors should be regarded as crucial to such a relationship. One of the important contextual factors is the training routine (White et al., 2017). In the light of the pandemic of COVID-19, two groups could provide a better understanding of the effects of physical activity on mental health – those previously engaged in physical activities, but unexpectedly forced to a long-term pause or reduction in their training routines, and those previously less active or inactive, but highly encouraged to introduce physical activity into their daily routine. In order to obtain a more comprehensive insight into the effects of physical activity on mental health, it is important to take into account its contextual counterparts, such

as one's level of sports participation, the intensity of one's physical activity, as well as the training routine.

Mental Health and the Level of Sports Participation (Elite vs. Recreational Athletes)

Although physical activity is considered to be undoubtedly beneficial, concerns are rising that high-level athletes (elite or professionals) are as susceptible to certain mental health issues as the general population (Rice et al., 2016). However, the existing literature is often confounded by the fact that many of the studies conducted on the "athletic population" have been based on sports college students and mainly female athletes (e.g., Schaal et al., 2011). Moreover, many studies have failed to include reference groups from recreational exercisers or the general population (Reardon et al., 2019), making it hard to draw clear conclusions.

When considering incidence of mental health issues, Gerber et al. (2011) showed that competing at an elite level neither contributes to the risk of depressive symptoms or additional distress nor can it be considered as a protective factor (Gerber et al., 2011). Similar, Castillo et al. (2010) suggested that high-level competition does not affect the risk of developing psychopathological symptoms. However, they found that perception of the situation matters and that higher levels of competition perceived by athletes is to be associated with a lower incidence of symptoms and a higher level of well-being. Additionally, Shirvani et al. (2015) showed that semi-professional athletes were prone to more adaptive emotion regulation strategies, compared to amateur athletes. In contrast, Peluso and Andrade (2005) showed that more intense physical activity performed at professional/elite levels can compromise mental health.

However, when considering specific stressors, the results seem to differ and highlight the presence of mental issues among elite athletes. In fact, Gulliver et al. (2015), for example, found that in increased stress situations (e.g., overtraining or injuries), elite athletes were more likely to experience symptoms of mental disorders than the general population, but no comparisons were made with recreational exercisers. Similarly, Oztekin et al. (2008) reported that professional athletes scored higher on depression than amateurs before and after injury-related surgery. Apart from injury, retirement, aging and competitive failure were found to precipitate depression (Reardon and Factor, 2010). Some authors (Cresswell and Eklund, 2007; Hughes and Leavey, 2012) explained that the elite sport environment limits the ways of shaping one's identity in the way that it generates an "identity foreclosure" (Hughes and Leavey, 2012, p. 95). Therefore, when the athletic identity is threatened to be removed, e.g., due to injury or retirement, there is a higher risk for elite athletes to experience psychological distress and other mental health issues. Together, these results may suggest that, while elite levels of sport participation are not a default risk factor for mental health problems and that prolonged exposure to pressures might lead elite athletes to adapt and become better at emotion regulation, the context of bigger or unexpected stressors might put elite athletes at a higher risk of psychological distress. This could

reflect greatly on athletes' ways of coping with the unpredictable situation caused by the current COVID-19 pandemic.

Having in mind the prevalence of mental health issues related to sport-specific stresses and challenges among elite athletes, it is justified to wonder whether exercise is only beneficial up to a certain point and whether elite athletes are actually more susceptible to mental health problems due to chronic exposure to stresses and pressures (e.g., Peluso and Andrade, 2005; Cresswell and Eklund, 2007; Hughes and Leavey, 2012). In other words, the beneficial psychological effects of physical activity may be limited to individuals at the recreational (or sedentary) level, while in the context of elite sports, those unique stressors might have detrimental effects. Conversely, another possibility could be considered. As elite athletes are frequently characterized as being able to adapt and thrive under pressure (Connaughton et al., 2008), prolonged exposure to pressure could lead to better adaptations in a unique stress situation, such as the current COVID-19 curfew.

Mental Health and the Intensity of Physical Activity

As mentioned above, many studies focusing on mental health have failed to differentiate between elite and recreational athletes, resulting in inconsistent results and limited conclusions about the prevalence of psychopathological symptoms. Yet, another confounding factor is the intensity of physical activity related to specific sports. For example, although sports such as archery require the same level of professionalism and commitment as long-distance running, the intensity of physical activity and the demands for high-level performance are very different. The importance of the intensity of physical activity is particularly visible in WHO (2020b) guidelines for the optimal effects on well-being, suggesting 50–300 min of moderate-intensity or 75–150 min of vigorous-intensity physical activity per week (Bull et al., 2020).

When it comes to the general population, a few studies that have examined the relationship between the intensity of physical activity and mental health have offered mostly inconsistent results. One group of studies showed benefits of high or vigorous physical activity. For example, Steptoe and Butler (1996) found vigorous activity to be positively related to emotional well-being regardless of sex, social class, and health status. Costigan et al. (2019) found that light and moderate physical activity was not associated with well-being, but that vigorous physical activity was associated with more positive affect among adolescents. In the context of COVID-19, results of a recent study showed that participants performing high physical activity showed lower values of state anxiety compared to participants performing moderate or low physical activity (Frontini et al., 2021).

However, other groups of studies found that moderate-intensity activity was the most beneficial activity level for improving well-being (Netz et al., 2005), that it significantly added to happiness (Downward and Dawson, 2016), that it could reduce short-term physiological reactions to brief psycho-social stressors (Taylor, 2000) and that it was positively associated with subjective well-being compared to high-intensity physical

activity which showed a negative effect (Wicker and Frick, 2015). There are also results showing that light-intensity physical activity produced the highest overall subjective well-being, but moderate-intensity was associated with the lowest overall value of subjective well-being (Downward and Dawson, 2016). It should be noted that Asztalos et al. (2012) found negligible differences in perceived stress and emotional distress among individuals engaging in different types of sports regarding intensity, suggesting that “one-activity-fits-all” recommendations are inappropriate.

It is worth noting that methodology-wise, the general limitations of most of these studies are the use of a single domain of mental health (e.g., happiness) and the lack of comparison between all possible intensities of physical activity (i.e., light, moderate, and vigorous, see Panza et al., 2019). Furthermore, previous studies have mostly relied on heart rate or accelerometry, which has been criticized for failing to distinguish between different types of physical activity behaviors (Timperio et al., 2004). More importantly, there seems to be no study addressing this issue in the context of high-level sports participation or distinguishing elite from recreational athletes.

The Current Study

Despite the fact that engagement in physical activity has been related to good mental health (e.g., White et al., 2017), the effects of physical activity and exercise routine on mental health in a crisis such as a pandemic have been found to be inconsistent. For example, Maugeri et al. (2020) found that 1 month into the COVID-19 quarantine in Italy, physical activity decreased and the reduction in physical activity had a profoundly negative impact on psychological health and well-being. However, Zhang et al. (2020) showed that the relation between life satisfaction and the severity of COVID-19 in one's local community was surprisingly negative in people who exercised more during the outbreak (more than 2.5 h per day). On the other hand, the relation was not significant for people who exercised between 1 and 2.5 h and it was positive for people who exercised up to 0.5 h.

The COVID-19 pandemic and the introduced compliance measures such as a lockdown or curfew are known to be stressful for the general population (e.g., Rajkumar, 2020; Zacher and Rudolph, 2020). The existing literature has suggested that athletes are at a comparable risk for clinically significant psychological distress as the general population (Putukian, 2016). Moreover, there have been indications that it could be even more detrimental for athletes, as the curfew forced many to give up their daily routines. Many athletes had to suddenly halt their training and competition participation.

Due to these inconsistent results, the goal of this research was to further explore how this uncertain and undoubtedly stressful situation caused by the COVID-19 pandemic could impact the mental health of individuals at different levels of sports participation and physical engagement. This study aimed to determine whether the pandemic and the introduced compliance measures put additional pressure on those engaging in high-level sports (i.e., elite athletes), relative to those less involved (i.e., recreational athletes or non-athletes), or whether those moderately or highly involved in physical activity could be

more resilient in the time of a pandemic. Thus, the aim of this research was to explore the effects of physical activity and training routine on mental health during the coronavirus pandemic and the proclaimed emergency state and curfew in Serbia. In order to add an additional value, we sought to address the above-mentioned methodological issues. We conducted two studies in which different mental health domains were assessed. Further, we employed a more comprehensive approach by taking into account the intensity of physical activity besides sports participation, and determined the mental health before and during the emergency state and curfew.

STUDY 1

The aim of Study 1 was to explore the effects of physical activity on psychological distress during the early stage of curfew. Physical activity was assessed via two variables: (1) as a broad measure of physical activity regarding sports participation with a differentiation between non-athlete, recreational athlete, and elite athlete participants, as in the majority of research, and (2) as the intensity of physical activity (sedentary, moderate, and highly active). Additionally, we tested the differences in psychological distress depending on changes in the training routine during the curfew among those who previously had a training routine, i.e., recreational and elite athletes. It could be assumed that athletes are more adaptive to the context of stress, since the majority of studies have revealed higher cognitive resources and extensive experience of athletes (especially professional athletes) in coping with anxiety contexts like competitions (Belinchón-deMiguel et al., 2019). Thus, we expected that physically active participants (both recreational and elite athletes) would have lower distress during the curfew compared to non-athletes (H1). Due to the conflicting results regarding mental health differences between elite and recreational athletes (e.g., Peluso and Andrade, 2005; Gerber et al., 2011), and the specific global effects of the pandemic as a stressful event for everyone (e.g., Rajkumar, 2020), we did not expect significant differences between elite and recreational athletes. In line with the previous research (Frontini et al., 2021), we further expected that those who performed higher intensity of physical activity will experience less distress during curfew compared to those who performed moderate or low intensity of physical activity (H2). Finally, we hypothesized that both recreational and elite athletes who did not change their training routine will experience lower distress compared to those who trained less or became inactive (H3). Since we do not expect differences between the elite and recreational athletes, we also do not expect that level of sports participation moderate the effects of training routine on distress.

Method

Participants and Procedure

In total, 678 individuals (66.2% females, $M_{age} = 35.85$, $SD_{age} = 12.45$, age range 18–78) participated in the study. The sample consisted of 20.5% (139) non-athletes, 64% (434) recreational athletes, and 15.5% (105) elite athletes. These groups were differentiated based on self-report question. Based on the

self-report question, among the physically active, three groups were formed regarding training routine during the pandemic and the curfew: those who became inactive (79 or 14.7%), those who reduced their trainings (399 or 74%) and those who kept the same training routine (61 or 11.3%).

There were sex differences in the level of participation [$\chi^2(2) = 63.63, p < 0.001$] and the intensity of physical activity [$\chi^2(2) = 21.13, p < 0.001$], with males more often belonging to the group of elite athletes and being more physically active. Additionally, there were also age differences in the level of sport participation with elite athletes were the youngest [$F(2,675) = 14.60, p < 0.001$], while there were no significant age differences regarding the intensity of physical activity [$F(2,669) = 12.24, p > 0.05$]. In preliminary analysis, statistically controlled sex and age did not have any influence to the obtained effects, thus they are not included as control variables.

The measures were administered online, via social networks, local online magazines, and sports-related websites. Data were collected during the period between March 31st (3 weeks after the declaration of a nationwide state of emergency and curfew) and May 6th (when the emergency state and curfew officially ended), while the majority of the sample (74%) fill the measures until April 19st (fifth week of emergency state and curfew). The study was approved by the Ethical Committee of Faculty of Sport and Tourism.

This study is a part of a larger project which includes other measures, but the participants completed measures that refer to the current state first and then continued to the other trait-like measures. The same sample was used in Popov et al. (2021), although the aim of the study was different.

Measures

The Depression, Anxiety and Stress Scale (DASS-21; Lovibond and Lovibond, 1995; the Serbian adaptation was available at the official website¹, and for further information about the validation see Jovanović et al., 2014). The instrument consists of three subscales: (1) depression, which assesses the degree of dysphoria, hopelessness, low-self-esteem, anhedonia, and passivity ($\alpha = 0.87$); (2) anxiety, which refers to the subjective feeling of situational anxiety, autonomic arousal, and skeletal muscle tension ($\alpha = 0.87$); and (3) stress, which measures difficulties in relaxing, nervous arousal, and the tendency to be easily agitated, irritable, and upset ($\alpha = 0.90$). The participants were asked to report how they felt during the previous week, due to the emergency state and curfew-related changes in daily functioning.

The Godin Leisure-Time Exercise Questionnaire (GLTEQ; Godin and Shephard, 1985; adapted into Serbian language by Pinčir et al., 2020) is a self-report measure of weekly physical activity. The original version measures the level of physical engagement during the previous week, during one's free time, in duration exceeding 15 min. For the purpose of this study, we adapted the instruction and asked for the level of intensity *before* the emergency state. The measure differentiates between three levels of physical activity: strenuous/vigorous (e.g., running,

squash or roller skating), moderate (e.g., fast walking, easy bicycling or tennis), and mild (e.g., yoga, easy walking or archery). The weekly frequencies of mild activities are multiplied by three, moderate by five, and strenuous activity by nine three metabolic equivalents. The total sum of all these activities forms a leisure activity score (fewer than 14 units – sedentary, 14–23 moderately active, and 24 or more – highly/vigorously active).

Additional multiple-choice question was added in order to assess the changes in the routines of physical activity due to the curfew (*“Since the curfew was imposed, how has your training routine been changed?”*).

Results

Firstly, comparison between frequencies of the level of participation and the intensity of physical activity was calculated (Table 1). Results showed significant differences [$\chi^2(4) = 235.48, p < 0.001$] with vigorously active participants including 100% of elite athletes, followed by recreational athletes and non-athletes, while sedentary participants included almost a half of non-athletes. Since there are no moderately active and sedentary participants among elite athletes, a fully interaction model in two-way ANOVA with level of sport participation and intensity of physical activity as between-subject factors is not possible, thus we only reported separated one-way ANOVAs.

We obtained significant differences between the groups based on the level of sport participation on all three dimensions of psychological distress (Table 2). *Post hoc* Bonferroni tests revealed that the lowest levels of anxiety, depression, and stress were reported by elite athletes, followed by recreational athletes, while the highest scores were reported by non-athletes.

We further inspected the differences in psychological distress by taking into account the level of intensity of physical activity our participants engaged in before the curfew. Again, significant effects of the level of physical intensity were obtained on all dimensions of psychological distress (Table 3). *Post hoc* Bonferroni tests showed that vigorously active individuals, compared to the moderately active, reported significantly lower scores on anxiety and depression. Furthermore, vigorously active individuals reported significantly lower scores on stress compared to both moderately active and sedentary participants.

TABLE 1 | Cross-tabulation of the level of sport participation and the intensity of physical activity.

Level of sport participation	Intensity of physical activity			Total
	Highly active	Moderately active	Sedentary	
Elite athletes	105 (100%)	0	0	105 (100%)
Recreational athletes	310 (72.3%)	72 (16.8%)	47 (11%)	429 (100%)
Non-athletes	26 (18.8%)	32 (23.2%)	80 (58%)	138 (100%)
Total	441	104	127	672

Six participants did not complete the Godin Leisure-Time Exercise Questionnaire (GLTEQ), and thus, instead of 678, there were 672 participants in total included in the analysis based on the intensity of physical activity.

¹ <http://www2.psy.unsw.edu.au/dass/Serbian/DASS-SER.pdf>

TABLE 2 | Results of one-way ANOVAs: differences in psychological distress during the curfew between non-athletes, recreational athletes, and elite athletes ($N = 678$).

Psychological distress	1 = Non-athletes (139)	2 = Recreational athletes (434)	3 = Elite athletes (105)	$F(2,675)$	η_p^2	Post hoc
	$M(SD)$	$M(SD)$	$M(SD)$			
Anxiety	4.29 (5.16)	3.07 (4.35)	1.72 (3.69)	10.03***	0.029	1 > 2 > 3
Depression	5.58 (5.61)	3.97 (4.68)	2.55 (4.05)	12.20***	0.035	1 > 2 > 3
Stress	9.07 (5.75)	7.43 (5.63)	4.96 (4.66)	16.64***	0.047	1 > 2 > 3

*** $p < 0.001$.**TABLE 3 |** Results of one-way ANOVAs: differences in psychological distress during the curfew regarding the intensity of physical activity before the curfew ($N = 672$).

Psychological distress	1 = Sedentary (127)	2 = Moderately active (104)	3 = Highly active (441)	$F(2,675)$	η_p^2	Post hoc
	$M(SD)$	$M(SD)$	$M(SD)$			
Anxiety	3.65 (4.54)	4.14 (5.16)	2.73 (4.28)	5.24**	0.015	3 < 2
Depression	4.76 (5.13)	5.03 (5.46)	3.68 (4.63)	4.74**	0.014	3 < 2
Stress	8.72 (5.58)	8.60 (5.73)	6.73 (5.56)	9.16***	0.027	3 < 1, 2

*** $p < 0.001$, ** $p < 0.01$.

Finally, we tested the differences in psychological distress by taking into account the changes in the training routine during the curfew among physically active, i.e., elite and recreational athletes, since only these two groups had the training routine in the past. We conducted two-way ANOVAs with training routine and level of sports participation as factors and distress scales as dependent variables in each analysis. Results showed a significant main effect of level of sport participation on stress (Table 4), with elite athletes showing lower scores ($M = 4.96$, $SD = 4.66$) compared to recreational athletes ($M = 7.43$, $SD = 5.63$), which had also been obtained in the previous analysis. Training routine did not show a significant main effect on either distress scale. However, there was marginally significant interaction effect on anxiety. *Post hoc* Bonferroni tests showed that there were no significant differences among elite athletes regarding anxiety level that depends on the training routine. However, recreational athletes who kept the same training routine showed higher anxiety compared to those who reduced trainings (Figure 1). Furthermore, elite athletes who reduced trainings showed lower anxiety compared to recreational athletes who also reduced or kept the same training routine during the curfew.

Additionally, we tested effects of physical activity and training routine on distress scales. Results showed that physical activity had the main effect on stress (Table 4). *Post hoc* Bonferroni test showed that vigorously active individuals ($M = 6.56$, $SD = 5.45$) had lower stress scores compared to sedentary individuals ($M = 8.83$, $SD = 5.67$). There was also the main effect of training routine on anxiety, with those who kept the same training routine ($M = 4.20$, $SD = 5.02$) showing higher anxiety compared to those who became inactive ($M = 2.38$, $SD = 3.56$) or reduced their trainings ($M = 2.69$, $SD = 4.25$). However, there was no significant interaction.

In sum, we partly support H1 by showing that physically active participants had lower distress compared to physically inactive participants. However, there are also differences between elite and

recreational athletes, with elite athletes experiencing the lowest distress, which was not in line with H1 stating that elite and recreational athletes would not differ in distress. Furthermore, we support H2 by showing that participants with vigorous physical activity showed the lowest scores on distress scales compared to the moderately active and/or sedentary. Contrary to our expectations (H3), we found the effects of the training routine on anxiety to be dependent on the level of sports participation. Specifically, elite athletes who reduced their trainings showed lower levels of anxiety compared to recreational athletes who also reduced or kept the same training routine.

STUDY 2

The aim of Study 2 was to further explore the differences in well-being among non-athletes, recreational athletes, and elite athletes during the ending stage of the curfew. Since the previous study did not include measures of mental health domains before

TABLE 4 | Results of two-way ANOVAs: differences in psychological distress regarding the level of sport participation (recreational and elite athletes) and changes in the training routine during the curfew ($N = 539$).

Effects	Anxiety		Depression		Stress	
	F	η_p^2	F	η_p^2	F	η_p^2
Level of sport participation	2.67	0.005	0.96	0.002	7.36**	0.014
Training routine	0.60	0.002	1.59	0.006	0.73	0.003
Interaction	3.17*	0.012	0.56	0.002	0.06	0.000
Physical activity	1.40	0.005	0.98	0.004	3.37*	0.013
Training routine	3.45*	0.013	1.37	0.005	0.47	0.002
Interaction	0.40	0.003	0.77	0.006	1.05	0.008

df_{bg} for level of sport participation was 1, for training routine and interaction was 2, and $df_{error} = 533$; df_{bg} for physical activity was 2, for training routine and interaction was 2, and $df_{error} = 525$; ** $p < 0.01$, * $p < 0.05$.

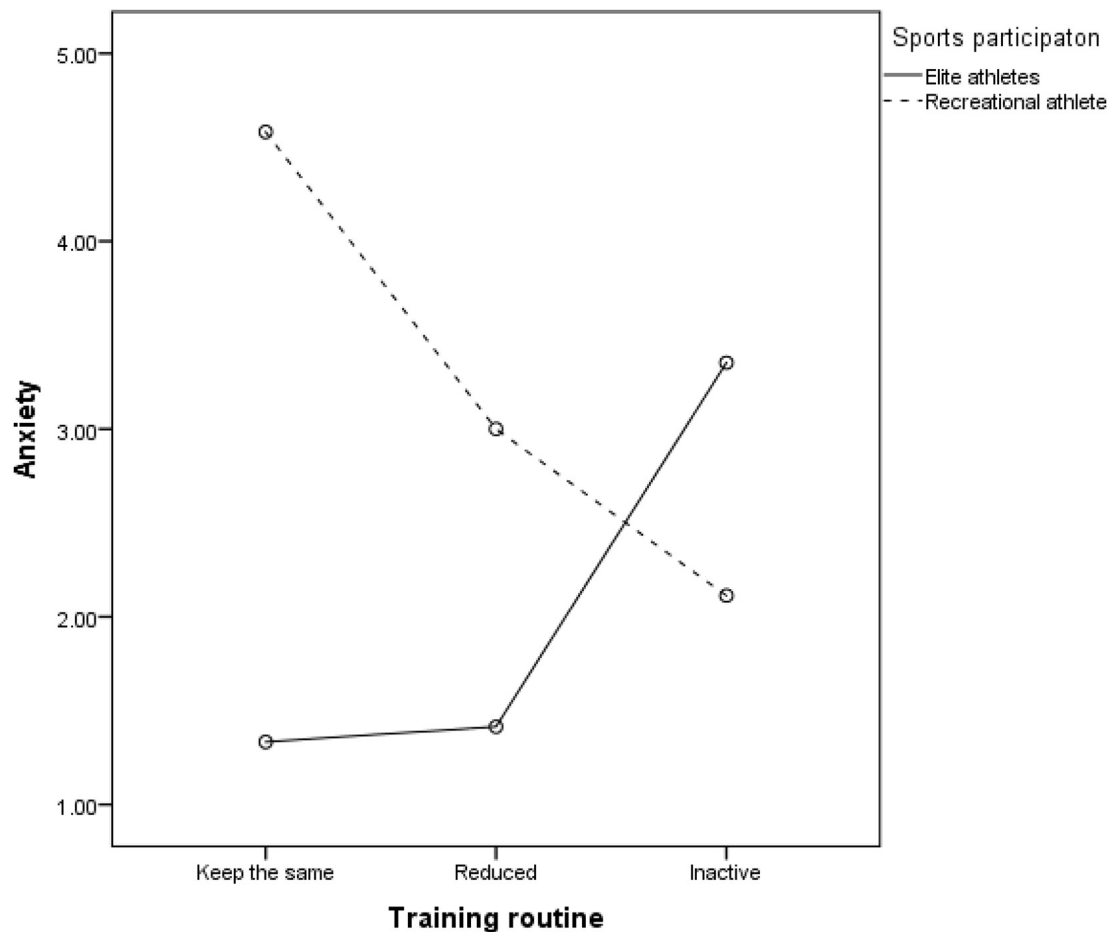


FIGURE 1 | The interaction between sport participation and the training routine during the curfew on anxiety among physically active participants (elite and recreational athletes, $N = 539$).

the pandemic, in this study, we asked the participants to fill out the measures by following two instructions: (1) before the pandemic and the emergency state and (2) in the previous week, during the emergency state and curfew. Firstly, based on the previous research (e.g., Zacher and Rudolph, 2020), we expected that well-being decreases among all the participants during the curfew (H1). However, we expected that physically active (both recreational and elite athletes) would have better well-being both before and during the curfew compared to physically inactive, i.e., non-athletes (H2). In addition, we expected that decrease in well-being would be smaller among physically active (H3). Thus, due to the better mental health among physically active individuals (e.g., White et al., 2017), we could expect that being physically active provides benefits for mental health in crises and stress situations. Further, we tested the differences in well-being depending on the changes in the training routine among the physically active. We assumed that both recreational and elite athletes who did not change their training routine during the curfew would show better well-being compared to those who became inactive or changed the training routine, i.e., reduced or increased trainings (H4).

Method

Participants and Procedure

The sample included 441 participants, 43 (9.75%) of whom were in quarantine and thus excluded from the final sample. Among 398 participants, 61.1% women, age range 18–73 ($M = 34.83$, $SD = 10.21$), 103 (25.9%) were non-athletes, 180 (45.2%) were recreational athletes, and 115 (28.9%) were elite athletes. The differentiation between recreational and elite athletes was based on questions about sport type and participation in competitions during the previous year. Thus, those who reported that they participated in a competition and engaged in types of sports such as collective and endurance sports in contrast to recreational types (e.g., fitness, gym, recreational running and cycling) were identified as elite athletes, while the rest were categorized as recreational athletes. Elite athletes had more participation in competitions during the previous year [$t(293) = -4.58$, $p < 0.001$, $M_{elite} = 14.37$, $SD_{elite} = 29.72$, $M_{recreational} = 2.26$, $SD_{recreational} = 15.51$], they have been involved in physical activity for a longer period [$t(286) = -2.16$, $p = 0.032$, $M_{elite} = 12.68$ years, $SD_{elite} = 10.74$, $M_{recreational} = 9.98$ years, $SD_{recreational} = 9.98$], and they had more frequent training

routine before the curfew compared to recreational athletes [$t(293) = -3.26, p = 0.001, M_{elite} = 3.26$ on a scale from 1 to 5, $SD_{elite} = 0.77, M_{recreational} = 2.94, SD_{recreational} = 0.86$]. Based on the reported frequency of the training routine by answering the two questions – before and during the emergency state, four groups were formed: those who became inactive, those who reduced trainings, those who kept the same routine, and those who increased trainings (see **Table 5**). Since sports fields, swimming pools, and other sports areas were closed, we asked the participants to report their training routines during the curfew, including sports other than their primary type.

There were sex differences in the level of participation [$\chi^2(2) = 31.48, p < 0.001$], with males more often belonging to the group of elite athletes and being more physically active. Additionally, there were also age differences in the level of sport participation with elite athletes were older [$F(2,394) = 4.24, p < 0.05$]. In preliminary analysis, statistically controlled sex and age did not have any influence to the obtained effects, thus they are not included as control variables.

Data were collected online via social networks, including groups and websites of recreation and sports associations. Data were collected in the period from April 20th till April 30th (during the 6th and the 7th week of the emergency state and curfew). The study was approved by the Ethical Committee of the Faculty of Philosophy, University of Novi Sad, Serbia, which is the Second Instance Commission of the Ethical Committee of the Serbian Psychological Society (Code: 202004092113_Gfu4).

Measures

The Satisfaction With Life Scale (SWLS; Diener et al., 1985, for the Serbian adaptation see Vasić et al., 2011) comprises five items measuring the cognitive domain of subjective well-being. The instruction was to rate items on a 7-point scale (from 1 = *strongly disagree* to 7 = *strongly agree*) relative to the general state, before the pandemic and the emergency state ($\alpha = 0.91$), and the previous week, while the emergency state and curfew lasted ($\alpha = 0.86$).

The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988, for the Serbian adaptation see Mihić et al., 2014) consists of 20 items measuring the affective domain of well-being, i.e., positive and negative affect, with 10 items tapping each. Positive affect includes subscales of joviality ($\alpha_{before} = 0.79$,

$\alpha_{curfew} = 0.83$), self-assurance ($\alpha_{before} = 0.81, \alpha_{curfew} = 0.77$), and attentiveness ($\alpha_{before} = 0.75, \alpha_{curfew} = 0.78$), while negative affect includes subscales of fear ($\alpha_{before} = 0.89, \alpha_{curfew} = 0.86$), self-disgust ($\alpha_{before} = 0.69, \alpha_{curfew} = 0.53$), and hostility ($\alpha_{before} = 0.75, \alpha_{curfew} = 0.72$). The instruction was to rate items on a 5-point scale (from 1 = *very slightly or not at all* to 5 = *extremely*), again, relative to the period before the pandemic and the emergency state and to the previous week, while emergency state and curfew lasted.

Two multiple-choice questions were added in order to assess the changes in the routines of physical activity due to the curfew (“How often did you use to train before the state of emergency was declared?” and “How often have you been training since the state of emergency was declared?”).

This study is a part of a larger project which includes other measures, but all the measures that refer to the state of emergency were given at the beginning of the instruments set, and these were followed by the measures referring to the period before the state of emergency.

Results

Firstly, mixed-design ANOVAs with one repeated-measure factor (before and during the curfew) and one between-subject factor (groups based on sports participation) were conducted, for each indicator of well-being as a dependent variable. The results showed a significant decrease in well-being during the emergency state in all groups (**Table 6** and **Figure 2**). There was also the main effect of the group on positive and negative affect, with non-athletes showing lower positive affect and higher negative affect, compared to recreational and elite athletes who were not mutually different. Thus, as for non-athletes, this tendency is independent of the estimation period. However, there were no significant interactions between the repeated-measure factor and the between-subject factor (F s ranged between 0.23 and 0.50, all $p > 0.05$), meaning that belonging to a group based on sports participation did not change the decrease in well-being.

Secondly, two-way ANOVAs with sports participation (recreational and elite athletes) and changes in the training routine as factors was conducted for each indicator of well-being as a dependent variable. However, since interactions between the two factors were not significant (F s ranged from 0.35 to 1.40, all $p > 0.05$), only the effects of the training routine were calculated.

TABLE 5 | Results of one-way ANOVAs: differences in well-being regarding the changes in the training routine during the curfew among recreational and elite athletes ($N = 295$).

Well-being	1 = Inactive (43)	2 = Reduced trainings (51)	3 = Keep the same training routine (143)	4 = Increased trainings (58)	$F(3,291)$	η_p^2	Post hoc
Satisfaction with life	3.91 (1.51)	4.06 (1.36)	4.13 (1.29)	4.23 (1.52)	0.46	0.005	–
Joviality	2.52 (0.94)	2.95 (0.94)	3.07 (0.93)	2.99 (1.09)	3.61**	0.036	1 < 3
Self-Assurance	3.04 (0.88)	3.24 (0.95)	3.47 (0.86)	3.46 (0.92)	3.10*	0.031	1 < 3
Attentiveness	3.14 (0.79)	3.31 (0.84)	3.59 (0.80)	3.49 (0.93)	3.92**	0.039	1 < 3
Fear	2.59 (0.82)	2.22 (0.79)	2.23 (0.84)	2.16 (0.94)	2.54	0.026	–
Self-Disgust	1.73 (0.62)	1.65 (0.73)	1.64 (0.64)	1.52 (0.62)	0.95	0.010	–
Hostility	2.56 (1.16)	2.06 (1.24)	1.97 (1.03)	2.01 (1.11)	3.26*	0.033	1 > 3

** $p < 0.01$, * $p < 0.05$.

TABLE 6 | Results of mixed ANOVAs: differences in well-being before and during the curfew between non-athletes, recreational athletes, and elite athletes ($N = 398$).

Well-being	Repeated-measures factor (before and during curfew)		Between-subject factor (sport participation)		
	$F(1,395)$	η^2	$F(2,395)$	η_p^2	Post hoc
Satisfaction with life	148.23***	0.273	0.99	0.005	–
Joviality	221.07***	0.359	15.44***	0.072	1 < 2 < 3
Self-Assurance	118.39***	0.231	14.66***	0.069	1 < 2 < 3
Attentiveness	166.99***	0.297	16.94***	0.079	1 < 2, 3
Fear	83.07***	0.174	8.68***	0.042	1 > 2, 3
Self-Disgust	18.29***	0.044	4.47**	0.022	1 > 2
Hostility	128.07***	0.245	5.49**	0.027	1 > 2, 3

1 = non-athletes (103), 2 = recreational athletes (180), 3 = elite athletes (115), *** $p < 0.001$, ** $p < 0.01$.

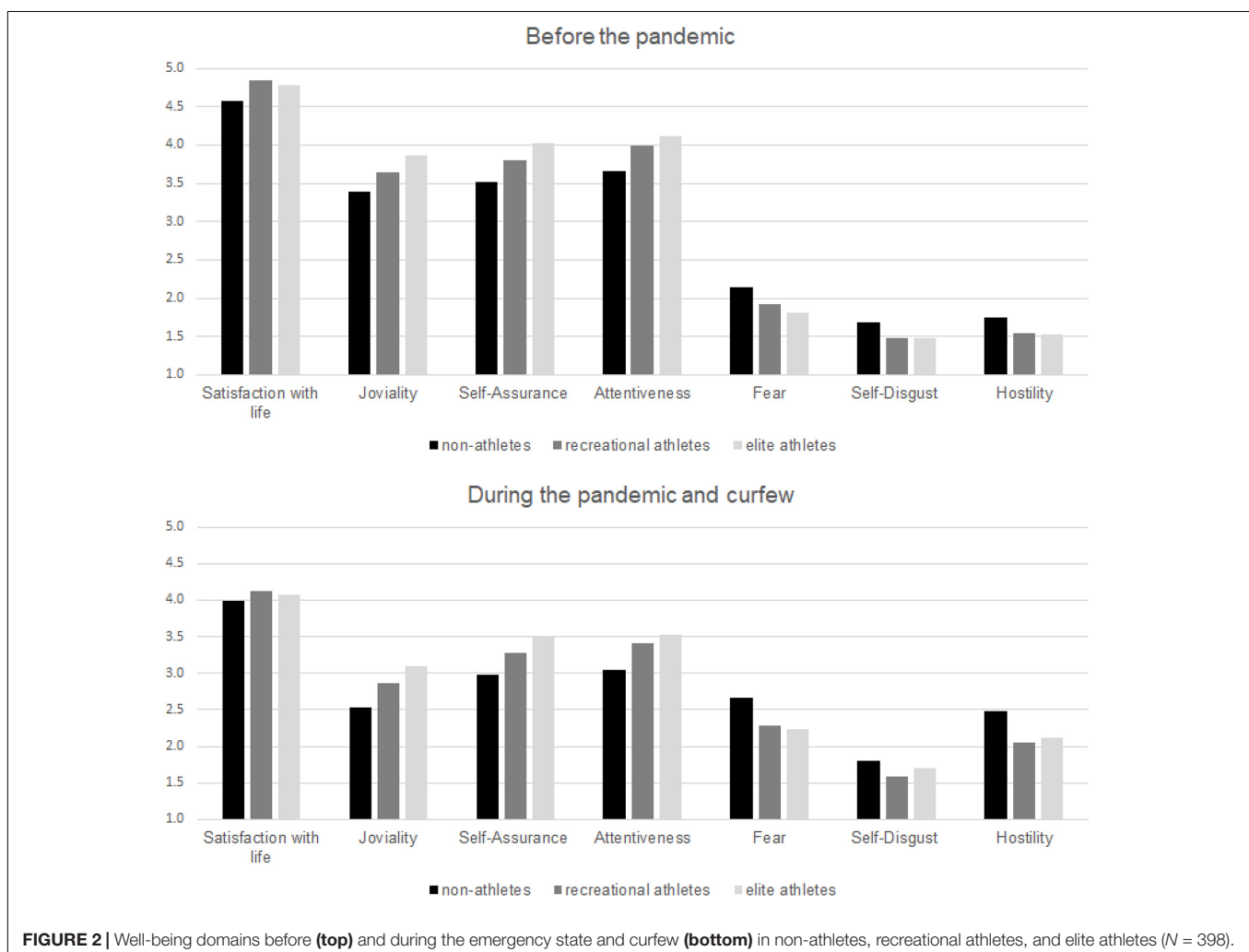
Results of the one-way ANOVAs showed that changes in the training routine among athletes had a significant effect on all the facets of positive affect as well as on hostility, with athletes

who became inactive reporting lower positive affect and higher hostility during the curfew compared to those who kept the same training routine (Table 5).

In sum, we confirmed that well-being decreased among all the participants during the curfew (H1) and that recreational and elite athletes had better well-being both before and during the curfew compared to non-athletes (H2). However, we did not confirm that decrease in well-being is smaller among recreational and elite athletes (H3). Thus, being physically active did not provide additional benefits for mental health in crises and stress situations, but rather reflected the same benefits as before the pandemic and the curfew. Finally, we confirmed that the athletes who did not change their training routine during the curfew show better well-being compared to those who became inactive (H4), but there is no difference in regard to those who reduced or increased their trainings.

GENERAL DISCUSSION

Since the beginning of the pandemic, numerous studies have been published regarding the importance of physical activity in the



general population during lockdown. WHO recommendations (WHO, 2020b) specifically include periodic times of moderate-intensity or vigorous-intensity physical activity during the week, which have proven to be particularly helpful, especially in times of anxiety, crisis, and fear (e.g., Aldana et al., 1996; Chekroud et al., 2018). These recommendations for the general population are mostly based on the idea that the beneficial effects of physical activity on mental health include distraction, self-efficacy, and social interaction (Peluso and Andrade, 2005). However, in the context of the lockdown and curfew, there are concerns that the reduced (or even complete lack of) access to regular routines may result in mental health disruptions in individuals who engage in sports or exercise. As athletes represent a highly unique cohort, the general WHO recommendations on physical activity in “at-home conditions” do not meet their sport-specific requirements (e.g., maximal musculoskeletal tension during specific movement such as sprinting). Although there have been some insights into physiological and musculoskeletal consequences of long-term detraining (Mujika and Padilla, 2000), little is known about the psychological aftermath of such forced and lingering circumstances.

In the present paper, we aimed to provide a comprehensive insight into the effects of different physical activity factors on mental health during different stages of the emergency state and curfew. Regarding differences in mental health indicators among non-athletes, recreational athletes, and elite athletes, the results of Study 1 showed that elite athletes, followed by the recreational athletes, had less psychological distress compared to the physically inactive (non-athletes). Although those who are physically active report less distress, contrary to our expectation, elite athletes showed significantly lower distress levels compared to recreational athletes. Although the group of elite athletes in our study is comprised of those that are mostly involved in national competitions, results are in line with a recent study that showed no impact of the pandemic on the anxiety response of Olympic and Paralympic athletes in the first wave of pandemic (Clemente-Suárez et al., 2020). These results are in line with some previous studies (e.g., McAllister et al., 2001; Modolo et al., 2009; Shirvani et al., 2015) and showed that elite athletes could react more adaptively to stressful situations and crises. It could be assumed that chronic exposure to pressures helps elite athletes strengthen their capacity to overcome novel stressful and challenging situations, including a situation such as a crisis caused by a pandemic.

Study 2 on another sample further provides evidence of better well-being, or more precisely its affective domain, among physically active individuals. At the global level, elite athletes had higher positive affect and both elite and recreational athletes had lower negative affect compared to non-athletes. Therefore, we could conclude that athletes, especially elite athletes, had better mental health in general, compared to non-athletes.

Study 2 revealed that the affective domain of well-being was reduced during the curfew in all participants. This is in line with studies that have revealed an overall decrease in subjective well-being during the early stages of the COVID-19 pandemic (e.g., Zacher and Rudolph, 2020), with negative affect decreasing over time (e.g., Sadiković et al., 2020). However, level of sports

participation did not affect the decrease of emotional aspect of well-being. This means that although athletes have better mental health, the global crisis situation resulting from the current pandemic has negatively affected everyone and engagement in physical activity has failed to moderate the decrease in mental health indicators. Thus, being physically active did not provide additional benefits for mental health, but rather reflect the same benefit that exists in non-crisis situations. However, since elite athletes have been found to have better mental health, this could make them more resilient to stressful and crisis situations compared to recreational athletes or non-athletes. It seems that elite athletes have some kind of “reservoir” of energy and self-assurance, which could lead to better adjustment even if mental health is lower overall.

Interestingly, there were no differences between athletes and non-athletes in the cognitive domain of well-being, but only in the affective domain. The distinction between cognitive and affective components of well-being has been well-documented (e.g., Luhmann et al., 2012). Previous studies have shown inconsistent results regarding differences in life satisfaction between athletes and non-athletes (e.g., Norinejad et al., 2014; Ivantchev and Stoyanova, 2019). One of the explanations could be that life satisfaction is a more stable component of well-being compared to the affective component. Thus, physical activity may have greater influence on mood changes (e.g., López-Bueno et al., 2020). Additionally, the cognitive domain is more related to the basic psychological needs (e.g., food or salary), while the affective domain is more related to social exchange and close relationships (Diener et al., 2009). Therefore, we could assume that athletes have extra social support, including members of their teams or sports groups.

When considering the level of intensity of physical activity, in the context of responding to the early stage of the curfew in Study 1, our results showed that participants with previous vigorous activity scored lowest on all dimensions of psychological distress compared to those who were previously moderately active or sedentary. Since all elite athletes belonged to the group of vigorous activity, this result is in line with previously mentioned findings (e.g., Shirvani et al., 2015). However, the group of vigorous activity was the most numerous and also included recreational athletes as well as those who considered themselves as non-athletes, although the latter were small in number. Besides the explanation referring to better mental health among those who were highly physically active, there is an alternative explanation of an effect on anxiety. The effect on anxiety could be explained by taking into account the physiological component of anxiety. Namely, it is possible that individuals who engage in vigorous physical activity are less sensitive or are used to physiological changes, e.g., increased heart and breathing rate, sweating or a rise in body temperature, all of which are inherent to anxiety. This complements previous findings that regular exercise might facilitate habituation and higher tolerance to the sensations of anxiety (Broman-Fulks and Storey, 2008; Ströhle et al., 2009, although not taking into account the intensity of physical activity directly). For further implications, a more detailed inspection of the specific time periods of intense activity engagement is needed.

Considering the effect of the training routine on mental health, the results of the two studies showed seemingly conflicting results. In Study 1, results showed that the effect of changes in the training routine on distress depends on the level of sports participation. Thus, elite athletes who reduced the training routine showed lower anxiety compared to recreational athletes who also reduced or kept the same training routine during the early stage of the curfew. Additionally, recreational athletes who reduced their trainings showed lower anxiety compared to those who kept the same training routine. Having in mind that Study 1 was conducted in the early stage of the curfew, it could be assumed that keeping the same routine requires extra effort and perhaps rescheduling other activities due to the limited time that could be spent outside. Being a recreational athlete usually means that the one is engaged in physical activity in leisure time, after work or other obligations. Since the curfew limits leisure time that recreational athletes usually spend outside or in sports objects that are now closed due to the pandemic, maintaining the training routine could be a challenging task. Thus, trying to balance the training routine and compliance with governmentally enforced restrictions related to COVID-19 could have resulted in additional stress, which had a negative effect on mental health among recreational athletes who were trying to keep the same training routine.

Alternative explanation could be that the group of recreational athletes might include a number of those prone to engaging in maladaptive coping strategies, e.g., failing to accept novel circumstances, engaging in avoidant behaviors, and trying to keep control over the situation by not changing the routine, or those prone to overtraining, giving overlapping symptoms with depression (e.g., low self-confidence, lack of appetite) and stress (e.g., sleep disturbances, irritability). It should be noted that the recreational athletes who kept the same training routine at this stage constituted a minority of physically active participants (55), while the majority (317) reduced their trainings.

Compared to recreational athletes, elite athletes who reduced trainings showed lower levels of anxiety. There are highly important implications of this result, coupled with the evidence that properly reduced training can be enough for achieving previous physical performance later on (Huyghe et al., 2020). Our results suggest that during the early stages of the curfew, when all resources were focused on adapting to the novel stressful situation and life conditions, elite athletes showed more adaptability to the novel circumstances and the curfew. Our results are in line with a conclusion of Huyghe et al. (2020) that athletes could benefit from focusing on the improvement of non-physical aspects of sports performance, while keeping the “minimum effective dose” in training. The period of adjustment and adaptation to this kind of unique stressor is necessary, until conditions are met for recreating one’s daily routine.

However, in the later stage as Study 2 showed, those who kept the same training routine showed better affective domain of well-being compared to those who became inactive. In the later stage of the curfew, almost half of the physically active individuals (48.5%) managed to keep the same training routine and there were also those who even increased trainings (19.7%). Thus, it could be assumed that after some time of adjustment to

novel circumstances and the restoration of a daily routine, those who continued with trainings in line with their routine before the pandemic showed better mental health. Thus, there is no additional benefit of being an elite athlete and keeping the same training routine that contributes to better well-being.

There are several limitations of this research. First, although in Study 2, the measures were given in two instructions (before and during the pandemic and the emergency state), reports of mental health before the pandemic rely on memory. Although all participants first filled out measures in line with the current state and then in line with the state before the pandemic, it is possible that they emphasized the negative effects of the current pandemic situation. Future studies should consider a longitudinal design in order to address the changes in mental health during the pandemic. Second, although the same recruitment method was used, the two studies were conducted on different samples. Thus, a comparison between the results of these two samples should be made with caution. Third, the differentiation between elite athletes, recreational athletes, and non-athletes was based on self-report. In Study 2, other criteria were used. However, as we could see in Study 1, some highly physically active participants may consider themselves as non-athletes. Thus, future studies should include some other, objective criteria for differentiating between these groups, i.e., sports and recreational club memberships in combination with a training routine and participation in competitions. Finally, although in preliminary analysis statistically controlled sex and age did not have any influence to the obtained effects, future studies should include more female elite athletes and both junior and senior athletes in order to test their possible moderation effect.

As our results contradict the evidence of better mental health among recreational and/or moderately active athletes, it might be that the “social outlet” (Schaal et al., 2011) aspect of physical activity is an important factor to consider within this group. There are hints that some benefits of physical activity rely greatly on social contact, as could be seen in recreational athletes (Zarrett et al., 2015). Given the context of social distancing, this should be further inspected.

In sum, we found that elite athletes, as well as individuals engaging in vigorous physical activity, showed the highest ability to adapt to the current crisis. More importantly, this result suggests that although in terms of mental health, the adequate first response to a crisis might require some adjustments in the daily routine (training-wise), keeping and adapting previous routines to new circumstances leads to long-term mental health benefits.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Study 1: Ethical Committee of the Faculty of Sport

and Tourism, Educons University, Novi Sad, Serbia; Study 2: Ethical Committee of the Faculty of Philosophy, University of Novi Sad, Serbia, which is the Second Instance Commission of the Ethical Committee of the Serbian Psychological Society (Code: 202004092113_Gfu4). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JS and SP conducted the Study 1. BD and JR conducted the Study 2. JS and BD wrote the original and revised manuscript and

performed the analysis of the results, with inputs from SP and JR. All authors contributed to the design and implementation of the two conducted studies, discussed the results, commented on the manuscript, and contributed to the final version of the manuscript.

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Exploring the Perceived Impact of the COVID-19 Pandemic Social Distancing Measures on Athlete Wellbeing: A Qualitative Study Utilising Photo-Elicitation

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Countries all over the globe have implemented mandatory social distancing measures in an attempt to suppress and control the spread of the Coronavirus disease (COVID-19). This enforced period of isolation, disruption to normal training routines and competition cancellation, could be having an adverse effect on the mental health and wellbeing of athletes. This study sought to explore the perceived impact of the COVID-19 social distancing measures on athlete wellbeing. Fourteen elite athletes who were unable to train or compete due to government imposed lockdown measures were recruited to participate in this qualitative study. Utilising the photo elicitation method, participants were asked to take a series of photographs that represented their experiences as athletes living in lockdown. These photographs were used to guide discussions in follow up unstructured interviews. Reflexive inductive thematic analysis identified three main themes that captured athletes' experience of social distancing measures and the implications for their wellbeing: (1) threats to wellbeing; (2) adapting routines and maintaining motivation; and (3) reflecting on participation in competitive elite sport. The initial sudden loss of sport in the athlete's lives posed a threat to their wellbeing, but over the duration of the lockdown period the athletes developed numerous strategies to protect their wellbeing. Furthermore, their time away from sport encouraged them to reflect on their athletic identity and to make life changes that would protect their wellbeing during the rest of the lockdown period and when they returned to sport. A number of immediate practical recommendations are offered for athlete support personnel working with athletes during the crisis, these include developing self-care strategies and social networks, adapting routines, setting new goals and encouraging the pursuit of dual-careers. Future research is encouraged to investigate how practitioners can deliver effective psychological support through tele-consulting, and to consider whether their support is best focused on therapeutic counselling or mental skills training during the pandemic.

Keywords: Coronavirus, COVID-19, athlete wellbeing, mental health, photo elicitation, reflexive thematic analysis

INTRODUCTION

On the 11th March 2020 the World Health Organisation (WHO) declared the coronavirus disease 2019 (COVID-19) outbreak as a pandemic. The situation is evolving rapidly with global case counts currently just over 122 million and deaths rates over 2.7 million worldwide on March 22nd, 2021 (World Health Organization, 2021). Whilst ongoing clinical trials and investigations aim to further our knowledge about the virus, its origin, and how it affects humans countries all over the globe have implemented mandatory social distancing measures in an attempt to suppress and control the spread of the virus. These strategies include; lockdowns, stay-at-home orders, curfews, non-essential business closures, bans on mass gatherings, school and university closures, travel restrictions and bans, remote working and quarantine of exposed people/travellers (World Health Organization, 2021).

Studies exploring the psychological implications of previous epidemics and pandemics have found social distancing measures to be particularly detrimental to psychological health (Taylor, 2019), with symptoms such as post-traumatic stress exacerbated by infection fears, longer quarantine duration, frustration, boredom, inadequate supplies, inadequate information and financial loss (Brooks et al., 2020). Similar findings have been identified in the COVID-19 pandemic, such as an association between negative changes in health behaviours (physical activity, sleep, alcohol and tobacco) and increased psychological distress (depression, anxiety and stress) (Stanton et al., 2020; Duncan et al., 2020), as well as increased psychological morbidity in those who identified as being at risk of contracting the virus (Jia et al., 2020).

There is an emerging evidence base that focuses on exploring the psychological implications of the COVID-19 pandemic on athletes, in response to the suggestion that athletes experience additional mental health risk factors compared to the non-athletic population (Schinke et al., 2018). Athletes have expressed substantial grief and frustration in response to this enforced period of isolation, disruption to normal training routines and competition cancellation (Pillay et al., 2020; Toresdahl and Asif, 2020; Gupta and McCarthy, 2021). These preliminary findings suggest that some pandemic mitigation strategies such as lockdowns, could be having an adverse effect on the mental health and wellbeing of athletes (Mann et al., 2020).

According to the World Health Organisation (World Health Organization, 2004), mental health is defined as “a state of well-being in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community” (p 1). Whilst mental health is a major resource for athletes in relation to their performance and development in sport, high rates of psychological distress and disturbance are reported among athletes (Markser, 2011) which may impair performance and wellbeing, according to the International Olympic Committee consensus statement on mental health (Reardon et al., 2019). Research suggests that the prevalence of mental health symptoms and disorders in male elite athletes in team sports (cricket, football, handball,

ice hockey and rugby) varies from 5% for burnout and alcohol abuse, to nearly 45% for anxiety and depression (Nixdorf et al., 2013; Gulliver et al., 2014; Beable et al., 2017; Brown et al., 2017; Gouttebarga et al., 2017a,b; Schuring et al., 2017; Drew et al., 2018; Kiliç et al., 2018). In female athletes, mental health disorders range from 10% to 25% for depression and eating disorders in particular (Greenleaf et al., 2009; Proctor and Boan-Lenzo, 2010; Brand et al., 2013; Wolanin et al., 2016). There is also evidence to suggest that occurrence of such mental health disorders amongst elite athletes are associated with higher incidence of severe injuries, surgeries, recent adverse life events, a higher level of career dissatisfaction and a lower level of social support (Gouttebarga et al., 2017b).

Considering the increasing number of mental health problems being reported in the athletic population, the challenges that the pandemic presents to them, and recent research identifying the adverse effect of social distancing measures on mental health, athletes could be considered an at-risk group during the current COVID-19 pandemic. Indeed, this is reflected in recent findings that show the COVID-19 lockdown period significantly affected athletes' physical and mental health. Specifically, physical deconditioning, worsening nutrition, uncertainty on return to sport, and disruptions to social interaction, training, and sleep patterns (Pillay et al., 2020) were associated with increased depression, anxiety and stress symptoms (Facer-Childs et al., 2021). Furthermore, in a recent study exploring adversity and resilience in athletes during COVID-19, athletes reported tangible losses with regards to their sport, support networks and athletic identity, and a sense of incongruence as a result of the dissonance between the usual structured, goal directed environment they were accustomed to, and the relatively aimless lockdown scenario presented by COVID-19 (Gupta and McCarthy, 2021). The incongruence experienced due to the lack of agency during the pandemic, resulted in psychological distress, ruminations, negative emotions and loss of motivation. Whilst the authors acknowledged the role resilience is playing in mobilising coping methods to protect athletes from these adversities, it could not be inferred that the athletes had positively adapted to the stressors as they are still living in a pandemic. Although the overwhelming evidence suggests that athletes have experienced negative physical and psychological effects of the COVID-19 pandemic, Şenışık et al. (2020) reported that the mental health status of athletes was better than non-athletes, attributing this difference to the potential protective effects of physical activity that were still experienced during their pause in sport participation.

Whilst the literature reviewed has furthered our understanding of the impact of social distancing measures on athlete mental health, the current research will utilise the concept of wellbeing as a framework for examining athlete's experiences. Giles et al. (2020) argued that whilst athletes are by definition sport performers, first and foremost they are people whose physical, mental and social health is reflected through their wellbeing and ill-being. A consideration of athletes' holistic health is fundamental to their identity as performers and people, and their participation in sport can contribute to or detract from their wellbeing. It is argued that the

exploration of wellbeing in relation to athletes' experiences of social distancing will provide a broader framework for investigation than mental health alone. Indeed, recent recommendations from a consensus statement on improving the mental health of high-performance athletes (Henriksen et al., 2019), identified various propositions to inspire researchers and support elite sport organisations to investigate and enhance mental health in athletes. Of particular relevance to the current study was their recommendation to better define mental health in sport as being more than the absence of mental illness, separate from performance, contextualised and acknowledging the full range of human emotions that are experienced.

Throughout sport psychology literature, researchers have found the construct of wellbeing to be both multi-faceted and complex. Lundqvist (2011) argues that "wellbeing is treated as an unspecific variable, inconsistently defined and assessed using a variety of theoretically questionable indicators" (p. 118). For the purpose of this research, the concept of wellbeing will be based on a review of existing measures of wellbeing in sport performers by Giles et al. (2020), who recommends an integrated measure of wellbeing that includes emotional, mental, social and physical components of wellbeing.

According to Stambulova et al. (2020), COVID-19 can be interpreted as a career transition barrier that interferes with athlete development and career progression. In the recent update of The International Society of Sport Psychology Position Stand on Athletes' Career Development and Transitions (Stambulova et al., 2020), "career excellence" is defined as "an athlete's ability to sustain a healthy, successful, and long-lasting career in sport and life" and not as "a destination to reach, but more a journey to, or process of, striving for it, in which athletes might need support" (p. 14). If we consider COVID-19 as a career development barrier from a holistic developmental perspective (Wylleman, 2019), it suggests substantial changes to athletes' athletic development (e.g., closed sports facilities, postponed and cancelled competitions), psychological health (e.g., threatened athletic identity), psychosocial aspects (e.g., social isolation, worries about significant others), academic-vocational responsibilities (e.g., change in focus to education or work), financial concerns (e.g., funding cuts) and changing legal developments (e.g., restrictions on movement). Indeed, Gupta and McCarthy (2021) suggested that if social isolation is conceptualised as an abrupt diversion in an athlete's career, it could trigger dissociations from their athletic identity and negatively impact wellbeing. Athletes often have a strong sense of identity that is derived from their participation in sport (Sparkes, 1998) and when this sporting platform is removed through injury or retirement, they lose access to vital resources and support networks which can result in threats to their wellbeing (Jewett et al., 2019). Preliminary findings suggest that the COVID-19 pandemic and lockdowns have presented athletes with a similar experience to that of forced retirement (Jewett et al., 2019; Park et al., 2013) and recommendations to support athletes using career transition and/or chronic injury psychological rehabilitation research as an intervention has been advocated (Gupta and McCarthy, 2021).

The current pandemic has presented sport and exercise psychologist consultants with challenges and opportunities with how best to support athlete's sport performance and wellbeing. A recent editorial by Schinke et al. (2020) reviewed the challenges encountered by athletes such as social isolation, career disruption, qualification process uncertainty and unconventional and limited access to training facilities and training partners. Underpinning these issues was the need to help maintain the health and wellbeing of athletes in their pursuit of performance excellence during this extraordinary time. Schinke et al. (2020) further reflected on their collective work with aspiring Olympic athletes across Asia, Europe and North America and suggested strategies to support athletes that encouraged openness to express their feelings and facilitate problem solving, identification of gaps in their development, and the setting of new goals. Mascaret (2020) reported that confinement during the COVID-19 pandemic encouraged athletes to modify their achievement goals; self-approach goals (improving oneself) and self-avoidance goals (avoiding regression). Specifically, they identified that self-approach goals decreased, and self-avoidance goals increased, suggesting that during confinement athletes were more focused on avoiding performance decrements than enhancing it.

In order to support athletes during this continuing global health crisis, further research is needed to investigate how social distancing measures are affecting athlete wellbeing. Given that isolation periods are detrimental to wellbeing (Taylor, 2019), and that elite athletes are at greater risk of mental health disorders (Reardon et al., 2019), together, the impact of the COVID-19 social distancing measures on elite athletes could be profound. It is vital that exploratory work which seeks to understand the lived experiences of athletes is conducted, to contribute to a limited but growing evidence base, in order to provide a foundation for future intervention studies to support athlete wellbeing, and to help inform Sport and Exercise Psychologists' recommendations/practice.

Research question

This study aimed to explore the perceived impact of the COVID-19 social distancing measures on athlete wellbeing. Specifically, the authors sought to investigate the emotional, mental, social and physical components of wellbeing that may have been affected by the lockdown measures.

MATERIALS AND METHODS

Theoretical Underpinning

According to Mayan (2009), qualitative studies should have methodological coherence, which this study achieved by ensuring congruence between epistemological and ontological positions, theoretical perspective and the research question. This study adopts a realist ontological viewpoint which acknowledges there is an objective reality of the material world, and also takes a critical realist epistemological perspective, accepting multiple accounts of any phenomenon (Maxwell, 2012). As described in Maxwell (2012) "critical realists thus retain an ontological realism while accepting a form of epistemological constructivism and relativism (multiple versions of a phenomena can exist)" (p.5).

By taking this stance, this research was able to explore how athletes perceived the impact of social distancing measures in the COVID-19 pandemic on their wellbeing.

This qualitative research collected data through combining the participant driven (open) photo elicitation method (Bates et al., 2017) with unstructured interviews, and was analysed using thematic analysis (Braun and Clarke, 2006). Conceptual coherence between theoretical and conceptual underpinnings of the research and the type of thematic analysis carried out is one of several proposed indicators of thematic analysis research quality (Braun and Clarke, 2020). In line with our aforementioned theoretical perspectives a reflexive approach to thematic analysis was taken, acknowledging and embracing researcher subjectivity as an analytic resource (Braun and Clarke, 2020). The choice to carry out an inductive thematic analysis was informed by the understanding that the analysis remains grounded in the data (Braun and Clarke, 2020). Furthermore, this form of analysis ultimately respects the participants' unique experiences of the COVID-19 pandemic, and thus follows on from our previously stated ontological and epistemological position. To further ensure that the themes developed from the data are true to the participants' overt understanding of their experiences (Braun et al., 2016), we employed semantic coding and did not aim to interpret any hidden or underlying meanings.

Photo Elicitation Method

The rise in accessibility and advancement of visual technology and communication through social networking sites and smartphones means that a wealth of contemporary phenomena and experiences are captured visually (Bates et al., 2017). The photo elicitation method uses photographs within an interview setting in order to prompt emotional connections to memories and evoke more meaningful accounts (Hogan and Warren, 2012; Kunitomo, 2004). Bates et al. (2017) describe the following three variations to the photo elicitation method: (1) Participant-driven (open): participants choose to take any photo they feel is relevant to the phenomenon under exploration (2) Participant-driven (semi-structured): the researcher shares a set of questions with the participants and asks them to take photos that align with those (3) Researcher driven: the researcher provides the photos for the interview to stimulate discussion only.

The photo elicitation method has previously been implemented to explore elite runners' disordered eating (Busanich et al., 2014), to capture the experience of Ironman competitors (Wakefield and Watt, 2012), and in a similar vein, creative collages using images has also been used to understand young athletes future career aspirations (Ronkainen and Ryba, 2018). The current study utilised the participant-driven (open) format as it was considered most appropriate to address the exploratory nature of the research question. By encouraging the production of participant-driven photographs the researcher can attempt to understand the experiences of the participants (including emotions and ideas) rather than imposing their own framework or preconceived ideas on the topic (Holloway and Galvin, 2017). The purpose of the images, therefore, is to create a dialogue and to introduce new dimensions that had not

been considered by the researcher, and in this respect is easily facilitated by the accompanying unstructured interviews.

Recruitment

As employed in previous qualitative work around athletes' experiences (e.g., Kirby et al., 2011), purposeful sampling was utilised to recruit athletes residing in countries enforcing strict lockdown measures which prevented them from leaving their house to train and compete in their sport. Participants were recruited through the researcher's network in elite sport and sustained through snowball sampling (Patton, 2002). However, none of the participants were known to the researchers so there was no potential for coercion. Contact was made to prospective participants through ethically approved invitations via email or through private messaging on public social media sites such as Twitter. The exclusion criteria were displayed in study invitations. Participants were unable to participate if they: were under the age of 18, had any existing clinical mental health problems, had contracted COVID-19, were recreational athletes, or resided in countries who did not have to adhere to lockdown measures. A heterogeneous sample of athletes were recruited to ensure that the research captured a wide range of athlete's experiences from team and individual sports.

Participants

A total of 14 elite athletes (eight White women, one Indian woman and five White men) representing 10 sports who were unable to train or compete due to government imposed lockdown measures participated in this study. Whilst the severity of the lockdown measures differed across the countries none of the athletes in the study were allowed to leave their homes to participate in organised sport.

In order to better define the sample, the athletic level of the participants was classified based on their highest standard of performance, their success at that level and the amount of experience they had gained at that level. Adopting the four-tiered classification system set out by Swann et al. (2015) participants were categorised as semi-elite; competitive elite; successful elite and world class elite. *Semi-elite athletes* participated below the highest level possible in their sport; *competitive-elite athletes* regularly competed at the highest level but had not achieved success; *successful-elite athletes* competed at the highest level and had experienced some success; *world-class elite athletes* competed and experienced sustained success at the highest level (e.g., Winning Olympic medals in consecutive games or major competitive victories over a number of seasons). To illustrate how participants met criteria for this research, pertinent demographic characteristics are provided in **Table 1**.

PROCEDURE

Upon recruitment, participants were informed of the study aims and procedure, and then provided their consent to participate. Participants were instructed to take any number of photographs they felt represented their experience of the COVID-19 pandemic as an athlete, using any available technology (e.g., iPads, smart phones, or digital camera). They were informed that the photos should not contain any people or easily identifiable places and

TABLE 1 | Participant demographic information.

Participant	Age	Sport	Elite level	Country of residence
Zoe	18	Athletics	Competitive-elite	South Africa
Dave	59	Biathle	Successful-elite	South Africa
Jess	21	Hockey	Semi-elite	United Kingdom
Kate	46	Fencing	Successful-elite	South Africa
Rob	51	Biathle	Successful-elite	South Africa
Hannah	18	Biathle	Competitive-elite	South Africa
Charlie	29	Rugby	Successful-elite	France
Olivia	18	Biathle	Competitive-elite	South Africa
Rachel	42	Powerlifting	Successful-elite	United Kingdom
Luke	30	Cricket	Successful-elite	Zimbabwe
Ben	22	Athletics	Competitive-elite	United Kingdom
Annika	48	Cross country	Successful-elite	South Africa
Sarah	18	Gymnastics	Successful-elite	South Africa
Amelia	25	Bodybuilding	Competitive-elite	United Kingdom

reminded that they were a conduit to aid discussions and would not be part of the data analysis; only the associated narratives would serve as the data set (as recommended by Bates et al., 2017). Participants were contacted again 2 weeks later to organise an online interview, and to submit via email any photographs they wished to discuss in the interview.

All interviews took place between April and May 2020 and were conducted virtually via Microsoft Teams due to the geographical spread of participants across the globe and lockdown regulations in place at the time of data collection. This virtual platform also provided a secure encrypted connection to ensure confidentiality. The online interviews were held in private rooms and the participants were informed that if they felt any discomfort discussing their experiences, they could terminate it without any questions asked.

Each interview was audio recorded and lasted between 45 and 60 min. In accordance with the participant driven (open) photo elicitation method, there were no pre-determined interview questions. The researcher began each interview asking, “Please could you talk through these photos and explain why you chose them to discuss today?” and asked follow up questions when appropriate. In this sense, the photos selected and discussed by the participant framed the interview process, leaving the control and power of the interview process as much as possible with the participant (Bates et al., 2017).

To protect anonymity participants were assigned pseudonyms and any identifying information was redacted from transcripts (Braun and Clarke, 2013) and interview data were stored in a password protected computer. Participants were debriefed following the interviews and given an information document that signposted to support resources in the event that any of the discussions had prompted any adverse psychological or emotional reactions.

Data Analysis

Due to the exploratory nature of this novel research, reflexive inductive thematic analysis (Braun and Clarke, 2019, 2020)

was used to analyse the data and the analysis process was informed by Braun and Clarke (2006) six phases of analysis. In order to achieve data familiarity, the researcher first transcribed interviews verbatim using NVivo software and engaged in repeated reading of transcripts and re-listening to the data, helping to move the analysis beyond a focus on the most obvious meanings. In the second stage of the analysis, all data relevant to the research question were coded. This process identified the first patterns in the data by grouping similar data segments at the semantic level. Similar codes were then clustered together to create a visual map of key patterns in the data, these existed in a hierarchical structure containing overarching themes, themes and sub-themes. The themes were reviewed to ensure they fitted with the coded data and the overall data set, and that they each had a clear organising concept. At this stage, the second author reviewed the themes to ensure they were substantially supported by data extracts, and contributed to answering the research question. The final themes and subthemes were then clearly defined and summarised to provide conceptual clarity and a road map for the final report.

Methodological Rigor

In alignment with the aforementioned conceptual underpinnings of the research, the authors engaged in careful design thinking to conduct reflexive thematic analysis research with methodological integrity (Braun and Clarke, 2021) and to ensure the validity of findings (Morse et al., 2002). For example, the lead author engaged in regular journaling, reflecting on the process to ensure an in-depth engagement with the data resulting in a meaningful analysis, as recommended by Braun and Clarke (2021). Furthermore, the lead author carried out the initial coding process which was reviewed by the second author, this process was repeated at the initial theme development stage, as per Braun and Clarke (2021) recommendations for best practise in reflexive thematic analysis. Credibility was ensured by giving participants the opportunity to check transcripts for accuracy, and to engage in a process of member reflections with the lead researcher (Tracy, 2010) to explore any gaps in the results and to share any similarities in the interpretations of the findings (Schinke et al., 2013). The analysis was also discussed and cross analysed at various stages by the lead researcher's professional doctorate supervisory team to ensure worthy contribution to the topic and meaningful coherence (Tracy, 2010). As such, we feel that this research is timely and that the findings contribute unique insights regarding athlete wellbeing throughout the COVID-19 pandemic, afforded by our use of the photo elicitation method that is seldom used in sport and exercise literature. Finally, the analytic write up contains data excerpts and analytical commentary to provide strong evidence of patterning across the data (Braun and Clarke, 2013), which we hope resonates with other members of the elite sporting community also affected by COVID-19 mitigation strategies.

Ethics Statement

Ethical approval for this study was obtained from the Research Ethics Committee School of Social Sciences, Humanities, and Law at the University of Teesside.

RESULTS

Following the participant driven (open) photo elicitation method, participants provided the researcher with photographs they had taken which documented their experience as an athlete living in lockdown, due to the global COVID-19 pandemic. Though the images were important to elicit discussion, they were not part of the analysis. Reflexive, inductive thematic analysis (Braun and Clarke, 2006) was applied to the participant's discussions of the images and identified three main themes which highlight their experiences of lockdown as athletes, these were (1) threats to wellbeing; (2) adapting routines and maintaining motivation; and (3) reflecting on participation in competitive elite sport.

Theme 1: Threats to Wellbeing

This theme is defined by athletes' discussions that focused on how the lockdown and social distancing measures negatively affected their wellbeing. Athletes talked about how existing worries were exacerbated by lockdown, including maintaining a balanced diet, body image, mental health and injury recovery (subtheme 1), and how limited training opportunities and reduced access to outdoor space threatened their wellbeing (subtheme 2).

Subtheme 1: Lockdown Impedes Basic Athlete Needs

Following the initial shock of the COVID-19 crisis and its ramifications for participation in sport, the continued lockdown period posed a threat to wellbeing for those athletes who were already coping with some form of adversity in their lives. Pertinent to the pandemic, Amelia spoke of the stress she experienced when she could not buy the food she needed to maintain her physique because of the panic buying in supermarkets:

So not being able to access my usual food in lockdown was really stressful at first, in my head I was thinking oh my goodness if I don't have 120grams of protein today I am going to lose all my gains. But if I took a step back and thought logically I knew I was not going to lose two years' worth of muscle in the space of a week because I couldn't get my hands on the food I needed. . . but at the time I thought my whole world had come crashing down, first they cancel my competitions and now I can't maintain my nutrition or physique because I can't eat the food I need to eat, I just can't cope with this. (Amelia, 25, body building, United Kingdom).

Jess also expressed physique concerns as she described noticing physical changes to her body due to the lack of training which translated into poorer mental wellbeing. The selfie she took in the bathroom mirror illustrated how her pre-existing body image struggles had been amplified during the lockdown:

In terms of the other things like my hair and my skin, and even my nails they're not growing the same way. I just don't feel that nice and that's when I started getting down which is a bit concerning. I have tried not to look in the mirror to be honest, I just try not to overthink it. I haven't been on the scales, because I just actually point-blank refuse at this point. I know it's the physical activity, the lack of it makes me feel disgusting. But yeah, it's horrible, I'm just managing it, I really just try not to think about it. I've always struggled with kind of weight. And I always knew that this period, I said to myself

this is gonna be hard, you're going to gain some weight. As soon as the restrictions are lifted. I'm really motivated to get rid of it, already. (Jess, 21, hockey, United Kingdom).

For many, participation in sport and exercise was used as a way to de-stress and to channel both physical and mental energy in a positive activity. This is exemplified by Rachel, who shared a photograph of her empty training diary and described how competing in sport had been a way of managing her attention deficit hyperactivity disorder (ADHD) and maintaining her wellbeing prior to lockdown:

I always needed the physical stimulus of sport but didn't know why, it wasn't until after the diagnosis of ADHD and then only last year when I was doing some work with my counsellor and I said I feel guilty about training because I haven't started working and I have to collect my son and my days are really short. She said have you thought that maybe you need it in order to function and that was a massive light bulb moment for me. I didn't realise, she was right, she was spot on. I need my sport to manage my mental health. (Rachel, 42 powerlifting, United Kingdom).

Referring to a photograph of him participating in rehabilitation training at home, Charlie described how the psychological implications of injury recovery were more difficult to cope with during lockdown. Charlie described how not being able to see friends, family, or his teammates exacerbated feelings of social isolation during the lockdown:

It's been tough having an injury in lockdown, usually I would use this time off to spend time with friends and family which I don't usually get time to do, but with lockdown you can't. Sat at home being isolated trying to find ways to connect with people, but it's not the same as face to face and I have found that difficult. Being injured can be quite isolating, you are away from the rest of the squad, you don't get those social interactions at the club that you really enjoy, and you feel like you are away from the group and so you go and see family and friends and to not be able to do that is pretty tough. (Charlie, 29, Rugby, France).

Rob also echoed this idea that being isolated from fellow athletes throughout lockdown posed a threat to wellbeing, as he described relying on team training as an opportunity to offer and receive social support, which he and his family miss:

As a family we miss the social interaction, my wife has a strong bond with a lot of the women in the training group and we all miss that as much as we miss the running itself, we are a bunch of good friends who support each other through difficult times. We can talk to each other on the phone but it is that actual physical interaction with a person that we miss. (Rob, 51, biathlete, South Africa).

Overall, the athletes discussed how existing stressors were exacerbated by the pandemic restrictions, which they seemed to have negatively affected their wellbeing.

Subtheme 2: Lockdown Stunts Athletic Development

This subtheme contributes to the overarching theme as many of the athletes shared how the lockdown had stunted their athletic development which they felt negatively affected their wellbeing. In response to their reduced access to training facilities the athletes made attempts to adapt equipment they had at

home. Amelia shared a series of photographs of the weightlifting equipment she and her Dad had built together during lockdown. She described how her reduced financial income paired with price increases on home training equipment, encouraged her to build her own training kit at home with her Dad. According to Amelia, this had a positive effect on their father-daughter relationship and her wellbeing:

That photo is of a drill on a bench. So being on furlough I couldn't afford to buy any decent kit. So, my Dad built me a squat rack, we built that together, so it was a bonding thing, so I could work out. I just couldn't afford anything, it felt like everywhere shot up their prices when lockdown happened so the only way around it was to build it myself. My Dad has been so supportive of me and he's always pushed my athletic side and thrown money at all the sports I played as a kid, but nothing ever really stuck so he's seen my passion for body building and I've made it me, and he's been so supportive and anything he could do to help he was happy too, let's build the equipment you can't buy and make weights if we have too he told me, which was really nice. (Amelia, 25, body building, United Kingdom).

Some athletes turned to social media to share their home training efforts, in order to feel connected with others in their sport. For example, Sarah shared images of herself training at home on Instagram with fellow gymnasts, which helped her feel part of the gymnastics community despite the lockdown restrictions:

As you can see in the photo of me doing a handstand on a wheelie bin, I have been posting lots on Instagram which helps you feel like you are in the world, that I am in the gymnastics environment, so it does sort of help. It keeps me motivated as I can see that everyone else is training at home and my friends call me and we are there for each other. (Sarah, 18, gymnastics, South Africa).

Although Sarah found some solace in sharing her training online, other athletes found such updates to be damaging to their wellbeing, triggering downward social comparisons of body image and their own ability to cope with lockdown. Jess and Olivia described feeling pressured to be proactive and accomplish goals during the lockdown period which had a negative impact on their wellbeing:

So, some girls on my team are skinnier than me, or better than me and I have never gone I wish I was like that, it has never impacted me because I've always had that self confidence that I am who I am and, to an extent I really do like who I am and I'm happy with how I am and what I'm doing and my achievements. But now, for some reason, it has hit me like should I be doing that? Why am I not doing that? How can I do that? Or why are people not including me in that? I've been noticing the most intricate things, and I'm thinking to myself, you're never normally like this, you shouldn't even be focusing on it. (Jess, 21, hockey, United Kingdom).

All over social media there is this thing that we need to use this time to get motivated and be so much better when we come out of the other side. But for some people they need a break, to slow down and relax for a while because all this bettering yourself might not be what you need right now and I think a lot of people are being pressured to think that they have to get better, to use this time productively and they beat themselves up if they don't, it is a really big thing

right now. . . they shouldn't feel pressured to come out of the other side so much better than when they came in. (Olivia, 18, biathle, South Africa).

By immersing themselves in their respective virtual sporting communities, the athletes not only compared their adaptation to lockdown life with other athletes online, but they also noticed inequalities with regards to access to equipment. Ben expressed feeling disadvantaged due to his lack of home training equipment:

A lot of people are putting stuff on social media who have managed to get access to equipment, and you wonder well if they've got that then what advantage have they got over me? (Ben, 22, athletics, United Kingdom).

Similarly, Olivia described feelings of animosity towards fellow athletes who could access more equipment than her, but also felt uplifted and inspired by some of the stories shared:

But there's definitely been jealousy on social media with people who have access to more than I do at the moment, but it is also really cool to see people in similar situations who are fighting through this and are coming together to get through this. (Olivia, 18, biathle, South Africa).

Underpinning the above conversations regarding athletic development during lockdown, there was a clear, common effort amongst the athletes to find alternative ways of training at home, although this did not always alleviate feelings of social isolation. Sarah a young gymnast, captured her experience of loneliness when training at home in an image of a sunset:

This photo of the wall with a sunset behind reminds me that my teammates are not with me and you are by yourself you are alone, it's different when you are in the gym there are about 100 people in there training with you and supporting you, but you don't have that being at home. It is an empty open space; it makes me sad. (Sarah, gymnastics, 18, South Africa).

Training from home not only heightened feelings of loneliness, but also blurred the boundaries between athletes' multiple identities which Rachel found difficult to manage:

I need to have my places that I go too to do stuff, like the gym is where I train and eat, I go to uni to be quiet and have space and my son and dog can't come. I need to have those places to function, but I don't have those places and now my life isn't functioning. (Rachel, 42, powerlifting, United Kingdom).

Rachel went on to explain how training from home was particularly challenging, but she was determined to make it work as her wellbeing depended on it:

This is a photo of my makeshift home gym. So yesterday I had the first training session in it, I built it last week, it was ready to go but there was so much other stuff in there and I thought ugh I can't. I had to move the fridge freezer to get the plates on the bar, there's a lawn mower so I can't get into the cage I have to move it. It's really dusty in there so the first time I thought argh this isn't working. So, the first lift when I had to breath in and brace, I got a mouthful of dust and wasps flying around my head and the dog was under my feet. I thought this is dangerous I can't do this I think I just did ten squats and then I thought I can't do this, I can't use this gym, I can't lift safely and I can't get into the space into my head

that I needed to with all that shit in there. (Rachel, 42, powerlifting, United Kingdom).

Despite the differences in lockdown restrictions between countries, many athletes acknowledged the instrumental role that spending time outside had on their wellbeing. Luke reflected on a photograph of him doing circuit training in his small garden and discussed how the lockdown restrictions limited his opportunity to exercise outside, for which he relies on for a natural biochemical mood boost:

We are all athletes and love being outside doing something that engages the endorphins, so to not be able to get the blood flowing and those positive vibes has been hard. (Luke, 30, cricket, Zimbabwe).

Similarly, Amelia described how her daily walks by the canal were an uplifting experience helping to relieve the pressure of living in close quarters with her family during lockdown:

So that is a photo of my caterpillar boots, throughout lockdown every morning I would stick them on and take myself out for an hour or two hours and go walking up by the canal, I am lucky where I live there are lots of beautiful places round here to walk. . . it was my meditation, those boots have done some mileage over the last year. . . During the lockdown my Dad was also furloughed from his job, so we were stuck in the house together, we are very close, but like any family you rub against each other eventually, so my walking was my time, it was my time to get out of the house and call my friends or stick my headphones in and listen to music or a podcast, it was my time to myself which I didn't have in the house. (Amelia, 25, Body building, United Kingdom).

For some athletes like Rob, the importance of access to outdoor space became even more apparent as he reflected on his friends' efforts to train with limited indoor space:

Friends who stay in an apartment block have had to get permission from everyone in their apartment block to run up the flights of steps, we are so fortunate with the size of our garden and the treadmill. Their level of frustration is a lot higher than ours, they just want to be able to get out on a road and be less restricted. (Rob, 51, biathle, South Africa).

In this subtheme, athletes discussed how the lockdown stunted their athletic development as a result of the lack of access to training equipment, social support and limited space, which negatively impacted their wellbeing. Various strategies were utilised as coping methods to facilitate their athletic development and to protect their wellbeing, such as building their own equipment, connecting with teammates through social media, and participating in exercise outside where possible to boost mood and maintain healthy wellbeing.

Theme 2: Adapting Routines and Maintaining Motivation

In this theme, the athletes mobilised coping resources such as adapting their routines and changing their motivational focus to manage the diminishing psychological wellbeing they experienced due to their lack of agency during the lockdown. They reflected on how before the pandemic their lives were

structured and goal driven, but the lockdown scenario had created an aimless existence which threatened their wellbeing.

Subtheme 1: Replacing Old Routines With New Ones

A key aspect which some athletes felt they lost in lockdown was their training routine, which for many provided a structure to their day. For Rachel, the lack of routine had deleterious implications for multiple aspects of her wellbeing, she discussed this as she shared a photograph of a bottle of gin and a kitchen cupboard filled with junk food:

I had nothing to do, literally nothing to get up for and I lost momentum. I went to bed later and later every night and then got up later every day and within a week and half I couldn't sleep, I was staying up late watching Netflix and then going to bed late, having crazy dreams, probably because of the alcohol but also because everything was just weird. Then waking up really late and the whole day I felt like I was on the back foot. Nothing was getting done it was one long thing of sleeping and staying up late and not getting much done at all. My routine went out the window and I felt awful. Now I have one it feels better. (Rachel, 42, powerlifting, United Kingdom).

Similar to Rachel, Ben also shared the challenges of having so much spare time and how adapting his routine had helped ease the boredom and frustration:

It was quite hard to adapt in the first couple of weeks and get into a routine and now I have that routine of I wake up and do a little circuit or something in the morning and then do some uni work and then go out training in the evening and now I have that routine it gives me a good structure and gets me through the days. It is quite good to have that routine or you sit around doing nothing all day. (Ben, 22, athletics, United Kingdom).

Some athletes involved their family members in their new routines, which had a positive impact on their wellbeing. For example, Sarah spoke of how she had coped with the decreased feedback from her gymnastic coaches during the lockdown, by becoming more autonomous with regards to her training and her parents taking on coaching roles:

In this picture my Mum and sister are holding onto the bar, we normally hang our washing on it, but it's not that strong and I have been working on it to improve my grip. I have grown a lot because I used to rely on my coach to help me do stuff, but now they are no longer there I have to motivate myself and do it all by myself, so I think I am more independent. My parents have learnt a lot in the process as I have had to teach them how to spot. I am so used to my coach knowing what to do so I had to teach them. My family has been my biggest support during lockdown. (Sarah, 18, gymnastics, South Africa).

However, it was not only about setting new athletic routines that was protective for wellbeing, the inclusion of new non sport related hobbies were equally effective at maintaining wellbeing. Olivia described how taking up photography helped pass the time, but also acted as an outlet for expressing her feelings during lockdown:

During the lockdown and having all this free time I have gotten into photography right. So, I have been playing with the camera and me peeking through the fence in that photo I was trying to get the same

feeling as being isolated from other people and that was the best thing I could do, being isolated from the outside, not being able to leave and not being able to have the freedom of choice and that sort of stuff. (Olivia, 18, biathle, South Africa).

Luke took a photograph of his PlayStation console to explain how his new routine involved playing online video games with his teammates during the lockdown. He felt this helped him to stay socially connected with fellow cricketers and also filled some of the competitive void he was missing from playing sport:

So Call of Duty, I am a very competitive person and I like to do things that involve competition and so obviously being locked up there are not many ways that we can find to do some competitive things, so having some online gaming has been entertaining and kept me busy and it's been nice because I've been playing with a lot of other friends, which is pretty cool, there are a lot of international cricketers that play so there's a lot of banter and stuff on the game which is quite cool. (Luke, 30, cricket, Zimbabwe).

For others like Charlie, the simple act of setting small, achievable, non-sport related goal each day was a useful strategy to protect his wellbeing:

I sent you a photo of a big hedge I trimmed, that was a whole day's work, it wasn't something I wanted to do, it just had to be done, it is about setting goals and that was my goal for the day. Being a sportsman, you are so used to having goals, you have games at the weekend and that is your goal all week, so doing things like that has helped me see that it is not just another day, it's the hedge day or the grass day or painting and it has been really important, it's really helped me. (Charlie, rugby, 29, France).

Overall, this subtheme encapsulates how athletes replaced their usual strict training routines with new activities that enabled social connection and emotional expression, helping to support their wellbeing during the pandemic.

Subtheme 2: Motivation for Training in Lockdown

Whilst many athletes adapted to the lockdown by creating new routines, many of the athletes discussed the challenges of motivating themselves to train for their sport during lockdown, as they were unable to access training equipment and they were uncertain when competitions would resume:

I didn't know why to train in quarantine, I had no big events coming up, I thought why should I train? (Olivia, 18, biathle, South Africa).

It's been quite lonely, and my motivation has been quite low. It has been in peaks and troughs, sometimes I am really motivated and have really good days and some days I do nothing at all. Keeping my motivation has been harder than anything else, just keeping my goals in mind despite the situation that is going on (Jess, 21, hockey, United Kingdom).

Adjusting goals from ego orientated to task orientated in light of the competition postponements and cancellations helped maintain their motivation to train despite the lack of agency in their sport:

You don't have the coach forcing you to pitch up at training or your Mum forcing you to get out of bed to take you to training, you have

to do it yourself and find the reasons behind why you are doing what you are doing. (Olivia, 18, biathle, South Africa).

My training diary is a good way of keeping track of what I am doing and that helps motivate me. Normally my sessions would be 2x200m and I'd know exactly what times I need to hit, but now I don't really know what a good time is to run across a football pitch in, or from one lamp post to the next, none of these things mean anything to me at the moment, it is all relevant to just me. (Ben, 22, athletics, United Kingdom).

In addition to changing their motivational focus to one of self-improvement in their sport, Hannah described how she was exercising to maintain her wellbeing:

As you can see from this photo of our pool it's not very big, but I swim in the morning, it is my favourite part of the day even though it is quite cold. It is not difficult it is not like training to keep fit, it is really fun, every time I get out of the pool, I feel refreshed. It is a good start to my day. It lifts my mood. (Hannah, 18, biathle, South Africa).

It seems that some athletes relied upon external motivations from family members to continue to train during this period of uncertainty in their athletic career:

I just try to get by week by week and motivate myself by; oh, look my Dad is running today I should run as well. So, my family plays a big role in motivating me. (Zoe, 18, athletics, South Africa).

With the four of us in our family running, if the kids aren't motivated my wife will motivate them to get on the treadmill or do a couple of laps around the garden. The community within the family is very motivational. (Rob, 51, biathle, South Africa).

Annika chose a photograph of her family running around the garden to illustrate how they had motivated each other through exercising as a group:

We are doing a Park Run every Saturday; we have done four since lockdown and everyone must participate. . . we are running around our house, we have a big area where we can run, we are not allowed outside of our house. . . My son follows his time and he and his older brother compare their times, the rest of us we are just enjoying it. (Annika, 48, cross country, South Africa).

Whilst some relied upon the people they lived with during lockdown for motivation, Ben was enjoying competing online against other runners in his local town by setting up routes to race on through the smartphone application Strava which he shared a photograph of:

On Strava you can map your run and the whole athletics community can get involved and you can do segments to find out what other people have run, and you can get a crown for running the fastest time on that segment. There is a segment that runs from lamp post 77 to 82 in my town which used to belong to my brother in whatever time he did, he was the champion of that segment so I went out and did my run to try and get it and I did so it's quite a good way to keep that competitive element of athletics by trying to race and become the fastest on different areas of road that are dotted around my town. Although you can't race against anyone in close proximity. (Ben, 22, athletics, United Kingdom).

In this subtheme, the athletes described relying upon family and friends to motivate and encourage them to train for their sport during lockdown, perhaps in replacement of teammates and coaches. Others however were motivated not by the pursuit of athletic development, but to protect their wellbeing during the lockdown, such as exercising outdoors to boost mood.

Theme 3: Reflecting on Participation in Competitive Elite Sport

Towards the end of the first lockdown period the athletes began to reflect on their athletic career. It seems the time spent away from competitive sport encouraged them to consider its place in their lives. Some engaged in a cost-benefit analysis of their participation with regards to the impact it had on their wellbeing.

Dave began to reflect on the financial strain associated with competitive sport and questioned if the current pressure he felt to recover from his injury was outweighed by the rewards of a gold medal:

I had planned to do the Provincial Biathle Champs and the Nationals, I probably won't go overseas as it is expensive, and I now question its value. It has all been cancelled now and I have broken my elbow, it may never be straight again. I have a lot of pressure to get this arm straight. But the other side of this thing is why am I competing? Is winning and getting a gold medal what it is really cut out to be? (Dave, 59, biathle, South Africa).

Reflecting on a photograph of his professional rugby kit, Charlie also commented on his changing view of the importance of competing:

But now it's like bloody hell we were really onto a good thing here and could have gone into the top league and had an amazing time, but that's disappeared as well and the longer it has gone on you realise that its only one year, one season and seasons come and go and I've done 13 of them or something, and as much as winning and being at the top is great it doesn't mean anything really, not when you really think about it, it's just a moment in the sun isn't it? (Charlie, 29, rugby, France).

For some participants, lockdown restrictions gave them time to reflect on how damaging participation in elite sport could be to their mental and physical wellbeing, being rather thankful for the time out. When looking at a photograph of his race number, Rob shared his experiences of debilitating performance anxiety whilst competing and the relief he felt that this year's competitions had been cancelled due to the pandemic:

I honestly think it is a good thing not to be competing, on race day my emotions are a combination of nerves and excitement, I usually have to go to the bathroom 3-4 times on the morning of an event, my stomach works overtime. It is nothing to do with my diet I have tried every variant of breakfast and lunch and dinner, nothing helps, it is just my nerves, I have a toilet roll in my back pocket. I put exceptionally high expectations on myself. I think that there has been more benefit to not racing from the psychological point of view, less stress on me. (Rob, 51, biathle, South Africa).

Like Rob, Luke also seemed to appreciate the time out provided by the pandemic, describing how before the lockdown he had continued to play hurt despite his injury, and that the

lockdown had allowed him to take the time he needed to recover from his surgery and mentally prepare for his return to play:

But this came at a good time for me as I actually tore my groin and my abdominal wall in January, but was still competing, I had an operation at the end of January so it's been quite nice as I was actually supposed to come back to play but it has given me a longer recovery period, so it's a kind of blessing in disguise as I can actually get my body back strong. I need to be in a good head space and have confidence in my body to be able to push it to its limits. It effects my performance a lot if I am not ready. (Luke, 30, cricket, Zimbabwe).

Whilst some of the athletes used the pause in competition as time to reflect and recover in preparation for their return to sport, others like Jess reflected on the importance of alternative career paths. Jess spoke of her identity as a student-athlete and how having a dual career was protective for her wellbeing, giving her something else to focus on during lockdown. She shared a photograph of a pile of research papers to illustrate this:

The photo of all the research papers is to show my identity as student now and that's what I have been doing with the majority of my time. Being a student-athlete has been protective for my wellbeing, definitely, in terms of my identity it has shifted a little bit. (Jess, 21, hockey, United Kingdom).

Charlie also considered how the time afforded by his injury during lockdown had forced him to think about what he was going to do after he retired from rugby, as he shared a photograph of an online apprenticeship programme he was studying:

The fact that we are in lockdown it has given me a lot of free time to look at other things and it's important thing for me to have another route outside of rugby. To make sure that when I come out whether it's the next two years or ten years, I have something to fall back on and have credentials so I can do what I want to do outside of sport. Before the lockdown I was playing rugby five times a week and there wasn't much time to look at stuff like this, at that point in time I was coming home from a long days training and was pretty tired and it was hard to switch into the mindset of studying. It has been nice to have it now as a flip from rugby. The thing that lockdown has done is show 100% that you do need these things in place especially as rugby or sports careers are not everlasting at some point you will have to go out and do some sort of other work and with my injury that is something else that showed that. (Charlie, 29, rugby, France).

Overall, the lockdown highlighted the fragility of the athlete's careers, and the extra time afforded by the cessation of their sport prompted them to explore alternative career paths that would help protect their wellbeing during subsequent periods away from sport.

DISCUSSION

This study was conducted in response to the growing number of athletes seeking sport psychology support during the pandemic, and the need to develop evidence-based interventions to inform best practice. Using a qualitative open photo elicitation method, this study explored the impact of the COVID-19 social distancing measures on athlete wellbeing. Three main themes; threats to wellbeing, adapting routines and maintaining motivation, and reflecting on participation in competitive elite sport, were

developed through the process of thematic analysis, and the main findings are discussed below.

The Loss of Sport Impacts Wellbeing

Overall, the athletes in this study provided narrative evidence for Giles et al.'s. (2020) conceptualisation of wellbeing as an integrated measure of emotional, mental, social and physical health. They shared their feelings of loss, shock and sadness at the cancellation of their sporting events, and spoke of the threat to their physical and mental health as a result of the social isolation during the lockdown. The current research identified athletes' feelings of loneliness from the lack of social interaction with their athletic peers and the negative impact this had on their wellbeing. Tomalski et al. (2019) similarly identified student-athletes as a unique population at a heightened risk for the development of mental health problems, coupled with a decreased willingness to seek help. It has been reported that periods of reduced physical activity compound feelings of isolation from teammates, distance athletes from the athletic community, allow less interaction with coaches and this lack of social support can cause emotional and psychological distress (Reardon et al., 2019).

Athletes also discussed how social media was used as a crux in order to immerse themselves in their sporting world, but which counterproductively encouraged downward social comparisons against fellow athletes who seemed to be coping better with lockdown, and highlighted inequalities regarding equipment accessibility which heightened return to play competition anxiety. Whilst not athlete specific, early research from Wuhan, China the first epicentre of the global pandemic has reported that excessive use of social media during lockdowns has led to an increase in mental health problems. The authors recommended that taking a social media break during the pandemic may promote wellbeing and mitigate the mental health repercussions of the pandemic (Zhong et al., 2021).

Negotiating the COVID-19 Athletic Career Transition

The athletes identified numerous barriers to their athletic development and the maintenance of their wellbeing during the lockdown. The lack of access to equipment impacted on their ability to train effectively and the difficulty buying specific foods needed to fuel their recovery slowed down their progress. These stressors were further amplified by the lack of access to their usual coping resources particularly social support. The literature suggests that upon removal of athletes sporting platforms for example through retirement or injury, athletes lose access to vital coping resources such as social support which can threaten their wellbeing (Jewett et al., 2019). Emerging research suggests that the COVID-19 crisis and lockdowns have caused athletes to experience a similarly, enforced pause in their athletic career to that of forced retirement and chronic injury (Jewett et al., 2019; Gupta and McCarthy, 2021). Therefore, it has been suggested that career transition support and chronic injury psychological rehabilitation strategies be used to guide interventions with athletes who are struggling to cope with this non-normative transition.

Stambulova et al. (2020) suggests that COVID-19 can be interpreted as a "career transition barrier" that interferes with athletes' ability to strive towards "career excellence." The present study findings suggest that from a holistic developmental perspective (Wylleman, 2019), the social distancing measures impacted participants' athletes, psychological, psychosocial, academic-vocational and financial development. Some athletes adapted their training routines to cope with this non-normative transition, whilst others experienced a crisis transition due to lack of resources and ineffective coping strategies. For example, some developed maladaptive behaviours such as disordered eating, sleep disruption, body image disturbance, depression and anxiety. These findings support the recommendation of Stambulova et al. (2020) that athletes need professional support in order to successfully negotiate this transition.

Samuel et al. (2020) conceptualised the COVID-19 pandemic as a "longitudinal, multifaceted, unpredicted, non-controlled change-event, with four distinct stages: (a) a pre-Coronavirus stage with unique career contextual conditions (i.e., stable engagement or a transitional period), (b) Coronavirus stage-A accompanied by instability and confusion, emotional response, and cognitive appraisal, (c) Coronavirus stage-B characterized by active coping or regression, and (d) Coronavirus stage-C; instability endures or decreases, depending on career trajectory." (pg1). The present study findings provide empirical evidence to support these proposed stages, as the athletes negotiated this career change-event by implementing changes across a number of the proposed dimensions, and recommend strategies such as setting new goals to help boost motivation, adapting their athletic career aspirations, developing new social networks outside of sport and broadening their self-identity in order to navigate the COVID-19 transition.

Strategies to Protect Wellbeing

Whilst the current study suggests that athletes did experience threats to their wellbeing in response to the social distancing measures that restricted their participation in sport, they also developed strategies to protect it during the crisis. These included adapting training routines and setting new goals, utilising social support and exercising outdoors to boost mood. The athletes adapted their training programmes in order to provide a structure to their lives during the lockdown, and shifted their motivational focus from enhancing performance to avoiding performance decrements. These findings support the research by Masciet (2020) who reported that during the lockdown athletes modified their achievement goals from self-approach goals (improving oneself) to self-avoidance goals (avoiding regression). Similarly, Gupta and McCarthy (2021) reported that the incongruence experienced by athletes due to the lack of structure during the lockdown resulted in psychological distress, negative emotions and loss of motivation.

Social support was instrumental in protecting the athlete's wellbeing during the lockdown, and they identified how different structural support systems provided specific functions, such as relying upon family members for emotional support and their coaches for feedback on their athletic accomplishments. Social support has been described in the literature as a multidimensional

construct that is comprised of three interdependent dimensions; structural (who provides the support e.g., family, friends, coach, teammates), functional (how is the support experienced e.g., emotional, esteem, tangible, network and informational forms) and perceptual (appraisals of the available amount and quality of the social support sources) (Bianco and Eklund, 2001; Holt and Hoar, 2006). Together with the present findings, this evidence suggests that athlete support personnel working with athletes during periods of isolation, need to assess and identify their social support preferences to ensure they are consistent with their needs and enhance its impact.

The findings of the current study support previous research which suggests that physical activity can help protect wellbeing during lockdown, and this effect is amplified if the activity takes place outside. Indeed, Thompson-Coon et al. (2011) suggested that participating in physical activity in outdoor natural environments has a greater impact on physical and mental wellbeing than physical activity indoors (Thompson-Coon et al., 2011).

Many of the athletes in the current study were motivated to not just train to enhance their athletic performance but to exercise to boost their mood, as per previous research (Rosenbaum et al., 2014; Rebar et al., 2015; Bailey et al., 2018). However, in light of the current global crisis there is a growing concern that social distancing measures that restrict exercise will contribute to a rise in obesity, depression, infections and cardiovascular disease (Chen et al., 2020). Furthermore, Mehrafar et al. (2020) suggested that a certain level of anxiety regarding the pandemic is completely normal, but that high levels of stress can have a devastating impact on daily life and the inability to manage stress can result in short- or long-term depression (Frank et al., 2020). Recent research conducted during the COVID-19 pandemic has reported that higher levels of physical activity were associated with lower levels of anxiety, suggesting that physical activity can help protect against some of the stressors associated with the crisis (Antunes et al., 2020), suggesting that our athletes' efforts to exercise improved overall wellbeing and were not in vein.

Engaging in Reflective Practice Encourages Stress Related Growth

The athletes in this study engaged in a process of reflective practice during the lockdown period and this helped facilitate "stress related growth" (Park et al., 1996) in response to the challenges presented by the pandemic. It has been suggested that not all stressful experiences result in negative consequences and that the process of confronting them can help broaden perspectives, develop new coping strategies, enhance relationships and mobilise personal resources (Park and Fenster, 2004). Results from the current study suggest that athletes in lockdown were afforded a prolonged period of wakeful resting (Eccles and Kazmier, 2019), that allowed them to reflect on their athletic participation and make life changes that would protect their wellbeing during the confinement period and when they returned to sport. These strategies included developing social support networks and engaging in activities and hobbies outside of their sport. In particular, they identified the importance of

maintaining a dual career and how this was protective for their wellbeing during lockdown and this period encouraged them to consider their plans for retirement.

The recovery literature associates rest with the reduction or cessation of physical activity and is fundamental for physical and psychological recovery following training and competition (Kellmann et al., 2018). Athletes become well rested if they engage in the resting process which includes sleeping and wakeful resting (Eccles and Kazmier, 2019). Athletes experience wakeful resting when they do not think about their sport, for example through participating in activities outside of it. The ability to engage in wakeful rest that facilitates a period of "psychological inactivity" can be protective for athlete wellbeing (Eccles and Kazmier, 2019). Indeed, the athletes in the current study reflected on how this enforced hiatus had allowed them to take a much needed rest from the physical and mental stress of competition. Although, for some this was particularly challenging during the first few weeks of lockdown due to the loss of structure and routine in their lives.

Some athletes used this time out of competitive sport to recover from past injuries and acknowledged their willingness to play hurt. Schneider et al. (2019) suggested that participation in competitive sport despite being injured is risky, but a common occurrence in athletes. The authors reported that the older the athlete the higher the inclination for self-exploitation and self-endangerment as reflected in their willingness to "play hurt." Others reflected on how the pause in their athletic schedule had allowed them to engage in non-sport related hobbies and build relationships with family and friends. Pink et al. (2015) suggested that a break from the pressures of sport can provide perspective to the individual and encourage the development of a multidimensional identity which can enhance wellbeing (Pink et al., 2018).

It has been suggested that the development of an adaptive and resilient personality, that enables athletes to control anxiety is fundamental to achieving success in high performance sport (Kellmann and Günther, 2000). It may be that in order to cope with the social distancing measures that pose a threat to athlete wellbeing, that particular personality traits could play a protective role. Indeed, the current research suggests that athletes engaged in a reflective practice process during the crisis and this helped them evaluate their situation and employ appropriate coping strategies. Indeed, recent research conducted with aspiring Olympic and Paralympic Spanish athletes, reported that the lockdown period did not increase anxiety levels perhaps due to their adaptive and resilient personality traits (Clemente-Suárez et al., 2020).

Practical Implications and Future Research

The present study highlights athlete's experiences of the COVID-19 pandemic, in particular, how lockdown restrictions have impacted athlete wellbeing. Findings of this study offer a number of more immediate practical recommendations.

Firstly, the findings can be integrated into current athlete wellbeing strategies provided by athlete support personnel. It is paramount that intra and interdisciplinary collaboration between athlete support personnel is encouraged, in order to coordinate efforts to help athletes cope with the current global crisis. For example, case conferencing between multidisciplinary team members and key stakeholders to identify athletes with pre-existing mental health problems, injuries or poor social networks who could be at increased risk during periods of social isolation and mobilise appropriate professional support. Sport psychology support should focus on the maintenance of wellbeing and the development of self-care strategies rather than performance gains during this crisis. Athletes are encouraged to adapt their athletic routines to facilitate a positive adjustment to the constraints of social distancing and help protect against the development of maladaptive coping behaviours. Goal setting strategies that focus on a mastery approach that encourages personal development over a performance approach that is focused on outperforming others (Elliot and McGregor, 2001), should be encouraged in order to boost motivation.

It is recommended that efforts should focus on developing social support within teammates and coaches through incorporating team activities, that provide an opportunity to check in and promote social connectedness. These might include virtual team competitions such as quiz nights or guided discussions to help encourage mutual sharing of their experiences. With the increased accessibility of virtual communication in response to the pandemic, this is an opportune time to capitalise on these new technologies to help enhance athlete wellbeing. In particular, it is worth evaluating the effectiveness of tele-consulting and future research is encouraged to investigate how practitioners can deliver effective psychological support through tele-consulting, and to consider whether their support is best focused on therapeutic counselling or mental skills training during the pandemic. Beyond the COVID-19 pandemic studies could explore how such technologies can be utilised to promote social connectedness during times of normal physical distancing such as injury and breaks between seasons.

Lastly, and in line with previous career transition research (Wylleman, 2019), athletes are encouraged to pursue dual careers to facilitate the development of multiple identities that can help protect wellbeing during times away from sport. In the very least athletes should be encouraged to participate in hobbies and activities outside of the sporting arena.

Strengths and Limitations

Qualitative methods of enquiry provide rich data and facilitate in depth exploration and examination of issues (Anderson, 2010). This qualitative study used an inductive approach which enabled the researchers to explore the perceived impact of social distancing measures during the COVID-19 pandemic on athlete wellbeing. However, the utilisation of an explicit wellbeing

scale may have provided further validation to the findings (Ryff, 1989).

This study has a number of key methodological strengths. First, the heterogenous sample (Braun and Clarke, 2013) included athletes of different ages and career stages, as well as representing individual and team sports, and from different countries. However, a potential limitation of this heterogeneity is that there may be different cross-cultural conceptions of wellbeing. The majority of the athletes in the study were white so future research must seek to include athletes from other racial backgrounds. Findings reported in this article are unique to this sample and this current pandemic, thus generalization of findings should be avoided, though it would be pertinent to conduct future research that surveys a larger number of athletes. Utilisation of the open photo elicitation method is another strength of this research. Having been previously used in sporting research (e.g., Wakefield and Watt, 2012), the use of visual imagery in research is thought to evoke memories and facilitate greater immersion and more detailed storytelling by participants, providing rich experiential data (Green and Brock, 2002). However, the interview process and our interpretations of the athlete's stories could have been influenced by the authors experience and knowledge as a sport psychologist, although the participants were invited to verify the findings in order to decrease the risk of misinterpretation (Karnieli-Miller et al., 2009).

CONCLUSION

In summary, the COVID-19 social distancing measures have had a considerable impact on athlete wellbeing. The initial sudden loss of sport in the athlete's lives posed a threat to their wellbeing, but over the duration of the lockdown period the athletes developed numerous strategies to protect it, such as adapting their routines, setting new goals, fostering social connectedness through technology and participating in new hobbies. Furthermore, their time away from sport encouraged them to reflect on their athletic career and to make life changes that would protect their wellbeing should they experience any future lockdowns.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Research Ethics Committee, School of Social

Sciences, Humanities and Law, University of Teesside. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LW conceived the study and conducted participant interviews. LW conducted data analysis and interpretations were reviewed by LB and created the initial manuscript draft. LB provided critical

revisions of successive drafts. LW and LB wrote and edited the manuscript. Both authors contributed to the article and approved the submitted version.

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The Potential Benefits of Non-skills Training (Mental Toughness) for Elite Athletes: Coping With the Negative Psychological Effects of the COVID-19 Pandemic

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The spread of COVID-19 has had a significant impact on global sport. This is especially true at the elite level, where it has disrupted training and competition. Concomitantly, restrictions have disrupted long-term event planning. Many elite athletes remain unsure when major events will occur and worry about further interruptions. Although some athletes have successfully adapted to the demands of the COVID-19 crisis, many have experienced difficulties adjusting. This has resulted in psychological complications including increased stress, anxiety, and depression. This article critically examines the extent to which non-cognitive skills training, in the form of increased awareness of Mental Toughness, can help elite athletes inoculate against and cope with negative psychological effects arising from the COVID-19 pandemic. Non-cognitive skills encompass intrapersonal (motivations, learning strategies, and self-regulation) and interpersonal (interactions with others) domains not directly affected by intellectual capacity. Previous research indicates that enhancement of these spheres can assist performance and enhance mental well-being. Moreover, it suggests that training in the form of increased awareness of Mental Toughness, can improve the ability to cope with COVID-19 related challenges. In this context, Mental Toughness encompasses a broad set of enabling attributes (i.e., inherent and evolved values, attitudes, emotions, and cognitions). Indeed, academics commonly regard Mental Toughness as a resistance resource that protects against stress. Accordingly, this article advocates the use of the 4/6Cs model of Mental Toughness (i.e., Challenge, Commitment, Control, and Confidence) to counter negative psychological effects arising from COVID-19.

Keywords: mental toughness, COVID-19, non-cognitive skills, elite athletes, positive psychology

INTRODUCTION

This article outlines how Mental Toughness training can help elite athletes cope with negative psychological effects arising from the COVID-19 pandemic. The spread of COVID-19 has had a significant impact on global sport. This is especially true at the elite level, where it has interrupted regular competition (e.g., The Super League), lead to rescheduling (e.g., Deontay Wilder vs. Tyson Fury III), and disrupted routine training (World Health Organization, 2020). In addition,

ensuing COVID-19 restrictions have affected long-term schedules and major event planning (e.g., the 2020 UEFA European Football Championship, and both the Tokyo 2020 Summer Olympics and Paralympics). Accordingly, many elite athletes remain unsure when competitions will occur, and worry about potential further delays. Although some athletes have successfully adapted to the demands of the COVID-19 crisis, many have experienced difficulties adjusting. Noting this, sporting bodies have become concerned about the psychological well-being of elite performers (Mehrsafar et al., 2020; Ivarsson et al., 2021).

Professional athletes are particularly vulnerable to the negative effects of COVID-19 disruptions because sport is the focus of their lives. It represents a core component of self-identity, is the sportspersons' vocation, and principal source of financial income. For these reasons, disturbance(s) to sporting schedules can cause uncertainty, prove unsettling, and in extreme cases produce psychological distress. This notion is consistent with the observation that increased levels of stress, depression and anxiety are frequently reported psychological responses to the COVID-19 crisis (Rajkumar, 2020; Mojtahedi et al., 2021).

In the case of sportspersons, negative psychological effects can manifest in a variety of ways. Pillay et al. (2020), who surveyed athletes in the final phase of the South African lockdown, found that many experienced feelings of depression (52%). Similarly, a significant number required motivation to keep active (55%), consumed excessive carbohydrates (76%), and reported altered sleep patterns (79%). These findings align with studies that predicted an increased demand for psychological services (Toresdahl and Asif, 2020; see Schinke et al., 2020; i.e., sport psychologists and counselors). A common issue being the inability to manage effectively COVID-19 related stress. Specific concerns centered on fear of infection, recovery from contagion, disruption to training, maintaining diet, changes in activity levels, inability to access training facilities, social isolation, disturbed sleep, and domestic complications (Kizhakkekara et al., 2021).

Concurrently, athletes often experience performance anxieties including apprehensions about the effect of interruptions on their ability to return to competition standard and sustain peak levels. This concurs with the notion that stress is detrimental when it arises from events that threaten the individual's sense of adaptive adequacy. Particularly when ensuing demands exceed the perceived capacity to cope and (Sherman and Cohen, 2006; Thelwell et al., 2017).

Noting these issues, Jukic et al. (2020) suggest that it is useful to encourage athletes to retune their mindset, so that COVID-19 disruptions are contextualized as a "positive" opportunity for personal development. Perceiving change as a constructive space for professional reflection and individual growth, potentially reduces negative psychological effects such as mental fatigue. This is especially true if support structures exist in the form of education (preventive behavior, hygiene measures, and recovery), daily conditioning advice, frequent monitoring, and psychological training (i.e., meditation, mindfulness, and deep breathing exercises), and individual athletes feel empowered to exploit them.

Regarding psychological training, sportspersons who effectively utilize available cognitive resources and successfully implement coping strategies will be best equipped to manage attendant mental distress (Jukic et al., 2020). However, not all athletes possess sufficient understanding of psychological processes to successfully manage their well-being. Recognizing this, the present article examines ways in which non-cognitive skills training, in the form of increased knowledge of Mental Toughness, can facilitate the development of self-efficacy and inoculate/moderate the negative psychological impact of COVID-19.

NON-COGNITIVE SKILLS AND MENTAL TOUGHNESS TRAINING

Non-cognitive skills denote abilities not directly affected by intellectual capacity. Although, this term is a misnomer to the extent that performance inherently relies upon cognitive processing (Borghans et al., 2008), researchers use the label to designate abilities or skills beyond those assessed by standard intelligence tests. Thus, non-cognitive skills encompass intrapersonal (motivations, learning strategies, and self-regulation) and interpersonal (interactions with others) domains. Previous research indicates that enhancement of non-cognitive skills across a range of applied spheres (i.e., sport, vocational, and educational) can aid performance (Lin et al., 2017), and suggests that non-cognitive skills training will improve the ability to cope with the challenges of COVID-19.

This is especially true of Mental Toughness, which is associated with positive psychological outcomes including increased psychological well-being and enhanced flow (i.e., the tendency to experience a psychological state of optimal experience) in real-world settings (Jackman et al., 2016). Pertinent to the present article, researchers have found that this is especially true in the context of sport (Golby and Wood, 2016). Moreover, the importance of Mental Toughness in optimizing performance is widely acknowledged within athletic settings (coaches, sports psychologists, athletes, etc.) (Goldberg, 1998; Stamatidis et al., 2020). This perspective is commensurate with the delineation of Mental Toughness as an important factor in fostering adaptive responses to positively and negatively construed pressures, situations, and events (Cowden, 2017; Lin et al., 2017).

The contemporary conceptualization of Mental Toughness derives from work on hardiness (Maddi, 2002). Hardiness comprises three factors: Commitment (deep involvement in life activities), Challenge (expectation that life is unpredictable and that changes stimulate personal development), and Control (the desire to influence outcomes) (Kobasa, 1979; Maddi, 2002). Noting that hardiness protected against psychological distress but failed to account for the unique demands of competitive sport, Clough et al. (2002) added a Confidence dimension to form their Mental Toughness model (Sheard, 2012). This modification was consistent with the observation that self-belief is a key component of competitive success (Lane, 2014).

For these reasons, development of Mental Toughness can help to counter the negative psychological effects of the COVID-19 pandemic. The potential effectiveness of Mental Toughness arises from the fact that the construct encompasses a broad set of attributes (i.e., inherent and evolved values, attitudes, emotions, and cognitions). These not only aid goal achievement, but concomitantly influence the way people approach, react to, and evaluate pressure, challenge, and difficulty. Thus, Mental Toughness is commonly viewed as a resistance resource linked to coping (Nicholls et al., 2011). Relevant to the present article, this abstraction is consistent with the original delineation of Mental Toughness. This derived from work with elite athletes and viewed Mental Toughness as synonymous with stress tolerance and maximized performance (Loehr, 1982, 1986, 1994; Earle, 2006).

Consistent with this view, Gerber et al. (2013b) found that higher levels of Mental Toughness within high school and undergraduate students were associated with reduced levels of depressive symptoms arising from high-stress situations. Moreover, high levels of Mental Toughness predict stress resilience, ward off depression, and help to maintain life satisfaction (Gerber et al., 2013a). Other studies also link high levels of Mental Toughness to health benefits (i.e., improved sleep quality; Brand et al., 2014). Noting this, theorists have recently framed Mental Toughness as a range of psychological resources that promote positive mental health (Lin et al., 2017; Drinkwater et al., 2019; Papageorgiou et al., 2019a,b). The positive effects of Mental Toughness are well documented in sport. For instance, Gucciardi and Jones (2012) showed small to moderate negative correlations between Mental Toughness and stress, anxiety, and depression in cricketers.

The benefits of Mental Toughness may arise from related coping strategies. This was demonstrated by Nicholls et al. (2008), who reported in a large sample of athletes that higher levels of Mental Toughness correlated with employment of more problem or approach-oriented strategies (i.e., logical analysis, thought control effort expenditure, and mental imagery) and less use of avoidance (resignation, mental distraction, and distancing). This finding concurs with the view that mental toughness in athletes can moderate negative consequences resulting from exposure to high stress (Gerber et al., 2018).

Observing conceptual difficulties with the definition of mental toughness, Gucciardi redefined the construct as “a state-like psychological resource that is purposeful, flexible, and efficient in nature for the enactment and maintenance of goal-directed pursuits” (p. 18, Gucciardi, 2017). This delineation acknowledges the roots of Mental Toughness and its use in applied settings, such as dealing with the negative psychological effects of the COVID-19 pandemic.

THE 4/6CS MODEL OF MENTAL TOUGHNESS

The multidimensional framework proposed by Clough et al. (2002) could provide vital insights into the negative psychological effects that the COVID-19 pandemic has had on elite

athletes. This encompasses four factors: Commitment, Challenge, Control, and Confidence. Commitment, also referred to as “stickability,” is the ability to carry out tasks successfully, despite problems/obstacles. Challenge denotes the extent to which individuals view change, setbacks, and tests as opportunities. Control represents the perception that individuals feel able to manipulate their environment. This dimension is subdivided into Emotional (the facility to keep anxieties in check) and Life (capacity to realize plans and make a difference). Confidence indexes self-belief in Abilities (individual worth) and Interpersonal capabilities (less likely to be intimidated in social settings). Acknowledging these subdivisions some researchers also call the 4Cs, the 6Cs (Poulus et al., 2020).

The 4/6Cs are encapsulated within the 48-item Mental Toughness Questionnaire (MTQ48; Clough et al., 2002), which produces both total and dimensional scores (see Perry et al., 2021). Although there has been debate about the stability of the model (see Gucciardi et al., 2012, 2013), Clough et al. (Perry et al., 2013, 2015, 2021) and independent researchers (e.g., Horsburgh et al., 2009) have published articles that demonstrate the model's factorial validity. Consequently, the MTQ48 is a generally accepted, widely used measure of Mental Toughness (Dagnall et al., 2019).

The strength of the 4/6Cs model, when applied to assessing the negative psychological effects of COVID-19, is that it can reveal individual areas of mental sensitivity. Indeed, as a commercial tool the instrument provides feedback specific to each of the 4/6Cs. This information is potentially useful for the development of individual coping strategies.

THE MTQ48 AND THE NEGATIVE PSYCHOLOGICAL EFFECTS OF COVID-19

The strength of the 4/6Cs Model is that it can be used to signpost specific, personal areas of stress susceptibility (values, attitudes, emotions, and cognitions). This is useful for appreciating the psychological consequences that the COVID-19 crisis has had on an individual, and for identifying at risk sportspersons. Knowledge of undesirable mental impact and discrete vulnerability can inform the development of specialized personal coping strategies. Explicitly, interventions that recognize personal sensitivities, robustness (“toughness”), and the uniqueness of each sportspersons’ psychological profile. This approach is conceptually sound, since previous research has established that higher levels of Mental Toughness are associated with positive outcomes across a range of applied settings (sport: Meggs et al., 2019; occupational: Marchant et al., 2009; educational: St Clair-Thompson et al., 2015; and health: Kruger, 2018). In this context, the 4/6Cs Model (Clough et al., 2002) can act as a nuanced tool for detecting both vulnerability to, and consequences of the negative psychological effects of the COVID-19 pandemic on elite athletes (Clough et al., 2016).

Applied to sportspersons, the 4/6Cs model can make specific predictions regarding the types of difficulties individuals are likely to experience as a function of lower scores on each of the Mental Toughness dimensions (Clough and Strycharczyk,

2012). Athletes scoring low on Commitment will be prone to distractions and accordingly find it difficult to complete tasks including exercise/training routines. Moreover, they may lack perseverance when confronted by sustained barriers (i.e., extended lockdown). Similarly, sportspersons scoring low on Challenge may become psychologically overwhelmed by difficulties arising from COVID-19. Particularly instability and unpredictability will prove uncomfortable, and tax the ability to cope. This can manifest as a tendency to focus on the detrimental consequences of enforced changes (e.g., postponement of competition and disruption to training), and a slowness to adapt. Potentially, resulting in a failure to realize developmental opportunities. Over time, athletes low in Challenge will perceive sustained pressure as wearisome and become risk averse. This may mean they become unwilling to explore alternative fitness and practice exercises.

Athletes scoring low on Confidence generally lack self-belief. During the COVID-19 crisis this is likely expressed as increased self-criticism and/or despondence. This can manifest as an overreliance on others, and a reluctance to assume responsibility/show initiative. In terms of Ability, low self-assurance often presents as concerns about capability, excessive worry, and the tendency to underestimate skills, knowledge, abilities, and importance. Interpersonally, lack of confidence often results in disengagement from the training group or team. This can lead to psychological distancing and the self-perception that the individual is not generally valued. Low Interpersonal Confidence is characterized by exaggerated concern for others' views and opinions. COVID-19 related isolation and distancing is likely to amplify these perceptions.

Finally, low levels of Control indicate perceived lack of volition, autonomy, and impact. In relation to the COVID-19 crisis, this can result in a sense of powerlessness. Accordingly, sportspersons are likely to feel they are unable to meaningfully influence factors. Relatedly, they may apply themselves to tasks haphazardly; devoting unnecessary effort and resources to aspects outside of their governance, and too quickly withdraw from matters they could influence. In terms of Emotional Control, low scores often reflect high levels of anxiety and a lack of affective adaptation. This is typically accompanied by overt expression of feelings. In terms of Life Control, low scores are characterized by perceptions of ineffectiveness and unimportance. At the problem-solving level, this hinders multi-tasking and is typified by the tendency to be easily defeated by setbacks.

Awareness of Mental Toughness and the 4/6Cs is important because it can inform the development of strategies to negate (inoculate) negative psychological effects, or it can suggest coping mechanisms to alleviate problems arising from the COVID-19 crisis (i.e., stress, anxiety, and depression). In both instances, knowledge of Mental Toughness and its psychological benefits can be helpful to elite athletes who are experiencing difficulties acclimatizing to the "new" normal. This approach has been highly successful across a range of applied settings (see Lin et al., 2017). This suggests that athletes would benefit from greater awareness of Mental Toughness generally, and the use of strategies targeted

to enhance personal areas of sensitivity that are likely to influence outlook and subsequent performance.

These could utilize specific methods to enhance sensitive 4/6C dimensions. Particularly, coaches could increase levels of Commitment by encouraging athletes to focus on their enjoyment/love of the sport and achievable goal setting (Weinberg et al., 2001; Leyton-Román et al., 2021). Established approaches to enhancing Challenge include the identification of self-referenced standards, use of targeted objectives, and rivalries with other athletes (Crust and Clough, 2011). Regarding both Confidence in abilities (individual worth) and Interpersonal capabilities, coaches could facilitate these factors by encouraging individuals to be appropriately assertive and expressive in performance and everyday life (Thelwell et al., 2017). For instance, develop a sense of self and presence related to role and performance.

Finally, trainers can develop Life Control within sportspersons through the referencing of previous achievements and accomplishments and imagining optimal performance (Erdner and Wright, 2018). These interventions are likely to be associated with heightened self-efficacy, the individual's belief in their ability to succeed in specific situations (Munroe-Chandler et al., 2008). Regarding Emotional Control, coaches can improve this factor by developing a sportsperson's understanding of emotion regulation strategies (i.e., cognitive reappraisal, distraction, and action control). Familiarity with these concepts is important since adaptive emotional control requires the ability to flexibly switch between emotion control strategies (Koch et al., 2018).

DISCUSSION

The application of the 4/6C Model to elite athletes will provide researchers with a nuanced understanding of the negative effects of the COVID-19 pandemic at both a general and personal level. At an individual level, MTQ48 feedback serves as a tool for signposting psychological areas of stress vulnerability (sensitivity) and probable adverse impacts (i.e., problematic values, attitudes, emotions, and cognitions). This information can play an important role in both preventing and identifying mental distress. Recognizing detrimental states can inform the advancement of coping strategies that can protect against/decrease the influence of negative psychological states arising from COVID-19.

Moreover, the 4/6C Model offers researchers a conceptual framework for designing person-centered, targeted interventions (Clough et al., 2016; Zalewska et al., 2019). In this context, the breadth of the model allows for the integration of a range of psychological and cognitive techniques tailored to the needs of a sportsperson. This individualized approach is consistent with the observation that therapeutic advice is best received when it is perceived as pertinent, collaborative, and helpful (Bachelor, 2013).

The success of the proposed application rests on the assumptions that Mental Toughness is malleable, and that increases in Mental Toughness resulting from psychological training concurrently enhance positive psychological elements.

There is significant evidence to support these propositions (see Lin et al., 2017). The view that Mental Toughness is adaptable aligns with the elucidation of the construct as a “plastic” trait that can develop over time (Strycharczyk and Clough, 2014), and concurs with behavioral genetic studies that find around half of the variance in the construct is attributable to non-shared environmental factors (e.g., Horsburgh et al., 2009; Veselka et al., 2009). Further consideration of this evidence, however, suggests an important training consideration. Explicitly, that improvements in mental toughness are best achieved by focusing on the dimensions with the lowest heritability (i.e., Commitment and Control).

Moreover, Gucciardi et al. (2009a,b) observed that interventions in the form of psychological skills training (PST) programs increased athletes’ ratings of Mental Toughness. Similarly, Sheard and Golby (2006) found that PST increased Mental Toughness, promoted psychological development, and aided the performance of adolescent swimmers. Extending this to consider whether PST enhanced positive psychological characteristics, Golby and Wood (2016) reported that PST increased levels of Mental Toughness and concomitantly heightened levels of perceived self-efficacy, positive affect, and self-esteem in student-athlete rowers. This supports the notions that Mental Toughness is trainable and that interventions can facilitate psychological well-being.

The use of Mental Toughness interventions requires cautious development and implementation for several reasons. Firstly, it is difficult to generalize across previous studies because they have often used small, highly specialized samples (e.g., Bull et al., 2005; Wilson et al., 2019). This makes comparisons difficult due to inherent variations in potentially conflating factors involving level of performance, sport, age, etc. Furthermore, although Mental Toughness studies frequently focus on “elite athletes” and “performers” these terms do not denote a homogeneous group. Rather, they indicate that individuals in a particular sport have reached a relatively high standard within that domain. Scrutiny reveals the presence of important differences in competition standard that may influence the effectiveness of interventions. Thus, although much work has used common respondent selection criteria (e.g., Woodman and Hardy, 2001; Hanton and Connaughton, 2002), such as full international honors and represented their country in major events (e.g., Olympic Games) (Jones, 2002), researchers have frequently employed different prescriptions (e.g., Cowden et al., 2014, tennis players; Bull et al., 2005, English cricketers).

In addition, papers have derived conclusions on the effectiveness of Mental Toughness using various methodological approaches (i.e., self-report, interview, and focus group) and data analytical techniques. Valid suppositions are only likely to arise from systematic triangulation of prior research. Less rigorous evaluations are likely to result in superficial inferences. A further limitation to consider is that preceding work has employed a range of different indices of Mental Toughness. These have different factorial structures and vary in their conceptualization of Mental Toughness. For instance, The Sport Mental Toughness Questionnaire (SMTQ, Sheard et al., 2009)

yields a general score derived from Confidence, Constancy, and Control. Clearly, personalized interventions based on SMTQ scores are likely to deviate from those predicated on the MTQ48.

Related to the use of self-report measures, much of the extant work on interventions has employed cross-sectional designs, with data collection occurring at one point in time. This approach focuses on relationships between variables and cannot establish causations (Nicholls et al., 2008). To establish causality or directionality researchers need to use experimental manipulation or assess changes in scores across multiple time points.

Noting these factors, while the body of research indicates that interventions can increase Mental Toughness and concomitantly have adaptive psychological benefits (i.e., facilitate coping), researchers and practitioners should carefully interrogate studies from which these conclusions derive before designing and administering interventions. Likewise, they should cautiously pilot interventions, carefully monitor and document outcomes (Stamatis et al., 2020).

A further caveat is that individuals high in Mental Toughness often exhibit socially malevolent characteristics (e.g., ruthless, and selfish), especially when they are striving to achieve goals (Sabouri et al., 2016). Hence, elements of Mental Toughness, particularly those associated with dark triad traits (i.e., narcissism, psychopathy, and Machiavellianism), may have detrimental effects on psychological health (Golby and Wood, 2016). Although, research in this area is relatively underdeveloped, recent evidence indicates that this supposition is overly simplistic because relationships between Mental Toughness, dark triad traits and psychological well-being are highly complex.

For example, Papageorgiou et al. (2019a) found that Mental Toughness mediated the effects of Subclinical Narcissism (SN) on depression, resulting in lower levels of depression. Moreover, Papageorgiou et al. (2019a) reported that SN increases Mental Toughness and reduces perceived stress. Exploring the link between SN with prosocial traits can be particularly helpful when seeking to identify and promote its adaptive tendencies against symptoms of psychopathology. As this is a nascent area of work, future research should further examine relationships between Mental Toughness, dark triad traits and psychological well-being. Also, to maximize the therapeutic use of Mental Toughness, subsequent work should seek to identify non-adaptive elements.

It is important to acknowledge that not all academics would support the proposed application of the 4/6C Model. Opponents argue that its usefulness is limited by conceptual deficiencies (Gucciardi, 2017). Frequently cited criticisms center on the insistence that Mental Toughness is a unidimensional rather than multidimensional construct, variations in factor structure as a function of context, observed deficiencies in measurement properties, and the authors’ failure to specify item selection processes (Gucciardi et al., 2012, 2013; Gucciardi, 2017).

Noting these concerns advocates of the 4/6Cs Model have robustly defended their position (e.g., Clough et al.,

2012). Commensurate with this stance, the MTQ48 remains a widely used, psychometrically validated instrument, which is supported by robust empirical evidence. Moreover, while different definitions and abstractions of Mental Toughness exist, delimitations share core characteristics (i.e., self-belief, persistence on achieving goals, motivation, and the ability to deal with setbacks). Indeed, these are integral elements of the 4/6Cs model. Further support for the applicability of the 4/6Cs to therapeutic contexts is provided by a wealth of previous related research (see review article of Lin et al., 2017).

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DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

ND collated ideas and organized content. KD assisted with drafting. AD advised on content. RW provided feedback on drafts. All authors contributed to the production of the final draft.

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