ADVANCES IN RESEARCH ON AGE IN THE WORKPLACE AND RETIREMENT

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ADVANCES IN RESEARCH ON AGE IN THE WORKPLACE AND RETIREMENT

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Shifts in the age composition of the workforce coupled with dynamic definitions of retirement represent important issues that influence work processes and, more generally, the experience of working across one's career. For example, redefinitions of careers and the changing nature of working have contributed to the emergence of distinct forms and patterns of work experiences across the prototypical work lifespan. Likewise, older individuals are increasingly delaying retirement

in favor of longer-term labor force participation. The study of age and work, and work and retirement by industrial, work, and organizational (IWO) psychologists and scholars of human resources management and organizational behavior (HR/OB) has recently proliferated in part as a result of such trends, along with the recognition that age-related processes are important indicators of various proximal (e.g., job attitudes, work behaviors, work motives, and wellbeing) and distal outcomes (e.g., sustainable employability, climates for aging, and firm performance) at various levels of abstraction in modern work environments.

Recent theoretical advances have suggested that age, along with individual psychological factors and various contextual influences can jointly influence work outcomes that contribute to long-term employment success, including work performance, job attitudes, work orientations, and motivations. Similar theoretical developments concerning retirement have postulated individual and contextual elements that drive success in the transition from career and work roles to non-work and leisure as well as post-retirement bridge employment roles.

In this Research Topic, we aim to curate a collection of papers that are representative of current trends and advances in thinking about and investigating the role of age in workplace processes and the changing nature of retirement. Our hope is to showcase various contemporary ideas and rigorous empirical studies as a means to inform broader thinking and to support enhanced theorizing and organizational practice regarding these processes.

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EDITORIAL
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Editorial: Advances in Research on Age in the Workplace and Retirement

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The Editorial on the Research Topic

Advances in Research on Age in the Workplace and Retirement

The global workforce is aging at an unprecedented rate, resulting in changes to the structure and processes of organizations that have redefined how we understand working and retirement (Rudolph et al., 2018). Modern career pathways and the changing nature of working have each contributed to the emergence of distinct forms and patterns of work experiences across the prototypical work lifespan (Wang and Wanberg, 2017). Likewise, older individuals are increasingly delaying retirement in favor of extended labor force participation (Zhan, 2016). Such changes to the workforce, coupled with dynamic (re)definitions of retirement are important concerns for researchers, practitioners, and policy makers alike, as each can profoundly influence the experience of working across one's career (Beehr and Bennett, 2015). The study of age and work, as well as the study of retirement transitions has recently gained traction, owing in part to the aforementioned trends, and in part to the emergence of evidence that age-related processes are important predictors of various work outcomes at different organizational levels.

In this *Frontiers Research Topic*, our stated goal was to curate a collection of papers that are representative of current trends and advances in thinking about and investigating the role of age in workplace processes and the changing nature of retirement. Our hope in doing so, was to showcase various contemporary ideas and rigorous empirical studies as a means to inform broader thinking and to support enhanced theorizing and organizational practice regarding these processes. We are very pleased to report that we have achieved this goal.

Beginning in August of 2016, we solicited proposal abstracts and additionally considered open-call papers until May of 2017. As a result of these efforts, we received 22 full-manuscript submissions (17 invited from abstracts; 5 received via open call), of which 5 were ultimately rejected (22.72% rejection rate). Of the 17 papers accepted for this research topic, a majority (15) represent empirical contributions, although we also feature two conceptual and literature review papers. These 17 manuscripts were authored by researchers representing a variety of different disciplines (e.g., industrial, work, and organizational psychology, management, human resources, occupational medicine, neuroscience) from a globally-diverse array of regions (Europe, Asia, North America, and Australia). The manuscripts further feature a varied array of methodologies (e.g., experimental designs, policy capturing methodologies, observational designs, longitudinal designs, systematic reviews). These diverse perspectives represent the breadth and scope of research concerning age, working, and retirement; this is indeed a vibrant international and multidisciplinary area of inquiry.

Broadly, the research presented here highlights four important points. First, there are a number of person changes in abilities and motivational factors associated with age

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(Faber and Walter; Henry et al.) that may impact on aging workers' social preferences (Gärtner and Hertel) and lead them to respond to work conditions differently from young workers (Brienza and Bobocel). Second, apart from general age-related trends in abilities and motivation, there is accumulating knowledge on the active role that workers play in managing their career development over time to facilitate "aging successfully" at work (Le Blanc et al.; Müller and Weigl; Wong and Tetrick). At the same time, we are starting to learn about organizational practices and interventions that support successful aging at work (Kensbock et al.; Oltmanns et al.). Third, hiring processes appear to be more subjected to age discrimination than any other organizational practices, yet the extent of age discrimination depends on how applicants present themselves (Derous and Decoster), decision-makers' personal characteristics (Fasbender and Wang), and the assumptions that decision makers hold about older workers (Kaufmann et al.). Moreover, and to a related degree, the attractiveness of particular job features to job applicants changes with age (Zacher et al.). Finally, researchers are making major strides toward improving our evidence-based knowledge of the retirement transition, and the multi-level factors (e.g., income, leadership, planning) that facilitate or hinder workers' motivation to continue working and their well-being once retired (Davies et al.; Lindwall et al.; Wöhrmann et al.; Yeung and Zhou). We next briefly summarize the studies included in our research topic based upon these important points.

PERSON CHANGES WITH AGE

Brienza and Bobocel investigate how older workers react to perceptions of justice in their current workplace in two empirical studies. Data from two samples of employees (total $N = 377$) were collected using online panels. The researchers find that employee age moderates the negative relationships of justice perceptions with deviance and emotional exhaustion. Moreover, emotional exhaustion mediates the differential effects of justice perceptions on deviance, and these effects are dependent upon employee age, such that older workers appear to be more sensitive to informational and interpersonal justice, and younger workers appear to be more sensitive to distributive and procedural justice.

Faber and Walter study the capability to correctly recognize collective emotion expressions (i.e., "emotional aperture"), and model the joint roles of age and agreeableness for predicting this ability. This study uses a sample of $N = 181$ German participants between 18–72 years of age who participated in an online study. Results suggest that, among individuals with lower agreeableness, there is a curvilinear relationship between age and emotional aperture. This finding suggests that the emotional aperture of those with low agreeableness peaks in middle adulthood, whereas the emotional aperture of those with high agreeableness is relatively high irrespective of age.

Gärtner and Hertel apply socioemotional selectivity theory to predict that familiar teams are prioritized when occupational future time perspective (OFTP) is perceived to be limited. They test their hypotheses using a within-person online vignette study. $N = 454$ participants were asked to choose between a familiar and a new team in three consecutive trials under various levels of manipulated OFTP. In the control condition (i.e., OFTP not manipulated), higher age indirectly predicts a higher preference for familiar teams through reduced OFTP. Moreover, experimentally restricting OFTP increases the preference for a familiar team over a new team regardless of workers' age.

Henry et al. offer a systematic review and critical discussion of the literature on domain-general future time perspective ($K = 17$ studies) and OFTP ($K = 16$ studies), and highlight implications for future research and practice (Note: Richard E. Boyatzis served as action editor of this article). Considering the broad implications of this review, it is clear that future time perspective at work is an important variable to the study of work and aging. For example, future time perspective can both mediate and moderate relationships between individual and contextual antecedents and occupational well-being, as well as motivational and behavioral outcomes.

SUCCESSFUL AGING AT WORK

Kensbock et al. integrate organizational change and accommodations literatures to propose a theoretical framework of the potential for negative experiences during the job accommodation process. This framework is then applied to a qualitative study with $N = 73$ manufacturing workers participating in a job accommodation program at a German industrial company. Results suggest that problems associated with health-related impairments are mostly solved by accommodations, however employees with disabilities report interpersonal problems and conflicts that are similar to those typically occurring during organizational change (e.g., lack of social support; poor communication). Furthermore, the findings of this research suggest that discrimination, bullying, and maltreatment are common during accommodation processes.

Le Blanc et al. propose an approach to understanding the popular concept of sustainable employability that is based on the ability-motivation-opportunity (AMO) framework. This study uses four different conceptualizations of aging at work to bolster evidence for both the convergent and divergent validity of this framework. Data were collected from $N = 180$ employees in Dutch public service organizations using an online survey. The results show that the four conceptualizations of aging are differently related to the three indicators of sustainable employability proposed within the AMO framework. Noteworthy additional findings are that "organizational age" (or tenure) has the strongest negative relationship with the motivation to continue working, and "functional age" (low work ability) has the strongest negative relationship with the opportunity to continue working.

Oltmanns et al. hypothesize that the recurrent experience of novelty at work is an important condition for brain plasticity. Using a case-control design across a time window of 17 years, this study investigates the effect of recurrent exposure to work-task changes on gray matter volume and cognitive functioning in a sample of middle-aged production workers who have otherwise

low levels of job complexity. The results suggest that work task changes are associated with better processing speed and working memory as well as with larger gray matter volume in those brain regions that have been associated with learning, and that typically show pronounced age-related declines. As such, this study offers that recurrent novelty at work could serve as an *in vivo* intervention that counteracts the long-term effects of low job complexity.

Müller and Weigl explore associations between employees' use of selection, optimization, and compensation (SOC) strategies at work and their peer-rated organizational citizenship behaviors (OCB). Using a cross-sectional design with multi-source data, a sample of primary school teachers were sampled ($N = 114$) who reported on their SOC strategy use, while their teaching partners reported on their OCB. Results suggest a positive relationship of loss-based selection behaviors with peer-rated OCB regardless of age. Moreover, there is a positive relationship of compensation behavior with peer-rated OCB for older workers, but the effect is negative for young workers, suggesting that compensation behaviors may be beneficial only at higher ages.

Wong and Tetrick build upon the lifespan theory of control and present a conceptual overview of job crafting as a mechanism for maintaining person-job fit across time. This paper argues that job crafting can be a particularly valuable mechanism for older workers to realign and enhance their demands-abilities and needs-supplies fit by proactively exerting personal agency to make changes to the task, social, and cognitive aspects of their jobs.

HIRING OLDER WORKERS

Derous and Decoster apply job market signaling theory to investigate whether older applicants benefit from concealing explicit age signals on their resumes (e.g., date of birth) and whether subtle age cues on resumes (e.g., older-sounding names) affect older applicants' hirability ratings. Using an experimental design and a sample of $N = 610$ human resource professionals, the results offer evidence for hiring discrimination of older applicants based on implicit age cues that exist in their resumes, and this effect is more pronounced among relatively older raters. Moreover, concealing one's date of birth led to overall lower ratings compared to not concealing one's date of birth.

Fasbender and Wang use theories of planned behavior and core self-evaluations to explore the direct impact of negative attitudes toward older workers on hiring decisions, and the moderating role of decision-makers' core self-evaluations on this relationship. These relationships were tested using an experimental vignette methodology and a sample of $N = 102$ participants working in human resource management. Results suggest that negative attitudes toward older workers have a consequent negative influence on the desire to hire older people. Moreover, decision-makers' core self-evaluations are found to buffer the relationship between attitudes toward older workers and hiring outcomes.

Kaufmann et al. present the results of two experimental studies of the role of facial appearance and impressions of fitness (i.e., physical and cognitive) on hirability assessments. For both studies, results indicate that older-looking job candidates receive lower hirability ratings, and this can be explained by less favorable fitness impressions. The first study also shows this biasing effect is to some degree mitigated when job candidates offered counter-stereotypic information about their fitness. Additionally, in the second study, facial age-based discrimination was less prevalent for jobs with less costumer contact.

Zacher et al. use an experimental policy-capturing design to test integrative hypotheses derived from job design and lifespan developmental theories (Note: Elias Kapoutsis served as action editor of this article). A sample of $N = 82$ employees indicated their job attraction for each of 40 hypothetical job descriptions in which four job characteristics (i.e., job autonomy, task variety, task significance, and feedback from the job) were systematically manipulated. Results demonstrate that the positive effects of task variety, task significance, and feedback from the job are stronger for younger compared to older employees, whereas there are no significant age-differential effects of job autonomy on job attraction.

RETIREMENT TRANSITIONS

Davies et al. draw upon comparative theories of retirement attitudes, offering a model of the direct relationship between job satisfaction and intended retirement age, and an indirect relationship between job satisfaction and intended retirement age, via retirement attitudes. These relationships are also proposed to be conditional upon household income. Data from $N = 590$ workers aged 50 and over from the United Kingdom were collected, and a conditional process analysis was used to test this model. Among other interesting findings, results suggest that higher job satisfaction among average and low household income workers is likely to make the prospect of retirement less attractive. Among high household income workers, however, no indirect effects of job satisfaction are found.

Lindwall et al. introduce the HEalth, Ageing and Retirement Transitions in Sweden (HEARTS) study, and present initial results from the two first waves of this ambitious project. The HEARTS study is an annual effort to study psychological health in the years before and after retirement, as well as both change and stability patterns related to retirement. Results from the first and second waves presented by this paper show that individuals who retired between these waves demonstrate more positive changes in psychological health compared with those who are still working or have previously retired.

Wöhrmann et al. investigate the relationship between respectful leadership and older workers' desired retirement age, and investigate both mediating (i.e., job satisfaction, subjective health, and work-to-private life conflict) and moderating (i.e., occupational self-efficacy) factors that might help to explain the assumed relationships with respectful leadership. A hypothesized model was tested within a large ($N = 1{,}130$) sample of blue and white-collar workers between 45 and 65 years of age. The results suggest that respectful leadership is positively related to older workers' desired retirement age and that this relationship

is mediated by subjective health and lower work-to-private life conflict.

Yeung and Zhou explore the mechanisms underlying the relationship between retirement planning activities and post-retirement well-being. This study adopts a resource-based dynamic model, and uses a longitudinal study design to examine whether pre-retirement planning activities can increase the total resources of retirees (i.e., tangible, mental, and social resources), and consequently contribute to better well-being following retirement. Using a sample of $N = 118$ Hong Kong Chinese surveyed across three time points spanning 6 months prior to retirement until 12 months thereafter, the study suggests positive changes in well-being for retirees who had increases in retirement resources before retirement. Additionally, retirees with more retirement preparatory activities before retirement acquire greater resources initially, which contributes to positive changes in post-retirement well-being over time.

CONCLUSION

We hope that this collection of papers inspires researchers to think differently about the study of aging and work, and retirement. When we initiated our call for papers we specified different directions of research that we regarded as important to advance knowledge on the role of age in the workplace and the changing nature of retirement. In reviewing the set of studies included in this research topic, it becomes evident that many of these research directions were adopted by these manuscripts, and that through these collective efforts, we are beginning to see a comprehensive and sophisticated picture of the opportunities and challenges of an aging workforce.

At the same time, the predominant focus of this set of studies still is on individual worker outcomes. Moving the focus from the individual worker to the level of dyads (i.e., vertical or horizontal; e.g., age differences between employees and their supervisors, couples retiring together versus apart), teams (e.g., the role of age diversity), and organizations (e.g., climate for successful aging, role of organizational support in the retirement transition) in future research will be fruitful to fully understand the broader implications of an aging workforce and changing nature of retirement.

The papers included in this research topic have adopted a broad variety of perspectives and methodologies, ranging from theory development papers to systematic reviews, and from qualitative studies and experimental studies to large-scale longitudinal studies. It is laudable that most empirical studies included in this research topic addressed at least one of the recently proposed methodological recommendations to move research on work and aging forward (Bohlmann et al., 2017). For instance, several studies make use of experimental and longitudinal research designs, examine mediators and moderators of relationships between age and work outcomes, and hypothesize and test curvilinear age patterns. At the same time, further research is needed that adopts a multilevel perspective on aging at work and retirement, with multiple predictors and/or outcomes at the individual, dyadic/team, and organizational levels of analysis.

The papers included of this research topic also incorporated a broad range of theoretical traditions. In line with recent suggestions to adopt lifespan perspectives to study work and aging, and retirement (Rudolph, 2016), we see a variety of lifespan theories represented among these studies, from socioemotional selectively theory and the meta-theory of selection, optimization, and compensation, to lifespan theories of control and job design. These perspectives reflect, to some degree, the breadth of theoretical coverage represented here. That said, we also note that research tends to broadly adopt these perspectives, while often not fully elaborating on the predictions derived therefrom. That is to say, it is relatively easy to invoke lifespan perspectives as broad explanations for aging and work or retirement processes. However, the tenets of such theories are rarely tested explicitly by such studies, and the specific developmental mechanisms considered within each theory are often neither operationalized nor observed. More precise mapping of theories onto research is an important consideration for future work in this field.

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ORIGINAL RESEARCH
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Employee Age Alters the Effects of Justice on Emotional Exhaustion and Organizational Deviance

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Fairness in the workplace attenuates a host of negative individual and organizational outcomes. However, research on the psychology of aging challenges the assumption that fairness operates similarly across different age groups. The current research explored how older workers, vis-à-vis younger workers, react to perceptions of fairness. Integrating socioemotional selectivity theory and the multiple needs theory of organizational justice, we generated novel predictions regarding the relations between perceptions of workplace justice, emotional exhaustion, and employee deviance. Specifically, we hypothesized and found that employee age moderates the negative relation between justice facets and deviance (Study 1) and emotional exhaustion (Study 2). We also found that emotional exhaustion mediates the differential effects of justice on deviance, and that this relation depends on employee age (Study 2). Relative to younger workers, older workers are more sensitive to informational and interpersonal justice; in contrast, relative to older workers, younger workers are more sensitive to distributive and procedural justice. The research supports and extends existing theory on organizational justice and on the psychology of aging. Moreover, it highlights the importance of considering employee age as a focal variable of interest in the study of justice processes, and in organizational research more generally.

Keywords: employee age, organizational justice, deviance, emotional exhaustion, instrumental and relational needs

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INTRODUCTION

Fair treatment can alleviate negative psychological states, such as emotional exhaustion (e.g., Liljegren and Ekberg, 2009; Lambert et al., 2010), that deplete the self-control required to maintain job performance and inhibit counterproductive behavior (Schaufeli et al., 2009; Bolton et al., 2012). Consistent with this logic, perceptions of organizational justice show reliable negative relations with a broad family of deviant workplace behaviors (Cohen-Charash and Spector, 2001; Dalal, 2005; Jones, 2009). Nevertheless, do all experiences of justice relate similarly to these outcomes for all employees? In the present research, we suggest a novel, more nuanced understanding of how perceptions of justice relate to employee deviance and emotional exhaustion by considering the role of employee age.

The current research integrates two previously separate theoretical frameworks—the multiple needs model of justice (MNM; Cropanzano et al., 2001) and socioemotional selectivity theory of human aging (SST; Carstensen, 1995). The multiple needs model of justice suggests that fair treatment fulfills fundamental psychological needs, including the need for instrumental control

and the need for relational belonging; it also suggests that different fairness-related experiences (i.e., distributive, procedural, informational, and interpersonal justice) can be differentially relevant for fulfilling such needs. As explained in the next sections, distributive and procedural justice are relatively more likely to satisfy employees' needs for instrumental control, whereas informational and interpersonal justice are more likely to satisfy needs for relational belonging (Cropanzano et al., 2001). Interestingly, socioemotional selectivity theory (Carstensen, 1995) and other research on human aging suggests that as people age, they become less concerned with instrumental needs and more motivated by relational needs.

Therefore, integrating MNM and SST, we predicted that employee age would moderate the effects of justice on employee deviance and emotional exhaustion. We focus on employee deviance and emotional exhaustion given their theoretical relationship with the fulfillment of needs. When instrumental and relational needs are satisfied, as when people experience fair treatment, negative emotional states that can increase emotional exhaustion are alleviated, leaving intact the self-regulatory resources required to maintain appropriate job behavior and suppress inappropriate job behavior. Thus, we expected that emotional exhaustion would mediate the negative relations between justice and workplace deviance, and that employee age would moderate these relations. **Figure 1** depicts our theoretical model.

The current research makes several contributions. First, the findings reveal that employee age dramatically alters the relations among important organizational variables (i.e., justice, emotional exhaustion, and deviance), adding to the growing scholarship on age-related psychological changes in the organizational context. Moreover, the research underscores the importance of considering employee age in the study of organizational justice specifically; although much is known about the effects of justice on employee behavior (see Colquitt et al., 2013), little research has considered how employee age may alter justice processes. Third, the present research provides conceptual support for two theoretical frameworks—socioemotional selectivity theory and the multiple needs model of justice—and illustrates the utility of utilizing research on the psychology of aging to better understand organizational phenomena. Finally, from a practical perspective, the current research highlights the importance of "fit" between the design and enactment fairness-related policies and employee age. By demonstrating age-related dissociative relations among organizational phenomena, our research provides impetus for practitioners to examine employee age closely when enacting organizational policies intended to satisfy different employee needs.

In the next section, we review the theoretical rationale underlying the present research by drawing on the SST and MNM. Then, we derive novel hypotheses from the integration of these literatures, which we test in two studies.

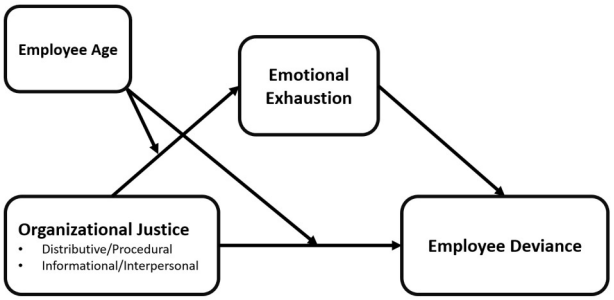

FIGURE 1 | Conceptual moderated mediation model. Emotional exhaustion mediates the negative relations between distributive and procedural justice on deviance among younger employees; emotional exhaustion mediates the negative relations between informational and interpersonal justice on deviance among older employees.

THEORETICAL BACKGROUND

Age-Related Changes in Needs

Socioemotional selectivity theory (SST; Carstensen, 1992) is perhaps the most prominent conceptual framework for understanding age-related shifts in human motivation, building on earlier research on value differences between younger and older people (Ryff and Baltes, 1976). SST argues that age-related changes in perspective of time and increasing relevance of emotion regulation lead to an increasing preference among people as they age for quality over quantity of social contact. Relative to younger people, older people actively select and create positive socio-emotional experiences in the service of maximizing the quality of social experience (Fredrickson and Carstensen, 1990; Lang and Carstensen, 1994; Carstensen, 1995; Carstensen and Mikels, 2005; Mather and Carstensen, 2005). As one example, in a 34-year longitudinal study, Carstensen (1992) found that social contact in relationships that serve instrumental purposes decreased with age, but social contact that fulfills quality relational needs remained stable or actually increased.

The broader psychological literature provides converging evidence for an age-related transition from instrumental to relational orientation. As people age, they increasingly prioritize positive social emotion and down-regulate negative social emotion (Gross et al., 1997), and they become more agreeable and less neurotic (Terracciano et al., 2005; Allemand et al., 2007). Similarly, with age, individuals become more empathetic (Sze et al., 2012), show improvements in reasoning about social dilemmas (Grossmann et al., 2010), and engage less in antisocial behavior (Lau et al., 2003; Tittle et al., 2003). Similar effects are observed in organizational research. For example, employee age is associated with increased motivation toward positive workplace relationships, greater cooperation and respect, increased orientation toward generative identity, and decreased motivation toward achievement, status, instrumental control, and competition in the workplace (e.g., Leviatan, 1992; Kanfer and Ackerman, 2004; Lord, 2004; Caldwell et al., 2008; Kooij et al., 2008, 2010, 2011; Stamov-Roßnagel and Biemann, 2012; Tenhiälä et al., 2013). Consistent with these latter findings, research has revealed negative relations between employee age and antisocial tendencies such as deviance, and related constructs such as revenge and retaliation (e.g., Gruys and Sackett, 2003; Lau et al., 2003; Bobocel, 2013).

In summary, evidence reveals a transition from instrumental to relational orientation as a function of age. Therefore, employee age might alter the personal relevance of workplace experiences that are associated with fulfilling instrumental and relational needs. As discussed below, despite theory suggesting that fairness can satisfy such needs, no research has integrated the literatures on aging and organizational justice to examine whether age may alter employees' sensitivity to different facets of justice.

Justice and the Fulfillment of Instrumental and Relational Needs

Justice researchers generally distinguish between four justice concepts. Distributive justice refers to people's perceptions of the fairness of outcomes they receive, such as compensation and benefits. Procedural justice refers to people's perceptions of the fairness of the processes by which decisions are made. Informational and interpersonal justice refer to people's perceptions of the quality of treatment they receive when authorities are implementing decisions, for example, whether they received adequate explanations and respectful treatment, respectively (for review, see Colquitt et al., 2005). A large body of research on organizational justice has demonstrated that employees' perceptions of justice predict numerous organizational outcomes (Cohen-Charash and Spector, 2001; Colquitt et al., 2001, 2013; Fassina et al., 2008; Whitman et al., 2012; Shao et al., 2013; Rupp et al., 2014).

According to the MNM (Cropanzano et al., 2001; also see Lind, 2001) one reason for the pervasive impact of justice perceptions is that fairness plays a crucial role in fulfilling multiple basic human needs. For example, equity theory of distributive justice (e.g., Adams, 1965) and control theories of procedural justice (e.g., Leventhal, 1976) argued that justice can fulfill people's need for control over their own material outcomes. According to these theories, organizational justice has *instrumental value* because it maximizes one's likelihood of obtaining adequate outcomes. Later theory and research on procedural (Lind and Tyler, 1988) and interactional justice (e.g., Bies and Moag, 1986; Tyler and Bies, 1990) argued that justice can also fulfill people's needs for social belonging. According to these models, justice also has *relational value* in that it communicates that one is valued and respected by one's social network (for recent review, see Bobocel and Gosse, 2015).

Linking Justice to Deviance via Emotional Exhaustion

From MNM and justice research, it is clear that fair treatment fulfills employees' instrumental and relational needs. From research in the broader psychological literature, it is also clear that when people perceive fulfillment of instrumental and relational needs, they experience lower levels of negative psychological states that lead to emotional exhaustion (e.g., low vitality, anxiety; Twenge et al., 2002; Ryan and Deci, 2008; Zhou et al., 2009). Emotional exhaustion, defined as a chronic state of depletion, impairs employees' ability to maintain appropriate-job related behavior and suppress inappropriate job-related behavior (Lee and Ashforth, 1996; Cropanzano et al., 2003; van Jaarsveld et al., 2010). Thus, we reasoned that experiences of fair treatment would predict lower levels of deviance via reductions in emotional exhaustion.

Organizational research supports the above reasoning. The negative association between justice and employee deviance is well-established (e.g., Aquino et al., 1999; Dalal, 2005; Berry et al., 2007; Jones, 2009; Liljegren and Ekberg, 2009; Colquitt et al., 2013; Holtz and Harold, 2013; Shao et al., 2013; Rupp et al., 2014). Meta-analyses have estimated the relations between different dimensions of justice and deviance to range from −0.22 to −0.32 (e.g., Colquitt et al., 2013). Whereas fewer studies have examined the relation between justice and emotional exhaustion, the research also indicates a negative association. For example, Lambert et al. (2010) found negative relations between distributive and procedural justice and emotional exhaustion.

Interestingly, despite early theorizing, only recently have researchers begun to examine the possible mediating role of emotional exhaustion in the relations between justice and organizational outcomes. For example, Campbell et al. (2013) demonstrated that emotional exhaustion mediates the negative relation between organizational justice and turnover (Campbell et al., 2013). Especially relevant to the current studies, Matta et al. (2014) demonstrated that state-level negative emotions mediate the negative relation between employees' perceptions of the fairness of daily events and their counterproductive workplace behavior.

In summary, there is ample reason to expect that organizational justice will relate negatively to both employee deviance and emotional exhaustion, and that emotional exhaustion will mediate the relations between justice and deviance. Nevertheless, in the present research, we also develop more fine-grained hypotheses regarding the justice-to-deviance relations by integrating MNM and SST.

Integration and Hypotheses

As explained earlier, research demonstrates that the salience of instrumental and relational needs change with age; relatedly, justice facets differentially fulfill these same needs. Employees perceive distributive justice when they believe that their outcomes are equitable; thus, distributive justice has direct instrumental value. Similarly, employees perceive procedural justice when they believe that they have control over the procedures through which outcomes are generated; thus, procedural justice also has instrumental value by affording employees indirect control over their outcomes. In contrast, employees perceived informational and interpersonal justice when they believe that authorities have adequately explained decisions and have treated them respectfully when implementing decisions; thus, relative to distributive and procedural justice, informational and interpersonal justice are more likely to satisfy employees' relational needs (for similar reasoning, see Johnson et al., 2006).

It is important to note that theory and research on the group-value model of procedural justice (Lind and Tyler, 1988; Conlon, 1993) and later the relational model of authority (Tyler and Lind, 1992) and the group engagement model (Blader and Tyler, 2003), has demonstrated that procedural

justice also has relational value (for review, see Bobocel and Gosse, 2015). However, the presumed psychological function of procedural justice may depend on how it is operationalized in research. Instrumental theories of procedural justice (e.g., Leventhal, 1976, 1980) emphasized the role of *structural aspects* of decision procedures that lead to perceptions of procedural justice (e.g., consistency of procedures, accuracy of information gathered). In contrast, relational theories (e.g., Lind and Tyler, 1988; Tyler and Lind, 1992; Tyler and Blader, 2003) emphasized both the structural and *interpersonal aspects* of procedures that lead to perceptions of procedural fairness (e.g., polite and respectful treatment, justification for decision). Importantly, the most widely used measure of procedural justice in organizational research over the past 15 years (and that used in the present studies; Colquitt, 2001) operationalizes procedural justice in terms of the former, whereas the interpersonal aspects of process are subsumed within the operationalization of interactional justice. In view of this operationalization, we expected that procedural justice would be valued more for its instrumental function than for relational reasons.

Integrating MNM and SST, we suggest that, whereas younger employees should be more responsive to distributive and procedural justice, older employees should be more responsive to informational and interpersonal justice. Employee age should therefore moderate the negative relations between organizational justice and both deviance and emotional exhaustion. Therefore, we made the following predictions:

Hypothesis 1: Employee age will moderate the negative relations between justice perceptions and deviance, such that (a) distributive and procedural justice will negatively predict deviance for younger employees, and (b) informational and interpersonal justice will negatively predict deviance for older employees.

Hypothesis 2: Employee age will moderate the negative relations between justice perceptions and emotional exhaustion, such that (a) distributive and procedural justice will negatively predict emotional exhaustion for younger employees, and (b) informational and interpersonal justice will negatively predict emotional exhaustion for older employees.

Furthermore, drawing on the extant research on justice, emotional exhaustion, and deviance, we expected that employee emotional exhaustion will mediate the justice-deviance relations. Given this, and extending Hypotheses 1 and 2, we expected that the mediating role of emotional exhaustion in the justice-deviance relations will differ as a function of employee age. Therefore, we made the following moderated mediation (Baron and Kenny, 1986) hypothesis:

Hypothesis 3: Employee age will moderate the mediating effect of emotional exhaustion in the justice-deviance relations, such that (a) emotional exhaustion will mediate the negative relations between distributive and procedural justice perceptions and deviance for younger, but not older employees, and (b) emotional exhaustion will mediate the negative relations between informational and interpersonal justice perceptions and deviance for older, but not younger employees.

STUDY 1

To begin, Study 1 investigated the moderating role of age in the justice-deviance relations (Hypotheses 1a and 1b). Note that both Studies 1 and 2 were reviewed and approved by the Human Research Ethics Committee at the University of Waterloo.

Methods

Participants

One hundred and ninety-four US working adults (99 female) were recruited via Amazon.com's Mechanical Turk (MTurk) to complete an online survey for payment (Buhrmester et al., 2011; Mason and Suri, 2012; Paolacci and Chandler, 2014; Landers and Behrend, 2015). One case had incomplete data and was not included in the analyses. Participants completed the survey in reference to their current job. Average age of participants was 39.78 (SD = 14.20); 69% of respondents were employed full-time in a broad range of occupations (e.g., service, professional, academic); mean organization tenure was 6.96 years (SD = 7.60); and the median income category was $30,000–$39,000.

Measures

Justice perceptions

We assessed employees' perceptions of justice in their current workplace over the past year, using Colquitt's (2001) 20-item scale. This scale comprises four items to assess employees' perceptions of distributive justice (e.g., "Do your outcomes reflect what you have contributed to the organization?"), seven items to assess procedural justice (e.g., "Have those procedures been free of bias?"), five items to assess informational justice (e.g., "Has your supervisor communicated details in a timely manner?"), and four items to assess interpersonal justice (e.g., "Has your supervisor treated you in a polite manner?"). All items were rated on 5-point scales (1 = *To a small extent* and 5 = *To a large extent*). Cronbach's α was 0.95 for distributive justice, 0.87 for procedural justice, 0.91 for informational justice, and 0.93 for interpersonal justice.

Employee deviance

We assessed employee deviance using a 15-item measure, with items from Bennett and Robinson (2000) and Jones (2009). Participants reported how frequently (1 = *Never*, 4 = *Sometimes*, 7 = *Daily*) they engaged in deviant workplace behaviors over the past year. Example items include: "Put little effort into your work," "Spent time on personal matters while at work." Cronbach's α for this measure was 0.91.

Control variables: Tenure, income, and gender

Employees provided demographic information including their age, and three other variables, for use as covariates in the primary regression analysis, following the recommendations of Becker (2005). First, we controlled employee tenure and income, given that these variables are likely to be correlated with employee age (e.g., Kooij et al., 2008), and may therefore serve as alternative explanations for our findings. For example, we wanted to rule out the possibility that instrumental needs become less relevant as employees age merely because such needs are already filled

by greater income or organizational tenure, which are associated with age. Similarly, we controlled participant gender, given past research indicating that men are more likely than women to engage in deviance (e.g., Hollinger and Clark, 1982; Hershcovis et al., 2007), to experience higher income and longer tenure (e.g., Lefkowitz, 1994; Schneer and Reitman, 1994), and may be less attentive to violations of relational needs (Schwartz and Rubel, 2005; Carothers and Reis, 2013).

Results

Preliminary Bivariate Correlations

As in prior research (see Colquitt et al., 2013), perceptions of informational and interpersonal justice were highly inter-correlated ($r = 0.719$, $p = 0.001$). Given that (a) these scales shared over 50% of the variance (Law et al., 1998) and (b) we had no theoretical reason to distinguish the two facets (Colquitt and Shaw, 2005; Ambrose and Schminke, 2009), we combined them into a composite to reduce multicollinearity in the analyses. Although distributive and procedural justice were also significantly inter-correlated, the subscales shared less than 50% of the variance, thus we maintained their distinction in the analyses.

At the bivariate level, distributive, procedural, and informational/interpersonal justice correlated significantly with employee deviance (see **Table 1**). Consistent with past research, the overall mean level of deviance was relatively low ($M = 1.97$, $SD = 0.83$); however, the distribution was not excessively skewed and was therefore left untransformed. Deviance correlated negatively with employee age, replicating past findings. As expected, gender, tenure, and income were each related to at least one of our focal variables, therefore we included them as covariates in the primary analyses.

Test of Hypotheses 1a and 1b: Does Employee Age Moderate the Relations between Justice and Deviance?

To test Hypotheses 1a and 1b, we conducted a hierarchical regression analysis with deviance as the criterion (see **Table 2**). Step 1 included the control variables, and explained a significant proportion of variance. Of the control variables, only employee gender predicted deviance. Step 2 included the focal mean-centered justice predictors and employee age; together these accounted for significant increment in variance explained. Distributive justice negatively predicted deviance; informational/interpersonal justice and procedural justice did not. As expected from past research, employee age negatively predicted deviance.

The three focal interaction terms were entered into Step 3 of the regression analysis and accounted for significant incremental variance. There was a significant interaction between employee age and distributive justice ($B = 0.010$, $SE = 0.003$, $t = 2.838$, $p = 0.005$, 95% CI [0.003, 0.017]), however, there was no significant interaction between employee age and procedural justice ($p = 0.833$). Hypothesis 1a was therefore partially supported. In support of Hypothesis 1b, employee age interacted with informational/interpersonal justice in predicting employee deviance ($B = -0.011$, $SE = 0.005$, $t = -2.351$, $p = 0.020$, 95% CI [−0.020, −0.002]).

As recommended by Aiken and West (1991), we plotted the interactions at one standard deviation above and below the mean on the predictors, and simple slopes were tested for significance (Dawson and Richter, 2006). Plotting interactions at one standard deviation on employee age is appropriate, as this represents employees at approximately 26 and 54 years of age (i.e., adequately representing younger and older employees in the workplace context; US Department of Labor, 2016). As shown in **Figure 2**, distributive justice was significantly related to deviance in younger employees ($t = -3.665$, $p < 0.001$), but not in older employees ($t = 0.187$, $p = 0.852$). Tests of simple effects showed that the effect of employee age at −1 *SD* on distributive justice was significant ($t = -3.869$, $p < 0.001$). Also, as shown in **Figure 2** informational/interpersonal justice was significantly related to deviance in older employees ($t = -3.610$, $p < 0.001$), but not in younger employees ($t = 0.216$, $p = 0.829$). Tests of simple effects showed that the effect of employee age at +1 *SD* on informational/interpersonal justice was significant ($t = -3.107$, $p = 0.002$). Importantly, the findings from Study 1 are independent of employee gender, income, and tenure[1].

STUDY 2

Study 1 provided some support for our conceptual model in which we reasoned that employee age would moderate the relations between different facets of justice and deviance. More specifically, we found partial support for Hypothesis 1a and full support for Hypothesis 1b: distributive justice predicted deviance in younger but not older employees, and informational/interpersonal justice predicted deviance in older but not younger employees. Unexpectedly, procedural justice did not interact with employee age.

The purpose of Study 2 was to replicate and extend Study 1 by examining the age-moderated mediating role of emotional exhaustion between justice perceptions and deviance (Hypotheses 2a–b and 3a–b). The fact that we predicted and observed two 2-way interactions in Study 1 renders common method variance an unlikely threat to the interpretation of the findings; nevertheless in Study 2, we utilized a two-wave survey format in which the focal variables were assessed at different times, to minimize the impact of common method variance by design (Podsakoff et al., 2003, 2012). In addition, given the consistent correlations between negative affect and employee reports of justice and deviance in the extant literature (Kaplan et al., 2009; Matta et al., 2014), consistent with other recent studies (e.g., Bobocel, 2013; Colquitt et al., 2015), we controlled for negative affect in Study 2 to increase validity. Controlling for

[1]Two extreme cases on deviance were observed (studentized residuals of 4.229 and 3.975) and excluded from the present analyses as outliers (Cohen et al., 2013, pp. 410–415). In follow up regressions with the outliers included, the distributive justice × age interaction remained statistically significant; the informational/interpersonal justice × age interaction was weaker ($p = 0.102$), albeit the same pattern. The differences may suggest that variables other than justice and employee age impact extreme levels of deviance.

TABLE 1 | Means (M), standard deviations (SD), and inter-correlations among study 1 variables.

Variable[a]	*M (SD)*	Age	Gender	Tenure	Income	Dist.	Proc.	Info./inter.	Dev.
Age	39.78 (14.20)								
Gender[b]	1.49 (0.50)	−0.089							
Tenure[c]	6.96 (7.60)	0.524***	−0.063						
Income (median)	US$ 30-39k (2.63[d])	0.272***	0.120	0.292***					
Dist.	3.55 (1.17)	0.022	0.016	0.075	0.218**	(0.95)			
Proc.	3.40 (0.89)	0.189**	−0.015	0.163*	0.213**	0.533***	(0.87)		
Info./inter.	3.96 (0.94)	0.144*	−0.172*	0.154*	0.168*	0.409***	0.581***	(0.94)	
Dev.	1.97 (0.83)	−0.203**	0.245***	−0.035	−0.026	−0.260***	−0.253***	−0.287***	(0.91)

Dist., distributive justice; Proc., procedural justice; Info./Inter., informational/interpersonal justice composite; Dev., Deviance. Reliability estimates (α) presented in parentheses on the diagonal. Income was assessed as individual income.
[a]N = 193. [b]1 = female 2 = male. [c] In years. [d] $10,000 increments.
**p < 0.05, **p < 0.01, ***p < 0.001.*

TABLE 2 | Unstandardized coefficients (standard error estimates in parentheses) from the hierarchical regression analysis predicting employee deviance in Study 1.

Predictor[a]	Step 1	Step 2	Step 3
Constant	1.486*** (0.183)	1.372*** (0.176)	1.449*** (0.176)
Gender[b]	0.348*** (0.108)	0.289** (0.103)	0.259* (0.102)
Tenure	0.002 (0.007)	0.014 (0.008)	0.013 (0.008)
Income	−0.020 (0.021)	0.011 (0.021)	0.007 (0.020)
Dist.		−0.123* (0.052)	−0.131* (0.051)
Proc.		−0.090 (0.076)	−0.084 (0.077)
Info./inter.		−0.093 (0.068)	−0.123 (0.068)
Age		-0.011* (0.004)	−0.010* (0.004)
Dist. × age			0.010** (0.003)
Proc. × age			0.001 (0.006)
Info./inter. × age			−0.011* (0.005)
R^2	0.054*	0.192***	0.246**
ΔR^2		0.138***	0.054**
ΔF	3.556*	7.847***	4.301**

All variables were mean centered. Dist., distributive justice; Proc., procedural justice; Info./Inter., informational/interpersonal justice composite.
[a]N = 191. [b]1 = female 2 = male.
**p < 0.05, **p < 0.01, ***p < 0.001.*

negative affect also helps to rule out common method variance as an alternative explanation for the results (Podsakoff et al., 2003).

Methods

Participants and Procedure

Two hundred and thirty-one US working adults were recruited via StudyResponse.net. StudyResponse.net is an academic organization that provides researchers with access to employees who participate in online research for pay, and has been used in prior psychological research (e.g., Piccolo and Colquitt, 2006; Bobocel, 2013; also see Landers and Behrend, 2015). Study 2 was administered in two sessions, separated by approximately 2 weeks. In the first session, employees provided demographic information including the control variables (to follow) as well perceptions of organizational justice in reference to their current job. In the second session, employees completed measures of emotional exhaustion and employee deviance. Forty-one participants from the first session failed to respond to the second session. Participants who failed to respond to the second did not differ significantly from those who completed both sessions on any of the focal predictors or control variables. Two participants submitted incomplete data and were not included in the analyses. In both sessions, we included two attention check items to assess careless responding (e.g., Meade and Craig, 2012). Five participants failed both items in at least one session and were therefore excluded from analysis, leaving a total sample of 183 (85 female), for a response rate of approximately 80%. Average age was 42.15 ($SD = 13.55$). All participants were employed full-time in a broad range of occupations (e.g., service, professional, academic), as in Study 1; mean tenure was 8.96 years ($SD = 8.04$), and the median income category was $70,000–79,000.

Measures

Perceptions of organizational justice

Colquitt's (2001) measure was used, as in Study 1. Cronbach's α was 0.94 for distributive justice, 0.91 for procedural justice, 0.94 for informational justice, and 0.93 for interpersonal justice.

Emotional exhaustion

Emotional exhaustion was measured using 6-items from Maslach and Jackson's (1981) emotional exhaustion scale (as per Wharton and Erickson, 1995). Items assessed the degree to which employees were exhausted over the past year from their workplace experiences (e.g., "I feel used up at the end of the day," "I feel frustrated by my job," "I feel burned out from my work"). All items were rated on a 7-point scale (0 = *Never felt this way* to 6 = *Feel this way every day*). Following Wharton and Erickson (1995), the items were summed; scale values range from 0 to 36. Cronbach's α was 0.94.

Employee deviance

In Study 1, we assessed deviance broadly. Although the results supported our predictions using this broad measure, we observed higher means (and larger standard deviations) on the subset of items that referenced the organization rather than the supervisor.

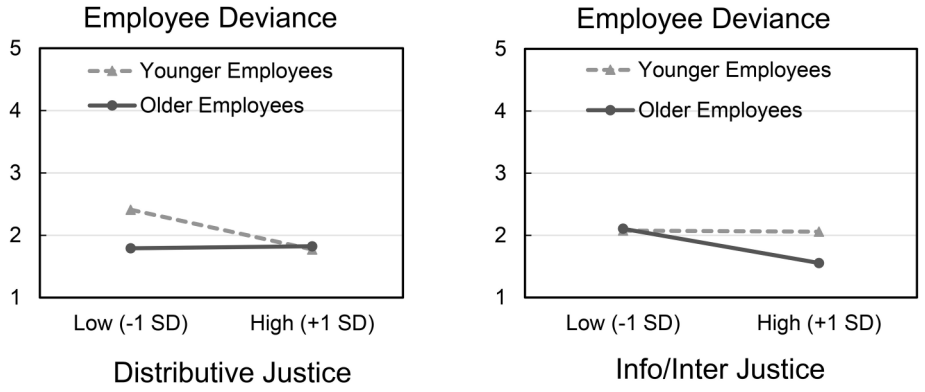

FIGURE 2 | (Left) Study 1 interaction between age and distributive justice on employee deviance (1–5), plotted at ±1 *SD* around the means on the continuous predictors. **(Right)** Study 1 interaction between age and informational/interpersonal justice on employee deviance, plotted at ±1 *SD* around the means on the continuous predictors.

The majority of these items assessed *production deviance* (see Spector et al., 2006)—the failure to perform job tasks effectively. Given this, and because of the theoretical connection between emotional exhaustion and below-peak performance, in Study 2 we focused on production deviance (7 items from Study 1, plus an additional item from Gruys and Sackett, 2003). Participants reported how frequently (1 = *Never*, 4 = *Sometimes*, 7 = *Daily*) they engaged in behaviors in the past year. Example items include: "Put little effort into your work," "Spent time on personal matters while at work," "Spent time on non-work related tasks" "Intentionally produced lower quality work than you are capable of." Cronbach's α for this measure was 0.94.

Control variables: Tenure, income, gender, and negative affect

As in Study 1, employees provided demographic information including their age, tenure, income, and gender, to be used as covariates in the primary regression analysis, following the recommendations of Becker (2005). In addition, we measured negative affect for use as a control variable in the analyses (see (Podsakoff et al., 2003; Kaplan et al., 2009)). Negative affect was measured using 5 items from Watson and Clark (1999). Participants reported the extent they felt in general: angry, irritable, hostile, upset, and distressed, on a 5-point scale (1 = *Not at all* to 5 = *Extremely*). Cronbach's α for this measure was 0.91.

Attention-check items

We included two "instructed response items" (e.g., Meade and Craig, 2012) in both the first and second sessions. Items requested participants to select a specific response (e.g., "Please select 'not true'"). To minimize false positives, we excluded cases from analyses only if participants failed both attention-check items in either survey).

Results

Preliminary Bivariate Correlations

As in Study 1, informational justice and interpersonal justice items were combined given their substantial overlap, $r = 0.781$, $p = 0.001$. Distributive justice and procedural justice were also highly inter-correlated, $r = 0.733$, $p = 0.001$, and thus combined into a single index[2].

As expected, at the bivariate level, negative affect was highly correlated with emotional exhaustion, deviance, distributive/procedural justice, and informational/interpersonal justice (**Table 3**), and therefore was controlled in all subsequent analyses. Deviance was significantly correlated with emotional exhaustion, informational/interpersonal justice, and marginally correlated with distributive/procedural justice. Emotional exhaustion was significantly correlated with both justice composites. As expected in light of our focus on production deviance, the mean level of deviance ($M = 2.31$) and standard deviation ($SD = 1.24$) were greater in Study 2 compared to Study 1. Employee age was again negatively associated with deviance. Given their correlations with the focal measures, we statistically controlled employee gender, tenure, and income in all subsequent analyses, as in Study 1.

Tests of Moderated Mediation Model: Does Employee Age Moderate the Indirect Effects (via Emotional Exhaustion) of Justice on Employee Deviance?

We used Hayes's (2013) PROCESS macro for SPSS (Model 8). We used Model 8 to provide a more stringent test of our hypotheses, by testing (and controlling) for age moderation of the direct path from justice to deviance. In follow up analyses with Model 7, which does not test or control for moderation of the direct effects, the effects reported below remain statistically significant. PROCESS calculates bias-corrected bootstrapped confidence intervals (95%) at 5,000 samples for each indirect effect. PROCESS conducts regression-based path analysis and creates product terms to analyze interaction effects, centering

[2] Although distributive and procedural justice were more highly inter-correlated in Study 2 than in Study 1, the magnitudes of association in the present research are within the range reported in recent meta-analytic reviews: $r_c = 0.61$; 95% CI: 0.35, 0.88 (Colquitt et al., 2013; also see Hauenstein et al., 2001).

TABLE 3 | Means (M), standard deviations (SD), and inter-correlations among study 2 variables.

Variable[a]	*M(SD)*	Age	Gender	Tenure	Income	Dist./proc.	Info./inter.	NA	EE	Dev.
Age	42.15 (13.55)									
Gender[b]	1.46 (0.50)	0.021								
Tenure[c]	8.97 (8.09)	0.527***	0.021							
Income (median)	US$ 70-79k (2.60[d])	−0.133	−0.183*	0.043						
Dist./proc.	3.49 (0.84)	−0.151*	−0.155*	0.010	0.230**	(0.95)				
Info./inter.	3.96 (0.90)	−0.219**	0.007	−0.101	0.126	0.570***	(0.94)			
NA	1.67 (0.77)	−0.115	−0.048	0.012	0.038	−0.213**	−0.271***	(0.91)		
EE	17.12 (7.50)	−0.113	0.054	−0.043	−0.126	−0.348***	−0.342***	0.664***	(0.94)	
Dev.	2.31 (1.24)	−0.192**	−0.128	−0.048	0.127	−0.125	−0.183*	0.672***	0.533***	(0.94)

Dist./Proc., distributive/procedural justice composite; Info./Inter., informational/interpersonal justice composite; Dev., Deviance; NA, negative affect; EE, emotional exhaustion. Reliability estimates (α) presented in parentheses on the diagonal. Income was inadvertently assessed as household (vs. individual income as in Study 1).
*[a]N = 183. [b]1 = female, 2 = male. [c]In years. [d]$10,000 increments. *p < 0.05, **p < 0.01, ***p < 0.001.*

TABLE 4 | Unstandardized regression coefficients with confidence intervals (standard errors in parentheses) estimating emotional exhaustion and employee deviance.

Variable[a]	Emotional exhaustion (*M*)		Employee deviance (*Y*)	
	Coeff.	**95% CI**	**Coeff.**	**95% CI**
Dist./proc. (*X*)	**−1.087 (0.593)**	**−2.258, −0.083**	−0.022 (0.106)	−0.187, 0.230
Emotional exhaustion (*M*)			**0.030 (0.014)**	**0.004, 0.057**
Employee age (*W*)	−0.044 (0.035)	−0.113, 0.026	−0.010 (0.006)	−0.022, 0.003
X × *W*	**0.094 (0.041)**	**0.012, 0.175**	−0.008 (0.007)	−0.022, 0.007
Gender	1.019 (0.790)	−0.541, 2.579	−0.215 (0.140)	−0.492, 0.062
Income	−0.206 (0.156)	−0.513, 0.101	0.049 (0.028)	−0.006, 0.103
Tenure	−0.011 (0.057)	−0.122, 0.101	0.001 (0.010)	−0.019, 0.021
Negative affect	**5.896 (0.531)**	**4.849, 6.944**	**0.864 (0.123)**	**0.621, 1.106**
Constant	7.160 (1.965)	3.281, 11.039	−0.313 (0.360)	−2.859, 2.045
	$R^2 = 0.545$		$R^2 = 0.503$	
	$F_{(9,172)} = 22.932$, $p < 0.001$		$F_{(10,171)} = 17.306$, $p < 0.001$	
	Direct effects Coeff./95% CI		**Indirect effects Coeff./95% CI**	
Younger employees	0.129 (0.149) [−0.166, 0.423]		**−0.071 (0.045) [−0.183, −0.007]**	
Older employees	−0.085 (0.142) [−0.366, 0.195]		−0.006 (0.027) [−0.045, 0.068]	

Direct and indirect effects are tested at ±1 standard deviation on employee age. Significant effects are presented in bold.
Dist./Proc., distributive/procedural justice composite. Info./Inter. and Info./Inter. × age terms are included as covariates, but are not presented here to save space. [a]N = 182.

the predictor variables prior to analysis. As PROCESS allows for a single predictor variable, we conducted two analyses, one for distributive/procedural justice, and the second for informational/interpersonal justice. We entered gender, tenure, income, and negative affect as controls (i.e., *covariates* in PROCESS; see Hayes and Preacher, 2014).

In the first test, we entered distributive/procedural justice as the predictor variable, employee age as the moderating variable, emotional exhaustion as the mediating variable, and deviance as the criterion. Consistent with Study 1, we entered informational/interpersonal justice and the age × informational/interpersonal justice product term as covariates in the model in order to control for their effect in the current analysis, thereby isolating the effect of distributive/procedural justice (see Hayes and Preacher, 2014).

Results are presented in **Table 4**. As expected, in support of Hypothesis 2a we found that employee age interacted with distributive/procedural justice to predict emotional exhaustion ($B = 0.094$, $SE = 0.041$, $t = 2.273$, $p = 0.024$, 95% CI [0.012, 0.175]). To illustrate the interaction, we conducted a hierarchical regression (with all Study 2 control variables), and plotted the slopes as in Study 1. As shown in **Figure 3**, distributive/procedural justice was negatively related to emotional exhaustion in younger employees ($t = -2.733$, $p = 0.007$), but not in older employees ($p = 0.821$). Tests of simple effects showed that the effect of employee age was significant at lower (−1 *SD*) distributive/procedural justice ($t = -2.526$, $p = 0.012$), but not at higher (+1 *SD*) distributive/procedural justice ($p = 0.478$). Employee age did not moderate the direct path from distributive/procedural justice

on deviance. Emotional exhaustion was a positive predictor of deviance. In support of Hypothesis 3a, we found a significant conditional indirect effect of distributive/procedural justice on deviance. Specifically, emotional exhaustion mediated the effect of distributive/procedural justice on deviance for younger but not older employees. We found no direct effects of distributive/procedural justice on employee deviance, indicating full mediation in this model. Hypothesis 3a was therefore accepted.

In the second test, we entered informational/interpersonal justice as the predictor variable, employee age as the moderating variable, emotional exhaustion as the mediating variable, and deviance as the criterion. As with the above analysis, we entered the control variables, as well as distributive/procedural justice and the age × distributive/procedural justice product term as covariates in the analysis.

Results are presented in **Table 5**. Consistent with the parallel analysis above, and as predicted by Hypothesis 2b, employee age interacted with informational/interpersonal justice to predict emotional exhaustion ($B = -0.080$, $SE = 0.041$, $t = -1.982$, $p = 0.049$, 95% CI [−0.160, −0.0003]). As shown in **Figure 3**, informational/interpersonal justice was related to emotional exhaustion in older employees ($t = -2.667$, $p = 0.008$), but not in younger employees ($p = 0.676$). Tests of simple effects showed that the effect of employee age was significant at higher (+1 *SD*) informational/interpersonal justice ($t = -2.286$, $p = 0.023$), but not at lower (−1 *SD*) informational/interpersonal justice ($p = 0.599$). Again, employee age did not moderate the direct path from informational/interpersonal justice on deviance. Emotional exhaustion was a positive predictor of deviance. In support of Hypothesis 3b, we found a significant conditional indirect effect of informational/interpersonal justice on deviance; specifically, emotional exhaustion mediated the relation between informational/interpersonal justice and deviance for older but not younger employees. We found no direct effect of informational/interpersonal justice on deviance, indicating full mediation in this model[3]. Hypothesis 3b was also accepted[4].

General Discussion

The current research drew on two previously separate theoretical frameworks—socioemotional selectivity theory of human aging (Carstensen, 1995) and the multiple needs model of justice (Cropanzano et al., 2001)—to derive novel hypotheses about whether and how employee age alters the effect of perceptions of justice on employees' experiences of emotional exhaustion and deviance. Overall, the findings from the present research support our conceptual model in which we posited that employee age would moderate the relations between justice, emotional exhaustion, and deviance. Given existing evidence of age-related changes in the salience of people's needs for instrumental control and relational belonging, we predicted that age would shape employees' sensitivity to particular facets of justice that are most likely to have instrumental value and relational value. Although deviance was found to be more frequent in general among younger vs. older employees (in line with past research, e.g., Berry et al., 2007), the present research also demonstrated that employees are differentially sensitive to different forms of justice as a function of their age. Specifically, distributive and procedural justice were significant predictors of deviance and emotional exhaustion for younger (but not older) employees, whereas informational and interpersonal justice predicted deviance and emotional exhaustion for older (but not younger) employees; unexpectedly, we found no interaction between employee age and procedural justice in Study 1 (to be discussed more later). Of note, our findings are independent of participant income, organizational tenure, gender, as well as the variance explained by individual negative affect.

Implications for the Literature on Employee Age and Organizational Sciences

In the present research, we integrated organizational justice theory with the literature on human aging. In so doing, we add to a growing body of research that demonstrates the important role of employee age for the organizational sciences in general (Baltes and Finkelstein, 2011; Bertolino et al., 2011; Tenhiälä et al., 2013; Henry et al., 2015; Scheibe et al., 2015; Zacher and Griffin, 2015), and in the study of justice processes more specifically (also see Bal et al., 2011). Our research showed that, in general, older employees engage less in employee deviance compared to their younger counterparts—but more novel, we also found that age shapes employees' sensitivity to workplace conditions, in this case, fairness-related experiences. Although fair treatment is relevant to employees of all ages, our findings suggest significant differences in the type of justice to which employees are especially sensitive. Younger employees are more sensitive than older employees to justice that fulfills needs for instrumental control, whereas older employees are more sensitive to justice that fulfills needs for relational belonging. As noted earlier, our findings are not accounted for by age-related differences in income, workplace tenure, or gender. Thus, they are consistent with research on human aging that has documented age-related changes in the salience of people's needs for instrumental control and relational belonging.

Implications for the Literature on Organizational Justice and Employee Deviance

The present research has several important implications for research on organizational justice and employee deviance.

[3]One extreme case on emotional exhaustion was observed (studentized residual of 3.406) and excluded from the present analyses as an outlier (Cohen et al., 2013, pp. 410–415). In follow up PROCESS moderated mediation tests with the outlier included, the distributive justice × age interaction was slightly weaker ($p = 028$); the informational/interpersonal justice × age interaction was slightly stronger ($p = 0.047$).

[4]Spector et al. (2006) argued that deviance falls into several "types" that are differentially, and even multiply, determined. Whereas we predicted that production deviance should be associated with emotional exhaustion, other types of deviance (e.g., abuse, theft) are likely to be determined by additional factors such as the desire for revenge (e.g., Jones, 2009). Moreover, drawing on socioemotional selectivity theory, older employees should be especially unlikely to engage in anti-social types of deviance. Nevertheless, in Study 2, we also assessed some of these types of deviance (e.g., peer-abuse, supervisor-abuse, theft) to explore whether our model would hold. Interestingly, follow up tests of moderated mediation revealed that indeed emotional exhaustion was not a significant mediator for these other types of deviance. Supplementary analyses are available on request from the first author.

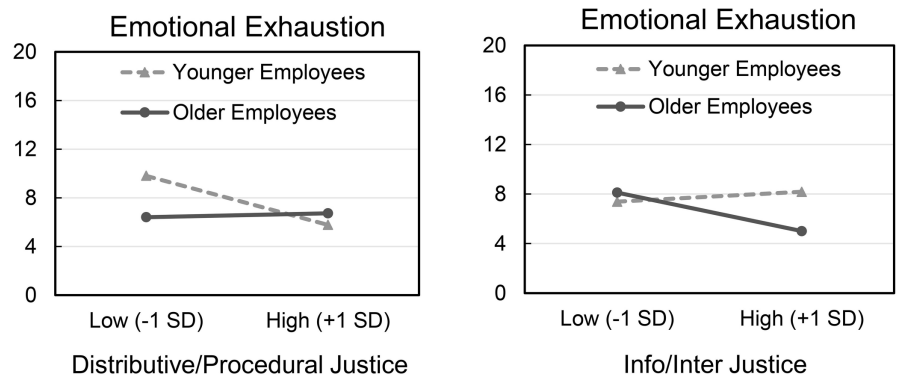

FIGURE 3 | (Left) Study 2 interaction between age and distributive/procedural justice on emotional exhaustion (0–36), plotted at ±1 *SD* around the means on the continuous predictors. **(Right)** Study 2 interaction between age and informational/interpersonal justice on emotional exhaustion, plotted at ±1 *SD* around the means on the continuous predictors.

TABLE 5 | Unstandardized regression coefficients with confidence intervals (standard errors in parentheses) estimating emotional exhaustion and employee deviance.

Variable[a]	Emotional exhaustion (*M*)		Employee deviance (*Y*)	
	Coeff.	**95% CI**	**Coeff.**	**95% CI**
Info./inter. (*X*)	−0.641 (0.636)	−1.897, 0.614	−0.026 (0.113)	−0.249, 0.196
Emotional exhaustion (*M*)			**0.030 (0.014)**	**0.004, 0.057**
Employee age (*W*)	−0.046 (0.035)	−0.115, 0.024	−0.010 (0.006)	−0.022, 0.003
X × *W*	**−0.080 (0.041)**	**−0.160, −0.000**	0.002 (0.007)	−0.013, 0.016
Gender	1.019 (0.790)	−0.541, 2.579	−0.215 (0.140)	−0.492, 0.062
Income	−0.206 (0.156)	−0.513, 0.101	0.049 (0.028)	−0.006, 0.103
Tenure	−0.011 (0.057)	−0.122, 0.101	0.001 (0.010)	−0.019, 0.021
Negative affect	**5.896 (0.531)**	**4.849, 6.944**	**0.864 (0.123)**	**0.621, 1.106**
Constant	10.953 (2.898)	5.233, 16.673	0.238 (0.533)	−0.814, 1.289
	$R^2 = 0.545$		$R^2 = 0.503$	
	$F_{(9, 172)} = 22.932$, $p < 0.001$		$F_{(10, 171)} = 17.306$, $p < 0.001$	
	Direct effects Coeff./95% CI		**Indirect effects Coeff./95% CI**	
Younger employees	−0.052 (0.182) [−0.411, 0.308]		−0.014 (0.042) [−0.065, 0.100]	
Older employees	−0.001 (0.108) [−0.214, 0.212]		**−0.053 (0.028) [−0.123, −0.009]**	

Direct and indirect effects are tested at ±1 standard deviation on employee age. Significant effects are presented in bold.
Info./Inter., informational/interpersonal justice composite. Dist./proc. and dist./proc. × age terms are included as covariates, but not presented here to save space. [a]*N = 182.*

Although past research has demonstrated a reliable negative relation between organizational justice and deviance (Cohen-Charash and Spector, 2001; Colquitt et al., 2001, 2013; Dalal, 2005; Berry et al., 2007), we advance the literature by demonstrating that different facets of justice relate to production deviance for younger and older employees. Similarly, whereas past research has long argued for the mediating role of emotional exhaustion in the association between justice and deviance, only a few recent studies have examined this relation empirically (e.g., Matta et al., 2014). In Study 2, we found that the negative relation between justice and production deviance can be explained through the effect of justice on emotional exhaustion. Moreover, employee age moderated this mediated effect: Older employees were more emotionally exhausted and in turn less effective performers when they perceived lower informational-interpersonal justice; in contrast, younger employees were more emotionally exhausted and in turn less effective when they perceived lower distributive/procedural justice. A recent meta-analysis revealed a broad range in effect sizes for different facets of justice and employee deviance (Colquitt et al., 2013), which could indicate the presence of significant uninvestigated moderators. The current research suggests that employee age may be one such moderator and reveals the existence of a more complex set of relations between justice, emotional exhaustion, and production deviance than previously known, relations that may be obscured without considering employee age. Thus, these studies contribute to a growing body of work showing the importance of investigating the effect of employee age in organizations, in particular showing the importance of considering age differences in the

organizational justice research. In fact, whereas most justice research has treated employee age as a control variable, in the current research we demonstrate that employee age can dramatically alter the relations between different experiences of justice and important organizational outcomes.

Our findings also have broader implications for justice theory. In particular, they provide indirect support for the multiple needs model of justice (Cropanzano et al., 2001), which suggests that justice fulfills needs for instrumental control and relational belonging (also see Lind, 2001), and that different fairness-related experiences may be especially relevant for satisfying these needs. In this way, the present research may provide a conceptual framework for future research examining differential effects of justice facets. To the extent that distributive and procedural justice have greater instrumental value relative to informational and interpersonal justice, whereas the latter have greater relational value, then other factors (e.g., certain leadership styles) that increase the salience of employees' instrumental vs. relational needs should moderate the impact of the justice facets, as we observed in the present research.

Strengths and Limitations

A key strength of the present research is the general convergence in findings across the two studies. Study 2 was designed as a constructive replication of Study 1, which allowed us to determine whether similar results would be observed within a different sample of employees and with a different survey design (time lagged vs. cross-sectional). As well, Study 2 extended Study 1 by examining mediation of the moderating effect of age. Although procedural justice did not have the expected role in Study 1, the results were similar, and in line with our conceptual model. Moreover, in Study 2, age did not moderate the direct path from justice to deviance when emotional exhaustion was included; nevertheless, our higher-order moderated mediation model was supported. Future research should investigate the conditions under which age determines the direct relations between justice and organizational outcomes.

Our research also has some key limitations. First, the data are correlational, and therefore causal inference is not permitted. Nevertheless, the results are consistent with our conceptual model, which we derived by integrating theory and prior research in different domains, justice, emotional exhaustion, deviance, and the psychology of aging. Moreover, in Study 2, we took steps to reduce third-variable alternative explanations, including using a two-wave study design and controlling for negative affect. Still, future research is needed to replicate our findings using experimental or longitudinal research designs, which enable causal inference among the variables.

In addition, employees may have exaggerated reports of unfairness and underreported the frequency of deviance given that our measures are self-reported. However, preliminary examination of the data revealed that responses to all measures in both studies were normally distributed and not excessively skewed; since responses were anonymous, threat of inflated or deflated reports is reduced (see Berry et al., 2012). Furthermore, our methods followed precedent in the measurement of justice, emotional exhaustion, and deviance. In particular, researchers have suggested that self-reports of deviance can be more reliable than other-reports because deviant behaviors are more likely to be acted out in private (e.g., Fox et al., 2007; Jones, 2009). Indeed, a recent meta-analysis comparing other- vs. self-reported deviance showed moderate-to-strong relations between the two, and recommended that self-reports are appropriate in most cases (Berry et al., 2012).

Unanswered Questions for Future Research

Our research also raises questions for future research. First, we hypothesized that employee age would moderate the relations between justice perceptions and psychological and behavioral outcomes due to age-related changes in the relative salience of basic psychological needs. Although we derived our hypotheses from existing theory and research, we did not assess the relative salience of instrumental and relational needs in the present research. Given this, we cannot make firm conclusions regarding the underlying role of psychological needs from the present research. Whereas the pattern of our data, the double dissociations in particular, are consistent with the underlying theory, it is necessary in future research to investigate directly the extent to which the salience of needs (e.g., across time or contexts) shapes employees' sensitivity to fairness.

Second, the theory guiding our research suggested that distributive and procedural justice should have similar effects, given their instrumental value to employees, as should informational and interpersonal justice, given their relational value. Thus, we had no reason *a priori* to separate the former, nor the latter justice facets. Nevertheless, in Study 1, distributive and procedural justice were only moderately inter-correlated, therefore, on empirical grounds we analyzed them separately, demonstrating the predicted effects for distributive but not procedural justice. In a follow up analysis, we created a distributive/procedural justice composite and re-ran the regression predicting deviance. Here, we found a significant and nearly identical interaction ($t = 2.819$, $p = 0.005$) with employee age, as reported in Study 2. Thus, although distributive and procedural justice were not as highly inter-correlated in Study 1 compared to Study 2, the findings are the same as in Study 2 when we combine them in the analysis. This supplementary analysis is supportive of Hypothesis 1a, but the inconsistency in results across the two studies—in particular, the differences in magnitude of inter-correlation between distributive and procedural justice—is a limitation (but see Footnote 2). Future research is needed to better understand under what circumstances, and to what extent, employee age alters the effect of different justice facets.

Third, whereas Study 1 used a broad measure of deviance, in Study 2 we focused on production deviance specifically. We made this adjustment in Study 2 because production deviance is more frequent than the more anti-social types of deviance (e.g., abuse, theft), especially among older employees. Furthermore, whereas emotional exhaustion should be sufficient to impair employees' ability to maintain appropriate job-related behavior, we expected that the more anti-social types of deviance may require additional motivational mechanisms, such as the desire for revenge (see Footnote 4). Thus, we reasoned that production deviance would be especially pertinent to our model. Although this adjustment provided greater specificity in Study 2, the

inconsistency between the two studies remains. Future research is needed to examine whether employee age also alters the effect of justice on motivational mechanisms such as the desire for revenge, which tend to amplify the more anti-social types of deviance.

Fourth, we measured employees' perceptions of justice using an established measure, which assesses the extent to which respondents perceive that particular normative rules are upheld. Recent research suggests the utility in also assessing perceived *injustice*, that is, the extent to which respondents perceive that normative fairness rules are violated (e.g., Colquitt et al., 2015). Future research is needed to explore whether and the extent to which employee age also moderates the effects of perceived injustice. For example, it may be the case that older workers, although better able to suppress deviance in general, are more sensitive than younger workers to injustice, potentially because people become more motivated to pursue prosocial experiences as they age. In this case, the differences in reactions between younger and older employees to *injustice* may be even more pronounced than those we observed here.

Considering injustice may also have implications for studying the more anti-social types of deviance, discussed earlier. That is, given that people experience losses more intensely than gains (e.g., Kahneman and Tversky, 1979) justice violations should be experienced more intensely than justice adherence. As such, justice violations would be more likely to motivate the anti-social types of deviance. Indeed, Colquitt et al. (2015) found initial evidence that injustice explained incremental variance beyond justice on one type of anti-social deviance (i.e., supervisor-directed deviance). Thus, it is possible that our present conceptual model would also apply to the more anti-social types of deviance, when assessing injustice as the predictor. Future research should continue to test the differential effects of justice and injustice experiences on the varieties of employee deviance.

Finally, future research should examine other personal or situational factors that affect the salience of employees' instrumental relative to relational needs that may moderate the impact of the different facets of justice, similar to our findings with employee age. For example, personality characteristics (e.g., strong other-orientation), may relate to greater needs for relational belonging, and therefore to greater sensitivity to informational and interpersonal justice, relative to distributive and procedural justice. Importantly, much research in psychology has demonstrated that individuals' self-identities can shift as a function of situational factors (e.g., Markus and Kitayama, 1991; Turner et al., 1994). For example, employees' collective (other-oriented) self-identity is heightened in the presence of charismatic vs. transactional leadership (see Paul et al., 2001; Zdaniuk and Bobocel, 2015). Thus, it is possible that justice may have differential effects *within*-person, depending on the context. Future research is needed to examine differential justice effects both between and within-person.

Practical Implications

Our findings have practical importance for organizational policy and decision-making. In particular, whereas managers need to understand the importance of distributing outcomes fairly and using fair decision-making procedures, our results suggest that they also need to recognize the increasing importance of ensuring informational and interpersonal justice, within the context of an aging workforce. The current findings also highlight that, despite the importance of all forms of fair treatment, it is important to consider the "fit" between fairness-related policies and employee age. Specifically, equitable pay and fair procedures may be insufficient to satisfy older employees, in the context of an organizational climate that fails to emphasize respectful treatment. Similarly, a respectful climate may be insufficient to satisfy younger workers, in the context of relatively less equitable pay.

Beyond implications for fairness-related policies, the findings could have implications for the success of any policies that fulfill employees' instrumental or relational needs, given that reactions to such policies might differ as a function of employee age. In particular, by considering age-related changes in the salience of needs, practitioners may gain insight into why such policies are (or are not) effective. It may also suggest ways to make certain that policies appeal to a broader range of employees. For example, past research showed that older employees are less motivated than younger employees to participate in training programs (Kooij et al., 2011); drawing on the present findings, it is possible that this may be because organizations mainly promote such programs by referencing their instrumental value for career advancement, which may appeal less to older employees. Rather, organizations might increase the appeal of training programs among older employees by highlighting the relational value of training. For example, practitioners could emphasize that training can provide opportunities for older employees to mentor junior colleagues, which may be appealing in light of their older employees' orientation toward generativity. Thus, by considering employee age and age-related changes in the salience of instrumental vs. relational needs, practitioners may be better able to manage a number of organizational policies.

CONCLUSION

By integrating socioemotional selectivity theory, research of human aging, and the multiple needs theory of justice, we developed and tested a novel, more nuanced understanding of the relations among organizational justice, emotional exhaustion, and employee deviance. Whereas fairness is relevant to employees of all ages, our findings suggest that there are significant differences in the type of justice to which employees are especially sensitive, as a function of age. Overall, our research has scientific and practical value, and contributes to a growing literature aimed at better understanding and improving important workplace phenomena by considering employee age.

ETHICS STATEMENT

The present research was conducted as part of JB's master's degree. This research was carried out in accordance with the

recommendations of the Human Research Ethics Committee at the University of Waterloo, with written informed consent in accordance with the Declaration of Helsinki.

AUTHOR CONTRIBUTIONS

JB provided the initial study concept. JB and DB contributed to the design. JB collected the data and conducted data analysis in collaboration with DB. JB drafted the manuscript. DB and JB revised manuscript and approved final copy for submission.

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The Curvilinear Relationship between Age and Emotional Aperture: The Moderating Role of Agreeableness

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The capability to correctly recognize collective emotion expressions [i.e., emotional aperture (EA)] is crucial for effective social and work-related interactions. Yet, little remains known about the antecedents of this ability. The present study therefore aims to shed new light onto key aspects that may promote or diminish an individual's EA. We examine the role of age for this ability in an online sample of 181 participants (with an age range of 18–72 years, located in Germany), and we investigate agreeableness as a key contingency factor. Among individuals with lower agreeableness, on the one hand, our results indicate a curvilinear relationship between age and EA, such that EA remains at a relatively high level until these individuals' middle adulthood (with a slight increase until their late 30s) and declines afterward. Individuals with higher agreeableness, on the other hand, exhibit relatively high EA irrespective of their age. Together, these findings offer new insights for the emerging literature on EA, illustrating that specific demographic and personality characteristics may jointly shape such collective emotion recognition.

Keywords: age, emotional aperture, emotion recognition, group emotions, agreeableness

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INTRODUCTION

Correctly recognizing and deciphering others' emotion expressions is an important interpersonal skill that critically shapes social functioning (Carstensen et al., 1997; Keltner and Kring, 1998). With emotional cues providing information about individuals' feelings, opinions, and intentions, the ability to assess and interpret others' emotions helps to create effective and harmonious social interactions and, thus, is vital for success in interpersonal communication (e.g., Byron, 2007; Isaacowitz et al., 2007).

Recent theory suggests that it is often important to grasp not only other *individuals*' emotion displays, but to simultaneously assess the emotions expressed by a group of others (Sanchez-Burks and Huy, 2009). Such "emotional aperture" (EA) reflects the ability to recognize a group's overall emotional composition by focusing on the global picture of diverse emotion expressions within a collective (Sanchez-Burks and Huy, 2009; see also Navon, 1977). With group and team structures permeating many modern organizations (Kozlowski and Ilgen, 2006) and groups' emotional setup shaping important processes and outcomes (George, 1996; Barsade et al., 2000; Walter and Bruch, 2008), the capacity to accurately decipher collective emotionality is likely to be critical for employees' functioning. Accordingly, research has illustrated EA as a unique capability (distinct from individual emotion recognition) that relates with important behaviors and outcomes in organizations (e.g., leaders' transformational behavior toward their followers; Sanchez-Burks et al., 2016).

Considering these consequences of EA, it is highly relevant to understand why some individuals may be better at recognizing collective emotion expressions than others. Research has only started to focus on EA's antecedents, however. While initial results have linked this ability with an individual's tendency toward global (rather than local) information processing (Sanchez-Burks et al., 2016), we are not aware of other empirical studies that have examined EA's origins. Hence, our conceptual and empirical knowledge about this construct remains cursory and one-sided. To advance the emerging literature on collective emotion recognition, it is important to complement the existing studies with a distinctly antecedent-focused perspective. The present study sets out to address this issue by empirically examining key factors that may promote or diminish an individual's EA.

We specifically focus on individuals' age as a potential influencing factor in this regard. With increasing life expectancies and later retirement ages across most industrialized nations, scholars have identified aging populations and workforces as being among the most prevalent demographic developments in recent decades (Hedge et al., 2006; Burger et al., 2012). Moreover, theory and research have repeatedly linked a person's age with his or her ability to correctly decipher other individuals' emotions (for a review, see Doerwald et al., 2016). It seems important, therefore, to examine whether such age-related changes may extend beyond individual emotion recognition to shape EA as well.

Interestingly, theory and research on cognitive developments across the adult lifespan point toward considerable ambiguity about the likely shape of the age-EA linkage. On the one hand, age-related growth in "crystallized" knowledge and experiences (Baltes, 1987; Ackerman and Lohman, 2006) may improve individuals' capacity for collective emotion recognition over time. On the other hand, age-related declines in "fluid" cognitive competencies (Birren and Fisher, 1995; Salthouse, 2010) and global information processing (Oken et al., 1999) may aggravate EA, particularly among older (rather than young or middle-aged) adults. Consequently, we believe a wider theoretical approach is required to provide greater clarity on the age-EA association, integrating such cognitive explanations with a motivational perspective.

Indeed, besides cognitive capabilities, research has shown that correctly identifying other individuals' emotions requires an actor's motivation to attend to others' emotion expressions (Buck, 1988; Marsh and Blair, 2008). Generalizing this notion toward EA, we propose that individuals are more likely to use their cognitive potentials to decipher group emotions to the extent they are interested in others. Logically, then, the role of age for EA should critically hinge on personality characteristics that shape this motivational orientation, and we argue that an individual's agreeableness is particularly relevant in this regard (Costa et al., 1991). As a broad, overarching trait, agreeableness subsumes several features that closely relate with one's concern for others and their feelings, including the tendency to be altruistic, caring, prosocial, and emotionally supportive (Digman, 1990; McCrae and John, 1992), and meta-analytic evidence has illustrated positive relationships between agreeableness and individual emotion recognition (Mayer et al., 2004; Joseph and Newman, 2010).

Building on this backdrop, our overall conceptual model casts agreeableness as a key moderator for the relationship between age and EA. By empirically testing this model in an age-diverse sample of 181 individuals, we strive to advance the nascent literature on collective emotion recognition, offering new insights into the role of key individual differences as antecedent conditions that may shape an individual's respective ability. Beyond extending our knowledge about the origins of EA, we thereby aim to provide a novel, differentiated perspective on the role of age for EA (and, potentially, for emotion recognition in general), illustrating that a full understanding of age-related changes in this regard requires careful consideration of relevant personality characteristics as motivational boundary conditions.

Theory and Hypothesis Development

The Construct of Emotional Aperture

Research has long investigated the ability to correctly recognize other *individuals*' emotion expressions (e.g., Rosenthal et al., 1979; Ekman, 2003), and a broad number of studies have identified both antecedents and consequences in this regard (for a review, see Elfenbein et al., 2002). The EA construct, by contrast, has been introduced more recently and, accordingly, the respective literature is in a more nascent state (Sanchez-Burks and Huy, 2009). Building on prior research on group emotions (e.g., George, 1990; Barsade et al., 2000), EA reflects "a person's ability to recognize the dynamic emotional composition of a collective" (Sanchez-Burks and Huy, 2009, p. 25). As such, EA extends beyond deciphering individual members' emotion displays toward identifying the distribution and potential heterogeneity of the emotion expressions within a group as a whole.

Consequently, scholars have emphasized that EA is both conceptually and empirically distinct from individual emotion recognition (Sanchez-Burks and Huy, 2009). In fact, a strong capacity to identify individual emotions may not suffice for an accurate assessment of a group's overall affective composition, because the fleeting nature of affective cues may make it virtually impossible to consecutively process each member's expressions in real time and to then aggregate these cues to the group level (Sanchez-Burks et al., 2016). Rather than representing a mere extension of individual emotion recognition, EA therefore "can be understood as using a global, or holistic processing style for encoding collective affective cues" (Sanchez-Burks et al., 2016, p. 119). Moreover, whereas measures of individual emotion recognition typically capture the ability to identify discrete emotions (e.g., anger, happiness; Nowicki and Duke, 1994), EA is assessed through the capacity to detect the distribution of positive vs. negative emotion expressions in a group (Sanchez-Burks et al., 2016). Not surprisingly, then, research has shown that (a) EA is only moderately correlated with individual emotion recognition and (b) EA exhibits incremental predictive validity for important organizational outcomes, over-and-above individual emotion recognition (Sanchez-Burks et al., 2016).

The Ambiguous Relationship between Age and Emotional Aperture

Lifespan theorists have pointed toward two potentially countervailing mechanisms that appear relevant for explicating the relationship between age and EA, arguing that age-related patterns of growth and decline may critically shape individuals' social cognitions and perceptions (Phillips et al., 2002, 2008). On the one hand, certain ("crystallized") cognitive abilities may follow a growth trajectory as individuals age, for example due to accumulated knowledge and experiences (Horn and Cattell, 1967; Baltes et al., 2006). Such learning effects may benefit one's emotional competencies (Carstensen et al., 2000; Magai, 2001). For example, individuals' knowledge about emotions may become more accurate and differentiated as they get older (Labouvie-Vief, 2003), enabling them to deal with emotional issues in a more efficient and automatized manner that requires less conscious effort (Suzuki and Akiyama, 2013; Morgan and Scheibe, 2014). Consequently, older individuals may become more adept at correctly deciphering both individual (Dougherty et al., 1996; Suzuki et al., 2007; Sze et al., 2012) and group emotions, suggesting a potentially positive linkage between age and EA.

On the other hand, another set of ("fluid") cognitive abilities (including perceptual speed and working memory capacity) follow an age-related decline trajectory (Horn and Cattell, 1967; Salthouse, 2010). Emotion recognition critically requires such fluid capabilities, because it hinges on the quick and accurate recognition and discrimination of audio-visual details, identification of characteristic patterns, and comparison of these patterns with prototypes stored in memory (Adolphs, 2006; Suzuki and Akiyama, 2013). Hence, from this perspective, it is logical to assume that emotion recognition will deteriorate as individuals get older. In fact, the majority of the studies on age and individual emotion recognition support this negative association (e.g., Sullivan and Ruffman, 2004; Salthouse and Davis, 2006; Ruffman et al., 2008).

More specifically, lifespan research has illustrated that the declining age trend for many fluid cognitive capacities follows a curvilinear pattern (Horn and Donaldson, 1980; Hartshorne and Germine, 2015). These capacities generally remain relatively stable (or even increase) until about middle adulthood and diminish rather steeply afterward (Myerson et al., 2003; Hedden and Gabrieli, 2004). Consequently, scholars have argued that the negative linkage between age and individual emotion recognition may follow a curvilinear pattern as well, such that this ability may slightly improve during young and middle adulthood and decrease at older age (Williams et al., 2009; Doerwald et al., 2016). We believe this argumentation directly generalizes toward EA. In fact, EA may impose even greater demands on fluid cognitive competencies, as compared with individual emotion recognition, requiring an actor to simultaneously perceive and encode *multiple* group members' emotional cues and to quickly integrate these – potentially diverse or even contradictory – stimuli into appropriate emotion categories in real time (Sanchez-Burks and Huy, 2009). Hence, age-related deficits in fluid cognition may yield a negative, curvilinear association between age and EA.

Additionally, as noted before, EA (rather than individual emotion recognition) uniquely requires a global, holistic style of information processing to decipher the emotionality expressed in a group as a whole (Sanchez-Burks et al., 2016). Despite some contradictory findings (e.g., Roux and Ceccaldi, 2001; Georgiou-Karistianis et al., 2006), a substantial body of research has illustrated cognitive impairments among older (as compared with younger) individuals when processing global stimuli (e.g., Slavin et al., 2002; Staudinger et al., 2011; Lithfous et al., 2016). In fact, some scholars have concluded that there may be a general shift from global toward local processing precedence with increasing age (Oken et al., 1999; Lux et al., 2008). Moreover, although this literature has rarely examined curvilinear relations, a study by Schwarzer et al. (2010) points toward this possibility, illustrating the holistic processing of facial stimuli to increase from childhood to young adulthood but to decrease afterward. Hence, beyond fluid cognitive decline, age-related detriments in global information processing may further contribute to a negative, curvilinear linkage between age and EA.

Taken together, these arguments lead to contradictory conclusions about the possible relationship between age and EA: improvements in crystallized cognition may promote this ability as individuals get older, while detriments in fluid cognition and global processing may induce curvilinear decline over time. To resolve this theoretical ambiguity, we believe it is vital to consider moderating factors in the age-EA association. Whereas the above argumentation is largely cognition-based, in particular, scholars have noted that emotion recognition also hinges on the extent to which individuals are interested in others and, thus, are motivated to attend to others' emotion expressions and to utilize their cognitive potentials in this regard (Batson and Shaw, 1991; Goetz et al., 2010). On this basis, we integrate arguments from the lifespan literature with theory and research on personality and its underlying motivations (McCrae and John, 1992; Stanley and Isaacowitz, 2015) to propose individuals' agreeableness as a key boundary condition for the age-EA linkage.

The Moderating Role of Agreeableness

As a broad dimension within the Big Five personality taxonomy (John and Srivastava, 1999), agreeableness centers around individuals' concern for others and their tendency to value harmonious social relations (Digman, 1990; McCrae and John, 1992). Highly agreeable individuals are good-natured, cooperative, warm, and trusting, and they tend to empathize with others' feelings (Graziano et al., 2007; Robbins et al., 2010). On this basis, it seems logical to assume that persons with relatively high agreeableness are motivated to not only attend to other individuals' emotions (and, thus, exhibit superior individual emotion recognition; Joseph and Newman, 2010), but also to grasp the overall emotionality within relevant groups, aiding them to more smoothly navigate social interactions (cf. Sanchez-Burks and Huy, 2009). As such, we anticipate agreeableness to moderate the role of individuals' age for their EA.

Among relatively agreeable individuals, we expect strong EA levels during young and middle adulthood. Given their deep interest in others and their tendency toward empathic concern (Melchers et al., 2016), these individuals may benefit from

frequent and intense experiences with collective emotions even at a relatively young age, enabling them to quickly build an extensive knowledge base about group emotionality. In addition, these individuals should be willing to devote large parts of their fluid cognitive capacities toward deciphering collective emotion expressions, in an effort to facilitate and maintain harmonious group relations (cf. McCrae and Costa, 1987). As noted before, research has shown these capacities to be particularly pronounced among young and middle-aged adults (Salthouse, 2004; Hartshorne and Germine, 2015).

Moreover, although highly agreeable persons are likely to experience declines in fluid cognition and global processing during older adulthood (Salthouse, 2010; Staudinger et al., 2011), we believe their EA is less likely to suffer from these developments than among less agreeable individuals. Importantly, agreeable persons tend to maintain a strong interest in other individuals and groups throughout their lifespan (Donnellan and Lucas, 2008), potentially enabling a continued pattern of growth in their crystallized knowledge about dealing with emotional situations and deciphering emotional cues. Such learning effects may be particularly important for EA, given the complexity, diversity, and subtlety of collective emotion expressions (Sanchez-Burks and Huy, 2009; see also Walter et al., 2013). In fact, as noted before, accurate and differentiated emotional knowledge may allow individuals to deal with emotional situations and process affective cues in a rather routinized manner that requires little cognitive resource investment (Adolphs, 2002; Scheibe and Carstensen, 2010). Hence, we anticipate that accumulating experiences with group emotions will enable highly agreeable individuals to (at least partially) compensate for age-related cognitive declines, such that their EA should remain relatively stable even during older adulthood.

Individuals with relatively low agreeableness, by contrast, have a tendency toward self-centeredness and indifference for other persons, and they tend to exhibit little concern for others' feelings and to attach low value to social harmony (Digman, 1990; McCrae and John, 1992). Hence, we expect a pronouncedly different pattern for the age-EA relation among less rather than more agreeable persons. During young adulthood, EA may remain relatively low among less agreeable individuals. These individuals' knowledge and experiences about collective emotion expressions should accumulate more slowly than among their more agreeable counterparts, because their lack of empathic interest is likely to limit the frequency and intensity of their exposure to emotional group situations (cf. Habashi and Graziano, 2007). Also, despite abundant fluid cognitive capacities (Salthouse, 1996) and a tendency toward global processing during younger adulthood (Oken et al., 1999; Schwarzer et al., 2010), less agreeable individuals may lack the motivation to invest these potentials for effectively reading group emotions.

Moving from young toward middle adulthood, individuals with relatively low agreeableness may exhibit a slight increase in EA. During this age period, even less agreeable persons may benefit from accumulating experiences with other individuals' and groups' emotion expressions, because social life in general (Carstensen et al., 2000), and group interactions in particular (George, 1996), inevitably entail many emotion-laden encounters. Hence, crystallized knowledge about relevant affective cues and collective emotionality may increase even among low-agreeableness individuals as they approach middle adulthood – although such emotional learning may remain somewhat limited due to their lack of empathy and social interest (McCown et al., 1988). At the same time, substantive declines in fluid cognition and global processing that could be detrimental for EA are unlikely to already manifest at this age (Salthouse, 2010; Schwarzer et al., 2010).

Finally, we expect a steep drop in EA among less agreeable individuals as they progress from middle toward older adulthood. As noted before, individuals generally start to experience pronounced losses in fluid cognition and global processing at this point (Oken et al., 1999; Salthouse, 2010). Due to their lack of empathic interest in others' feelings (Digman, 1990; Côté et al., 2011), persons with lower agreeableness may find it more difficult, as compared to their high-agreeableness counterparts, to compensate for such declines through the pronounced and continued accumulation of emotional knowledge. Consequently, they should less strongly benefit from experience and learning effects about deciphering collective emotionality at higher age, and the detrimental role of cognitive declines for EA may therefore prevail to a larger extent. All in all, we therefore predict the relationship between age and EA to follow a curvilinear pattern among individuals with less agreeableness, with relatively low EA levels during younger and older adulthood and a temporary peak around middle adulthood.

Taken together, this rationale suggests a curvilinear interaction model for the age-EA linkage, with agreeableness representing a key contingency factor. Accordingly, we hypothesize:

Hypothesis 1: Agreeableness moderates the curvilinear relationship between age and emotional aperture (EA). For individuals with higher agreeableness, EA remains relatively pronounced irrespective of their age. For individuals with lower agreeableness, the age-EA relation exhibits an inverted U-shape, with lower EA among younger and older than among middle-aged adults.

MATERIALS AND METHODS

Sample and Data Collection

We aimed to recruit a heterogeneous sample for the present study to ensure sufficient variability in participants' age, personality, and EA. Working with a group of students, we approached personal and university contacts (located in Germany) via email and social media channels with the request to participate in an on-line study on interpersonal interactions in the workplace (for similar procedures, see Bledow et al., 2013; Bunderson et al., 2016). These individuals received general information about the study (without disclosing specific hypotheses), along with a link to a secured online survey platform. Beyond demographic variables (including age), this survey incorporated a performance-based test of EA (Sanchez-Burks et al., 2016) as well as self-report measures of personality. We translated all measures

to German using common back-translation procedures (Brislin, 1980). Participation was voluntary and anonymity guaranteed.

Of the targeted participants (approximately 700 individuals), 350 persons opened the survey, of which 184 provided information for all relevant study variables. Three of these participants were excluded due to excessive missing data on the EA test. Therefore, our final sample comprised 181 participants. These individuals were, on average, 38 years old ($SD = 13.77$) and covered a relatively wide age range (from 18 to 72 years). Participants were employed across a variety of organizations and industries (e.g., in manufacturing, construction, insurance, trade, and health care), with a majority (64%) working in the service sector. Fifty-three percent of the participants were female, and their average tenure with their current employer was 8 years ($SD = 8.48$).

Measures

Emotional Aperture (EA)

We assessed EA using Sanchez-Burks et al. (2016) performance-based instrument. This measure consists of 17 two-frame video clips, each of which displays emotional reactions within four-person groups with differing gender and ethnicity compositions (based on the Montreal Set of Facial Displays of Emotion; cf. Beaupré and Hess, 2005). Consistent with established measures of individual emotion recognition ([e.g., the Diagnostic Analysis of Non-Verbal Accuracy (DANVA); Nowicki and Duke, 1994], the present EA test takes into account the dynamic and fleeting nature of affective cues in real-life interactions (see also Ekman, 2003). Hence, the stimulus video clips are relatively short (2s each). They initially depict a group with neutral or baseline facial expressions, followed by a second frame in which some group members exhibit an emotional reaction (i.e., changing to a different, positive or negative emotion expression) while others may retain their initial expression. After each clip, participants indicate the percentage (answer options: 0, 25, 50, or 100%) of group members that have exhibited a positive or negative emotional reaction, respectively. Due to the clips' brevity, it is virtually impossible to focus on each individual's expressions, and participants are therefore required to gauge a quick assessment of the global emotionality expressed within the group as a whole (Navon, 1977). A participant's overall EA score is calculated based on the accuracy of his or her responses, representing the percentage of correct answers to all 34 items (i.e., 17 video clips, each with two responses for positive and negative emotional reactions). Hence, individual EA scores can range from 0 (all responses incorrect) to 100 (all responses correct). Sanchez-Burks and colleagues provide further details on the EA measure and its administration, along with evidence for its reliability as well as discriminant and predictive validity.

Age

Participants indicated their age (in years), along with other demographic variables, toward the end of the survey.

Agreeableness

Before implementing the EA measure, we captured participants' agreeableness with a five-item measure based on Goldberg (1999), using a five-point response scale (1 = *strongly disagree*; 5 = *strongly agree*). Sample items included, "I am interested in people" and "I feel others' emotions." Cronbach's α was 0.82.

Control Variables

We considered extraversion and openness to experience as possible controls because (a) these personality traits entail interpersonal aspects (Batson and Shaw, 1991; Goetz et al., 2010) and (b) research has shown these traits to associate with the ability to recognize individuals' emotions (Matsumoto et al., 2000; Elfenbein et al., 2002). Using the same five-point response scale as for agreeableness, we assessed extraversion with four items ($\alpha = 0.74$; sample item: "I start conversations") and openness to experience with five items ($\alpha = 0.78$; sample item: "I am full of ideas"), based on Goldberg (1999). Further, we included gender as a possible covariate (1 = male; 2 = female) because research has shown that women generally exhibit higher individual emotion recognition ability than men (Hall and Matsumoto, 2004). Finally, we included the industry sector (1 = service; 2 = non-service) of a participant's employing organization as a covariate to account for potential biases related to higher emotional engagement, distinct emotion norms, and more frequent interpersonal interactions in the service industry (Ashforth and Humphrey, 1993).

RESULTS

Descriptive Statistics

Table 1 presents means, standard deviations, and bivariate correlations for all study variables. As shown, we found that age is negatively related with individuals' EA ($r = -0.29$, $p < 0.01$), whereas EA is not significantly associated with agreeableness ($r = 0.07$, *ns*) or any of the potential control variables. Individuals' age, however, significantly correlates with industry (such that participants working in the non-service sector are older, on average, than those working in the service sector; $r = 0.36$, $p < 0.01$), and age is negatively correlated with both openness ($r = -0.28$, $p < 0.01$) and agreeableness ($r = -0.15$, $p < 0.05$). Importantly, examining our conceptual model both with and without the control variables did not alter the significance or interpretation of the findings (cf. Becker, 2005). To illustrate the unique roles of age and agreeableness for EA, we therefore report the results including the controls in the following.

Moreover, to further examine the specific role of agreeableness (rather than other personality traits) for the age-EA linkage, we explored extraversion and openness to experience as possible moderating variables (i.e., we repeated our hypothesis testing by replacing agreeableness with extraversion and openness, respectively). We did not expect the respective interaction terms to be significant, because neither of these alternative personality traits shares the explicit concern for others and the empathic interest that characterizes high agreeableness (Digman, 1990;

TABLE 1 | Means, standard deviations, and bivariate correlations.

Variables	*M*	*SD*	1	2	3	4	5	6
(1) Industry sector	1.36	0.48						
(2) Gender	1.53	0.50	−0.33**					
(3) Extraversion	3.42	0.91	−0.09	−0.00				
(4) Openness	3.82	0.68	−0.20**	−0.07	0.41**			
(5) Agreeableness	3.96	0.72	−0.16*	0.26**	0.39**	0.31**		
(6) Age	38.17	13.77	0.36**	−0.14	−0.08	−0.28**	−0.15*	
(7) Emotional aperture	62.12	12.75	−0.07	0.07	−0.05	0.05	0.07	−0.29**

*N = 181. Industry sector: 1 = service; 2 = non-service. Gender: 1 = male, 2 = female. *p < 0.05, **p < 0.01.*

McCrae and John, 1992). And, in fact, we found none of the alternative (linear or curvilinear) interaction coefficients to be statistically significant. These supplementary findings are available from the first author.

Hypothesis Testing

We used curvilinear moderated hierarchical regression analysis (after standardizing all continuous predictors) for hypothesis testing, entering the control variables in Step 1, the main effects for age and agreeableness in Step 2, the squared age term (age^2) in Step 3, and the interaction terms for agreeableness with both age and age^2 in Step 4 (Cohen et al., 2003; see **Table 2**). As shown, Step 2 of this regression analysis yields a negative linear relationship between age and EA ($B = -3.86$, $SE = 1.03$, $p < 0.001$). Moreover, as illustrated in Step 3, this association is qualified by a curvilinear pattern ($B = -2.29$, $SE = 1.00$, $p < 0.05$). Without considering the moderating role of agreeableness, EA remains relatively stable (with a slight increase) among younger individuals, with a relatively steep decline commencing after individuals' late 30s (see **Figure 1**).

Importantly, Step 4 reveals that this curvilinear pattern does not equally apply among all individuals, with agreeableness representing a critical moderator ($B = 2.09$, $SE = 0.78$, $p < 0.01$). **Figure 2** illustrates the pattern of this curvilinear interaction. Among less agreeable individuals (−1 SD), simple slopes analyses yield an inverted U-shaped relation between age and EA (simple slope for the curvilinear term: $B = -3.74$; $SE = 1.16$, $p < 0.01$), with EA slightly increasing until these individuals' late 30s and decreasing markedly afterward. For individuals with higher agreeableness (+1 SD), in contrast, simple slopes analyses reveal non-significant linear ($B = -2.60$; $SE = 1.41$, $p = 0.07$) and curvilinear relationships ($B = 0.45$; $SE = 1.38$, $p = 0.75$) between age and EA. As shown, these individuals exhibit relatively strong EA at younger age, with only a slight (and non-significant) declining trend over time. Hence, the present results support the curvilinear interaction model proposed in Hypothesis 1.

FIGURE 1 | Curvilinear relationship between age and emotional aperture.

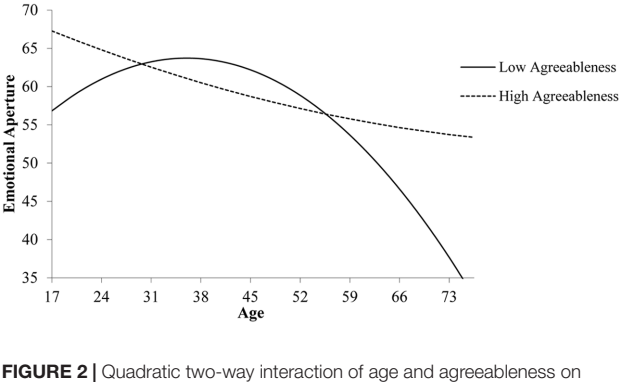

FIGURE 2 | Quadratic two-way interaction of age and agreeableness on emotional aperture.

DISCUSSION

This study examined the relationship between an individual's age and his or her ability to identify collective emotion expressions (i.e., EA). As expected, our results revealed a negative, curvilinear linkage between age and EA that was qualified by agreeableness as a key moderating factor. For individuals with higher agreeableness, EA remained relatively pronounced across the age span covered in our investigation (i.e., 18–72 years). Among less agreeable persons, by contrast, we observed a curvilinear association, such that EA remained relatively limited at both younger and older age, with a momentary peak around these individuals' late 30s.

Theoretical Implications

These findings make several contributions to the literature on age and (collective) emotion recognition. Scholars have only

recently identified and operationalized EA as a construct that is distinct from individual emotion recognition and relates with key behavioral outcomes in organizations (Sanchez-Burks and Huy, 2009). Also, although Sanchez-Burks et al. (2016) have linked EA with individuals' global information processing, research on EA's antecedents has been virtually non-existent to date. Little remains known, therefore, about relevant factors that may promote or detract from an individual's respective ability. To address this issue and widen the nomological net surrounding EA, the present study illustrates the importance of individuals' demographic and personality characteristics as antecedent variables. By highlighting the joint roles of age and agreeableness, we promote new knowledge on why some persons may be better able than others to correctly recognize and decipher group emotions. As such, this study offers fresh insights into the origins of EA as an important, yet under-examined form of emotion recognition. Our findings seem particularly timely in the context of an aging population and an increasingly age-diverse workforce (Hedge et al., 2006; Kunze et al., 2011).

More specifically, the curvilinear interaction pattern uncovered in our research constitutes an important conceptual contribution. Integrating seemingly contradictory theoretical arguments, these findings show that one should not expect age-related changes in EA to similarly occur across all individuals. High agreeableness, in particular, may motivate individuals to closely attend to others' emotions, enabling them to compensate for age-related cognitive losses and, thus, to retain relatively strong EA across the adult lifespan. With lower agreeableness, by contrast, a lack of empathy and interpersonal motivation may curtail individuals' emotional experiences and limit their willingness to invest cognitive capacities for collective emotion recognition. Despite a momentary increase during younger to middle adulthood, these individuals' EA therefore suffers markedly at higher ages. In sum, these results advance a differentiated understanding of the age-EA linkage. Focusing on individuals' age, by itself, would provide an incomplete and inaccurate picture of EA's development over time, with agreeableness constituting a critical contingency factor.

Finally, the curvilinear role of age among less agreeable individuals unveiled in our findings may advance the literature on general emotion recognition (i.e., beyond EA). Based on a comprehensive review of this literature, Doerwald et al. (2016, p. 166) have recently concluded that, despite rather consistent evidence for age-related deficits among older (as compared with younger) adults, "the evidence is less conclusive regarding levels of emotion perception at middle-age." Hence, the present study provides new evidence on emotion recognition (albeit collective rather than individual) among middle-aged adults as a relatively under-studied age group. At least among individuals with relatively low agreeableness, our results corroborate Doerwald et al.'s (2016) preliminary suggestion that substantive age-related declines in emotion recognition may remain limited to older rather than middle adulthood.

Practical Implications

The present study offers a number of suggestions for organizations aiming to improve collective emotion recognition within their workforce. Despite a trend toward age-related decline, our results show that organizations are well-advised to look beyond this demographic aspect when considering risks and potentials regarding employees' EA. More agreeable employees, in particular, may enjoy an EA advantage largely irrespective of

TABLE 2 | Curvilinear moderated hierarchical regression analysis.

	Emotional aperture			
	Step 1	**Step 2**	**Step 3**	**Step 4**
Constant	61.34*** (5.10)	59.57***(5.04)	61.24***(5.03)	62.08*** (4.96)
Control variables				
Industry sector	−1.11 (2.19)	1.24 (2.20)	1.75 (2.18)	1.30 (2.15)
Gender	1.49 (2.06)	0.53 (2.08)	0.51 (2.05)	0.07 (2.02)
Extraversion	−1.11 (1.06)	−1.18 (1.08)	−1.65 (1.08)	−1.83 (1.07)
Openness	1.05 (1.09)	−0.07 (1.10)	0.09 (1.09)	−0.10 (1.09)
Main effects				
Agreeableness		0.80 (1.08)	0.73 (1.07)	−1.57 (1.35)
Age		−3.86*** (1.03)	−2.41* (1.20)	−2.46* (1.17)
Squared term				
Age^2			−2.29* (1.00)	−1.64 (1.01)
Interactions				
Age × Agreeableness				−1.40 (1.17)
Age^2 × Agreeableness				2.09** (0.78)
R^2	0.02	0.09**	0.12**	0.16***
Adjusted R^2	−0.00	0.05	0.08	0.10
ΔR^2	0.02	0.07**	0.03*	0.04*

Unstandardized regression weights are shown. Standard errors in parentheses.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.*

their age, whereas EA may be especially problematic among less agreeable employees both at relatively young and relatively old (rather than middle) age. Hence, organizations may contribute to EA among both younger and older employees by incorporating agreeableness into personnel selection procedures, fostering and communicating an agreeable organizational climate (Hofmann and Jones, 2005), and consistently emphasizing the relevance of emotional issues and emotion expressions at work toward their employees (Ashforth and Humphrey, 1995; Ashkanasy and Daus, 2002). Importantly, however, we offer these considerations with due caution. Given the limited literature on EA, we believe additional research is needed before strong practical recommendations are warranted.

Strengths and Limitations

A key strength of the present research is its use of a validated, performance-based instrument to capture EA (Sanchez-Burks et al., 2016). Scholars have noted that such performance-based measurement is crucial for a valid assessment of emotional abilities, avoiding problems with distorted perception or socially desirable responding (Mayer et al., 2008; Joseph and Newman, 2010). Moreover, our focal measures combine direct accounts of demographic information (age) with self-reported personality assessments (agreeableness) and performance-based approaches (EA), thus ameliorating common method concerns (Spector, 2006; De Vries et al., 2014). And finally, our relatively age-diverse sample and inclusion of middle-aged participants allows for an assessment of EA's development across a relatively long and continuous part of the adult life span, enabling us to identify curvilinear patterns that would not be discernable using extreme group designs (i.e., comparing only younger vs. older individuals) or more age-restricted samples (cf. Doerwald et al., 2016).

At the same time, this investigation has several limitations. Our theoretical reasoning has drawn on various cognitive and motivational mechanisms, for example, to explain the expected pattern of the age-EA linkage and the moderating role of agreeableness. Nevertheless, our empirical study did not incorporate these mediating factors. A relevant concern, in this regard, is that the present EA measure might overemphasize well-documented age deficits in perceptual speed (e.g., Neupert et al., 2006) due to its use of time-limited emotion stimuli (i.e., 2-s video clips; Sanchez-Burks et al., 2016). Hence, our findings might offer an inflated account of age's negative consequences for EA, exaggerating the role of losses in fluid cognition and downplaying the role of crystallized knowledge gains. Importantly, however, scholars have noted that a time-limited measurement approach is necessary for a realistic assessment of emotion recognition, as it (a) mirrors the quick and fleeting nature of emotion expressions in real life (Nowicki and Duke, 1994; Ambadar et al., 2005; Isaacowitz and Stanley, 2011) and (b) helps to avoid possible ceiling effects (Wilhelm et al., 2014). Moreover, as outlined before, the present EA stimuli are deliberately presented so quickly that it is virtually impossible to consecutively focus on each individual's emotion expressions, thus emphasizing global types of information processing over mere perceptual speed (Sanchez-Burks et al., 2016). And finally, we believe the moderating role of agreeableness uncovered in our study makes it unlikely that the observed age effects solely result from fluid cognitive deficits. It is clear, however, that future research could benefit from extending our model to directly assess the proposed mediating mechanisms and, thus, to assess their relative importance and further alleviate related concerns.

Moreover, like most of the previous studies on individual emotion recognition, we used a convenience sample rather than randomly selecting from a general population, and we therefore cannot rule out potential selection bias. Also, our results' generalizability is limited due the fact that all data were collected within one country, Germany. Most previous empirical work on EA has been conducted in the United States (Sanchez-Burks et al., 2016, Studies 1 and 2 [Study 3 combined data from the United States, France, and Brazil]) and, as such, the present research extends the EA literature toward a new cultural context. At the same time, scholars have noted that cultural familiarity can benefit emotion recognition accuracy (Elfenbein et al., 2002). The present EA measure's use of ethnically diverse stimulus groups and relatively simple (i.e., positive and negative) emotion categories may ameliorate such concerns (Sanchez-Burks et al., 2016). Nevertheless, future research that constructively replicates the present findings in alternative cultural contexts or in more diverse samples could create further confidence in our conclusions' cross-cultural transferability.

Again mirroring the majority of the studies on age and individual emotion recognition as well as the existing research on EA (Doerwald et al., 2016; Sanchez-Burks et al., 2016), we employed a cross-sectional study design. Consequently, we cannot ascertain whether the age differences observed in the present sample arise from age or cohort effects (Rhodes, 1983), and we cannot draw strong causal conclusions. Multi-wave longitudinal designs that track multiple cohorts and repeatedly measure individuals' EA (along with other potential antecedent variables, such as agreeableness) over extended periods of time would be helpful to address these concerns (Doerwald et al., 2016).

Future Research Directions

Besides addressing limitations, our study offers a number of interesting directions for future research. Despite the relatively wide age range covered in our sample (i.e., 18–72 years), for instance, it is clear that our findings do not allow for conclusions about EA among younger or older individuals. With EA representing a novel and largely unexamined construct (Sanchez-Burks et al., 2016), it would therefore be worthwhile to further examine this ability within such age groups. It seems particularly interesting to investigate EA's development through childhood and adolescence, thereby creating new knowledge on the origins of this ability during early life. Similarly, with increasing life spans in most industrialized societies (Wilmoth, 2000), it seems important to examine whether the EA decline observed in our data among less agreeable individuals continues at older ages, and whether highly agreeable individuals can maintain their relatively high EA during even later life stages.

The present study has illustrated the role of individuals' agreeableness as a boundary condition for the age-EA linkage. Future research could extend this notion to examine contextual

(rather than individual) moderators. In organizational settings, in particular, explicit or implicit display rules and emotion norms may influence how employees express and perceive emotions (Rafaeli and Sutton, 1989; Diefendorff and Richard, 2003). Such rules and norms might shape EA among employees that spend large parts of their working lives within the respective organization, potentially altering age-related developments in this capacity. Similarly, research has demonstrated that perceived closeness between an actor and a target may attenuate the negative linkage frequently observed between age and individual emotion recognition (Zhang et al., 2013). It seems worthwhile, therefore, to examine whether the age-EA linkages uncovered in our research would similarly occur among participants that feel a closer psychological bond with the target group (e.g., due to strong social identification). Furthermore, prior studies have shown that older individuals tend to pay closer attention to positive rather than negative information (Isaacowitz et al., 2006; Horning et al., 2012). To better understand the age-EA association, it may be interesting to examine how this positivity bias (Mather and Carstensen, 2005) might influence older individuals' EA and shape the moderating role of agreeableness in this regard.

Moreover, as noted before, individuals working in the non-service sector were older and less agreeable than individuals working in the service sector in the present study (see **Table 1**). Hence, although industry sector and EA were not significantly related (and although controlling for industry sector did not change the pattern and significance of our findings), it would be interesting to further explore whether the curvilinear interaction of age and agreeableness on EA might differ across industries. The present sample's size is too limited to address this question with confidence. Hence, future research could benefit from addressing this issue in larger samples with more balanced industry representation.

Finally, beyond addressing concerns about causality and cohort effects, longitudinal studies that capture both EA and agreeableness at multiple points in time could enable an interesting extension of the present considerations, modeling age-related EA changes in parallel with potential age-related personality developments. While we have found a negative relationship between age and agreeableness ($r = -0.15$, $p < 0.05$; see **Table 1**), prior research on this issue has produced somewhat mixed results (for an overview, see Specht, 2017). Meta-analytic evidence, for example, points toward relative stability in agreeableness during young and middle adulthood and a slight increase among older adults (Roberts et al., 2006; see also Roberts and Mroczek, 2008), whereas some recent studies have reported stable (e.g., Kandler and Bleidorn, 2015) or even decreasing (e.g., Wortman et al., 2012) agreeableness at older ages. Hence, longitudinal research could enable a more dynamic perspective on how age-related agreeableness trajectories could shape the age-EA linkage over time.

CONCLUSION

The present research illustrates that individuals' EA jointly hinges on the complex interplay of their age and agreeableness. As such, this study offers relevant insights into the antecedents of EA as an important, yet rarely examined construct. We hope our findings will stimulate additional research efforts related to the predictors and consequences of collective emotion recognition, hence offering a tangible contribution to the empirical knowledge base on individuals' emotional abilities.

ETHICS STATEMENT

As an online study with voluntary and anonymous participation, no specific manipulations, and no deception, the authors' university did not require ethics approval for this research.

AUTHOR CONTRIBUTIONS

Both authors provided ideas, planned the study, and edited the manuscript. AF collected the data, conducted analyses, and wrote initial drafts of the manuscript.

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Future Time Perspective in Occupational Teams: Do Older Workers Prefer More Familiar Teams?

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Working in teams is quite popular across different industries and cultures. While some of these teams exist for longer time periods, other teams collaborate only for short periods and members switch into new teams after goals are accomplished. However, workers' preferences for joining a new team might vary in different ways. Based on Carstensen's socioemotional selectivity theory, we predict that emotionally meaningful teams are prioritized when occupational future time perspective (OFTP) is perceived as limited. Building and expanding on studies outside of the work context, we expected that older as compared to younger workers prefer more familiar teams, and that this effect is mediated by workers' OFTP. Moreover, we assumed that experimentally manipulated OFTP can change such team preferences. The hypotheses were tested in an online scenario study using three experimental conditions (within-person design). Four hundred and fifty-four workers (57% female, age $M = 45.98$, $SD = 11.46$) were asked to choose between a familiar and a new team in three consecutive trials: under an unspecified OFTP (baseline), under an expanded OFTP (amendment of retirement age), and under a restricted OFTP (insolvency of the current company). Whereas the baseline condition was always first, the order of the second and third conditions was randomized among participants. In the baseline condition, results showed the expected mediation effect of workers' OFTP on the relation between workers' age and preference for a familiar over a new team. Higher age was associated with more limited OFTP, which in turn was associated with higher preference for a familiar over a new team. Moreover, experimentally restricting OFTP increased preference for a familiar team over a new team regardless of workers' age, providing further evidence for the assumed causal processes and showing interesting avenues for practical interventions in occupational teams.

Keywords: future time perspective, age-related differences, older workers, teamwork, team preference, socioemotional selectivity theory

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INTRODUCTION

Today, working in occupational teams is ubiquitous (Kozlowski and Ilgen, 2006; Mathieu et al., 2017). However, workers often change their team over the course of their careers, for instance, after a project cycle is concluded. While workers are often assigned to a team by the management, workers can also volunteer for or select a specific team. Regardless of such opportunities, workers

have preferences about whom they want to work with, for instance, as a function of familiarity of the other team members (e.g., Glaman et al., 2002; Tett and Murphy, 2002; Bandiera et al., 2005). While some workers embrace new teams as learning opportunities and expansions of their occupational network, others might dislike such changes and rather prefer familiar teams. In the current research, we postulated that workers' chronological age is a central influence on such team preferences, and that these age effects are mediated by workers' occupational future time perspective (OFTP).

Our postulation is based on the socioemotional selectivity theory (e.g., Carstensen, 2006), which explains age-related changes in social behavior as a function of individuals' perceptions of remaining time (Carstensen, 2006; Cate and John, 2007). A general assumption of this theory is that information acquisition and expansion of social networks are more strongly emphasized when future time is perceived as rather expansive and open-ended, whereas emotional well-being and the maintenance of existing social contacts increase in their relative importance when future time becomes perceived as limited (e.g., Carstensen, 2006). Indeed, empirical studies have shown that older persons generally prefer emotionally close and familiar over novel social partners (e.g., Fredrickson and Carstensen, 1990; Fung et al., 1999, 2001; Fung and Carstensen, 2006).

However, the central mechanisms described in the socioemotional selectivity theory are not assumed to be restricted to persons' general lifespan but can be applied to different time spans (Carstensen et al., 2003). We applied the age-related dynamics described by the socioemotional selectivity theory to the context of working teams, and examined consequences of age-related changes in OFTPs. In the work context, occupational time refers to the time between entry and exit of individuals' occupational activities. Therefore, OFTPs describe individuals' perceived remaining time for their occupational activities (see Zacher and Frese, 2009, 2011). Please note that OFTP can refer to different occupational activities and related time spans depending on the focused frame of reference. For instance, occupational time more generally refers to the complete time span between starting a first career until retirement. However, organizational time refers to the time span between entering and leaving a specific work organization. Although the different focused frames of reference might sometimes lead to different future time perspectives that can even interact with each other (e.g., a relatively young worker having a long general occupational time perspective, but a limited organizational future time perspective due to a temporary work contract; e.g., Husman et al., 2016), we postulated that the direction of OFTP effects on the preference for familiar over new teams is similar regardless of the specific time span.

We assumed that OFTPs explain age-related differences in preferences for familiar over new teams. We measured age-related differences of OFTP as mediator between age and team-related preference. In addition to that we also manipulated participants' OFTP in order to demonstrate its causal influence on participants' preference of familiar over new teams (e.g., MacKinnon and Pirlott, 2014; Preacher, 2015) using a dynamic within-person design (see also Goldstein et al., 1994; Quené and van den Bergh, 2004). Each participant indicated their preferences for familiar or new teams in three conditions, i.e., during a first baseline condition and during two consecutive conditions with a temporary manipulation of OFTP. The temporary manipulations of OFTP were realized with a scenario approach including either an expansion of OFTP (amendment of retirement age by 10 years) or a limitation of OFTP (termination of employment due to insolvency of the current company). Due to the multilevel nature of our data, we could examine rather stable age-related differences in team-related preference as a function of workers general perceptions of OFTP (between-subjects effect), as well as temporary changes of team-related preferences in response to the experimental manipulation of OFTP (within-subjects effects; see multilevel logistic modeling, Van der Leeden, 1998; Quené and van den Bergh, 2004).

Our study contributes to existing literature in three ways. First, we tested the relationship between age and preference for familiar over new teams, adapting implications of socioemotional selectivity theory to occupational team settings. Second, we tested OFTP as mediating mechanism between age and preference for familiar over new teams using both correlational and experimental evidence (third contribution). Understanding such mediating processes not only contributes to the epistemic understanding and theory development, but also supports the development of practical interventions. In particular, documenting the central role of OFTP as effective mediator between workers' age and team-related preference provide fruitful suggestions for HR management and companies to address challenges related to the increasing demographic changes in most countries worldwide (e.g., Hertel and Zacher, in press).

Age, Occupational Future Time Perspective, and Team Preference at Work

Socioemotional selectivity theory maintains that the perception of time influences social goal-directed behavior and motivation (Carstensen, 1995, 2006). Depending on the temporal context, individuals set goals and adjust their motivational investment to reach these goals. In particular, the relative priority of specific goals might change as a function of individuals' perceptions how much time is remaining. Hence, when time is perceived as limited – for instance, when people get older – attention shifts from expansive or "future-oriented goals to emotionally meaningful goals" (Carstensen et al., 2003; Fung and Carstensen, 2006, p. 248–249). As a result, the perceived boundaries on time are assumed to affect social motivation and goal orientation in the way that the regulation of emotional states becomes prioritized. By spending time with emotionally meaningful partners, the individual's benefit is in the contact itself because positive feelings arise out of this social contact (i.e., effective emotion regulation; Carstensen et al., 2003). In contrast, when pursuing expansive or open-ended goals, individual focus more on potential long-term payoffs, such as gathering knowledge or future career opportunities.

Furthermore, the perceived remaining time is also assumed to affect individuals' preference for familiar or unknown interaction

partners. Prior research has shown that individuals with a limited perceived future time maximize contact with familiar or emotionally close partners and minimize interaction with unknown or less familiar persons so that they can conserve energy and regulate their affect (Carstensen et al., 1999; Fung et al., 1999). By focusing their resource usage on familiar partners, persons assimilate to the perceived shrinking time horizon. Such motivational shifts can be related to persons' lifespan in general, but are also possible in more specific life domains or contexts, such as, for instance, leisure or work (see also Peetsma and van der Veen, 2011).

Upon entering a career, individuals are usually inexperienced and need to learn new skills and expertise through gathering information and socializing. In this case, the perceived time perspective for this new activity is rather wide and open-ended. Zacher and Frese (2009, 2011) adapted the general assumptions of socioemotional selectivity theory to employees' perceptions of remaining time and opportunities at work, and showed that age and OFTP were negatively related (see also Weikamp and Göritz, 2015). Moreover, various researchers have found that persons' work values differ as a function of their age, with younger workers placing higher values on information gathering and career orientation whereas older workers being more likely to prefer emotionally meaningful goals and generativity motives at work (e.g., Ng and Feldman, 2010; Kooij et al., 2011; Hertel et al., 2013; Hommelhoff et al., 2017). Furthermore, an expanded time perspective seems to facilitate social networking activities and contact frequency at work (e.g., Wrzus et al., 2013). Thus, at the beginning of a professional career, workers seem to focus more on gathering new information and knowledge. However, toward the end of a career, workers more strongly try to save resources by avoiding negative emotions (Hertel et al., 2013) and pursuing activities that increase experiences of meaningfulness, such as supporting other colleagues (Ng and Law, 2014).

Based on the socioemotional selectivity theory, we assumed that workers' age influences their preference for familiar over new teams. Joining or staying in a more familiar team implies that work conditions and interaction partners are more predictable and reliable, and that workers' positive affect might arise out of the social contact itself. In contrast, joining a new team might come with more unknown consequences and therefore require unpredictable amounts of resources to handle upcoming tasks or struggles. However, a new team also includes learning opportunities and potential expansions of the occupational network. Thus, we hypothesized that older as compared to younger workers are more likely to favor familiar teams over new teams because familiar teams provide more opportunities for resource conservation and emotion regulation. Moreover, we proposed that OFTP mediates the link between age and preference for familiar over new teams. More formally, we postulated:

H1: Workers' chronological age is positively correlated with their preference for familiar over new teams.

H2: The relationship between workers' age and their preference for familiar over new teams is mediated by their occupational future time perspective.

In addition, we also assumed that workers' preference for familiar over new teams (and vice versa) can be affected by *contextual* changes of their OFTP in addition to rather stable age effects. Such contextual changes can be caused by unforeseen accidents or deadlines, economic shortfalls, or legislative changes such as changes in retirement age. Moreover, contextual effects on OFTP can also refer to more specific occupational activities, such as working in a specific company (e.g., Husman et al., 2016). In general, an open-ended OFTP should lead to relatively high preference for new teams over familiar teams because this future-oriented goals are more important, and new teams provide additional new contacts and learning opportunities (Fredrickson and Carstensen, 1990; Carstensen, 2006). However, when workers' OFTP is restricted their preference for new over familiar teams should be rather low, instead, emotionally meaningful relationships should be more important to regulate affect, optimize the usage of resources, and compensate for losses (Baltes and Carstensen, 1996; Carstensen, 2006).

Existing research has shown that future time perspective can change behavior and motivation in different contexts, such as individuals' lifestyle choices (Tasdemir-Ozdes et al., 2016), job-crafting intentions (Kooij et al., 2016), goal setting and tracking (Ko et al., 2014), and choice of social partners (Fung et al., 1999; Hommelhoff et al., 2017). However, there is no empirical evidence so far that contextual changes in OFTP can also change team-related preferences at work. Examining potential effects of such contextual changes of OFTP provide interesting insights for potential practical interventions in work organizations, for instance, in order to motivate older workers to join new teams. Moreover, examining contextual changes of OFTP in a controlled experimental design contributes a more conservative test of the causal influence of OFTP on preferences for familiar over new teams, which is inherent in the assumed mediation process specified in Hypothesis 2.

More formally, we assumed that temporary changes in OFTP have a causal influence on team-related preference. Specifically, we hypothesized that contextual influences can temporarily affect persons' preference for familiar over new teams at work:

H3: Temporary changes of occupational future time perspective causally affect workers' preferences for familiar over new teams, insofar that expansions of occupational future time perspective decrease, and limitations of occupational future time perspective increase workers' preferences for familiar over new teams.

MATERIALS AND METHODS

Participants

The study was conducted using a German online panel (a pool of registered persons who have agreed to take part in web-based studies) on psychological research[1]. All panel members who matched the two criteria of the panel filter "working"

[1]https://psyweb.uni-muenster.de

and "between 18 and 67 years old"[2] were invited by email to voluntarily participate. Six hundred and three participants followed the link to the questionnaire, and 454 participants (drop-out rate 25%) could be included in the analyses. The excluded participants (25%) did not differ demographically from the included participants. The sample consisted of 57% females, 42% males, and 1% not specified. Workers were between 18 and 67 years of age ($M = 46$ years, $SD = 11.46$) and had worked for about 12 years ($SD = 10.77$) for their present company. In our study more than 60% of the participants did social or entrepreneurial work (based on Holland's RIASEC model, 1997) and had a university degree. The participants estimated that on average about 51% of their daily work was teamwork, and 59% of participants preferred teamwork over working alone. In addition, the perceived physical health was described as rather good ($M = 3.94$, $SD = 0.87$).

Procedure

The study has a mixed 3 (contextual constraints: baseline, extended, or limited OFTP) × 2 (sequential order of extended and limited OFTP conditions) design. The three conditions were nested within each participant with the order of the conditions differing between participants. For testing Hypotheses 1 and 2, we considered only the baseline condition. To examine Hypothesis 3, we used the experimental within-person design to show that temporary changes in OFTP can change participants' preference of familiar over new teams. Furthermore, we accounted for differences on the between-group level such as age and stable OFTP (between-group design). In doing so, we were able to explore changes in participants' team-related preferences triggered by the interaction of experimentally manipulated (temporary) future time perspective and more stable age-related differences between workers.

At the beginning of the survey, participants were given instructions and were assured that all data would be handled in an anonymized form and only used for scientific purposes. All participants started with the unspecified baseline condition. No specific instructions were given for the baseline condition; participants were simply asked which team they would prefer:

Imagine you are working together in a team. Due to reorganization at your company, you have the possibility to change teams or remain in your existing team. Assuming that the two following teams are available, which team would you choose?

Afterward, participants had to select one out of two teams. The familiar team was described as *Team A: existing/known team, all tasks and responsibilities are clear, colleagues are well-known, knowledge and expertise are established.* The new team was described as *Team B: new team, tasks seem to include the opportunity to learn something new, colleagues are unknown, could provide future career opportunities.*

After participants had indicated the preferred team, the second team preference task followed, this time depending on the experimental order condition. In the extended OFTP condition, participants read:

Now imagine the following situation: Last week you were informed by your management that the government has adopted a law which increases the mandatory retirement age by 10 years. In addition, occupational health protections at work have been improved such that it is possible for all to work longer in good physical condition.

In the limited OFTP condition, participants read:

Now imagine the following situation: You were told by your management that your company is in the red again this year and is bankrupt. The company's continued existence is ruled out. One year remains for all employees until lay-off; however, there is still enough work so that all employees can continue their work until the end of the year.

After each scenario, participants were asked again which team they would prefer with the same description of the two teams in all three scenarios. The assessment of stable OFTP was conducted after the three team preference measures, together with the demographic variables. We decided to measure all time-related variables after the experimental conditions because we were concerned about potential demand (OFTP) and self-stereotyping effects (e.g., Desmette and Gaillard, 2008; Posthuma and Campion, 2009; Meisner, 2012). In addition, stable OFTP was considered to be highly related to participants' age, which is an objective variable making recursive effects of the dependent variable on age unlikely. Please note that we measured OFTP with respect to participants' real occupational life, not with respect to the imagined future time scenarios that were part of the experimental manipulation[3]. Thus, we assumed that participants were able to imagine an expanded or limited occupational future time scenario and anticipate preferences based on those without changes in their general OFTP with regard to their real occupational life (see also Fredrickson and Carstensen, 1990; Fung et al., 1999, for similar assumptions).

At the end of the survey, participants were offered feedback on their personal OFTP score. This feedback was provided anonymously by the system using benchmarks derived from a previous unpublished study.[4] Furthermore, this research was part of a larger research project.[5] For the current study, we focused on perceived OFTP and demographics such as age, gender, organizational as well as job tenure, percentage of teamwork, organizational support, attitude toward teamwork in general, education, and physical health.

This study adheres to the recommendations of the Federation of the German Psychologists Association's Code of Ethics. The online panel platform used for this research[6] is a joint project of four German universities, and complies with the scientific standards in psychology research. Approval was given

[2]Initially, 6,124 panel members met the criteria of being between 18 and 67 years old and working, and were thus invited to participate. Non-respondents did not differ demographically from the respondents.

[3]Indeed, the measured OFTP scores were not different as a consequence of the experimental manipulation using imagined extended or limited OFTPs, $M_{order(baseline-limitation-expansion)} = 3.94$ and $M_{order(baseline-expansion-limitation)} = 3.97$.

[4]This study is available on request from the first author.

[5]A full list of variables collected in this study is available on request from the first author.

[6]https://psyweb.uni-muenster.de

by the project manager dedicated to psychology. All subjects participated voluntarily in the survey in accordance with the Declaration of Helsinki. No ethical review or approval was required for this study under the national or international requirements.

Measures

To develop the experimental scenarios, we adopted existing scenarios from research on social partner selection (Fredrickson and Carstensen, 1990; Fung et al., 1999). In their studies, Fung et al. (1999) used a baseline condition, an extended future time condition (i.e., participants were informed that they will live 20 years longer than expected), and a limited future time condition (i.e., emigration to another country in the next weeks). As expected by the authors, participants were less likely to select known social partners in the extended future time condition. In the limited future time condition, the participants preferred spending time with familiar partners. The authors compared the participants' preference for the familiar social partners in the contextually changed scenarios with the baseline condition. This research showed that the manipulation of future time perspectives can significantly affect participants' preferences for social partners (Fredrickson and Carstensen, 1990; Fung et al., 1999). Building on and extending this research, we adapted the scenarios to the context of occupational teamwork. In doing so, we operationalized the contextual extension of OFTP with respect to participants' more general occupational future time (amendment of retirement age by 10 years) whereas the contextual restriction of OFTP was realized with respect to participants' organizational future time (termination of employment due to insolvency of the current company) as a more specific aspect of OFTP. However, the postulated direction of OFTP on the preference for familiar over new teams was assumed to be the same regardless of the specific frame of reference of OFTP.

The participants' team-related preferences were coded "1" for the familiar and "0" for the new team. Order of the contextual variations of OFTP were coded "0" when the extended OFTP condition preceded the limited OFTP condition, and "1" when the limited OFTP condition preceded the extended OFTP condition.

Participants' stable OFTP was measured with respect to their real occupational life using items from Zacher and Frese (2009, 2011; Zacher, 2013) based on Carstensen and Lang's (1996) German future time perspective scale. We followed Zacher's (2013) suggestion to include only 8 of the 10 items matching to three independent latent variables. Factor analyses suggested that the items of the OFTP scale load on three subscales: the perceived Remaining Time, the Focus on Opportunities, and the Focus on Limitations before leaving the workforce (Zacher, 2013). We included these subscales in our analyses because they might influence participants' preference for familiar over new teams in different ways. Our experiment built on temporary changes in remaining occupational future time, therefore the subscale Remaining Time (measured with three items, for instance, *"Most of my occupational life lies ahead of me."* Cronbach's $\alpha = 0.80$; see also Zacher and Frese, 2009; Zacher, 2013) might be particularly relevant in the relation between age and participants' team-related preference. The other two subscales Focus on Opportunities (measured with three items, for instance, *"My occupational future is filled with possibilities."* Cronbach's $\alpha = 0.90$), and Focus on Limitations (measured with two items, for instance, *"As I get older, I begin to experience time in my occupational future as limited."* Intercorrelation $= 0.69$, $p < 0.001$; see also Cate and John, 2007; Zacher, 2013) might have lower but still significant effects in this regard. Furthermore, we also included the item: *"I could do anything I want in my occupational future."* Zacher and Frese (2011) used four items to measure the Focus on Opportunities scale and Zacher (2013) showed a moderate factor loading for this item. Therefore, we included this item in the overall OFTP scale (Cronbach's $\alpha = 0.91$). Participants answered on a Likert scale ranging from *"does not apply at all"* (1) to *"applies completely"* (7) (Zacher and Frese, 2009).

Moreover, subjective health was considered as a control variable. Prior studies have shown positive correlations between OFTP and subjective health (Zacher and Frese, 2009; Kooij et al., 2013; Hoppmann et al., 2015). We assessed physical health with one item: *"How would you describe your state of health in general?"* on a five-point Likert scale ranging from very bad (1) to very good (5).

The following variables were measured at the end of the study: participants' age, organizational and job tenure, gender, highest educational qualification, percentage of their teamwork in their current job (from 0 to 100%), attitude toward teamwork in general, perceived organizational support, and work environment (adapted from Holland, 1997).

Analytical Procedure

To test the main effects of participants' age on their preference for familiar over new teams (H1) and the assumed mediation of OFTP (H2), we conducted multiple logistic regression analyses. For OFTP, we calculated an average scale score with higher OFTP scores indicating more open-ended future time perspectives, and lower OFTP scores indicating more limited future time perspectives. Furthermore, to compute the indirect effect of age on participants' preference for familiar over new teams (mediated by OFTP), we used the PROCESS macro for SPSS by Hayes (2013) including 5,000 bootstrapping samples. Bootstrapping contains random resampling with replacement. IBM SPSS Statistics 24 was used for the analyses. Additionally, we calculated multiple logistic regression analyses for the mediating role of the three subscales of OFTP on the relation between age and participants' preference for familiar over new teams. The three subscales were designated as Remaining Time (high scores indicate perceived long future time remaining), Focus on Opportunities (high scores indicate plenty perceived future opportunities), and Focus on Limitations (high scores indicate perceived few future limitations).

To accommodate the multilevel nature of our study and the nested structure of our data (team preference decisions nested within each participant), we used multilevel path modeling. In doing so, we followed Quené and van den Bergh's (2004) suggesting a multilevel random coefficients model

instead of calculating an ANOVA with repeated measures. First, the multilevel approach allows for handling unbalanced data and does not require sphericity. Second, a multilevel approach takes the hierarchical data structure (design effect) into account and considers intra-class correlation (Goldstein et al., 1994). Third, all participants could be included regardless of missing data points, maintaining the planned power of the experimental design (Quené and van den Bergh, 2004).

To analyze the influence of the temporary limitation or expansion of OFTP, we added two dummy variables: one for the limited and one for the extended OFTP condition. These dummies were used as independent variables influencing participants' preference for familiar over new teams as binary dependent variable on the within level (Snijders and Bosker, 2012). We considered the dichotomous nature of the dependent variable by using multilevel logistic regression analysis. We used MPLUS 7.4 (Muthén and Muthén, 2012, Los Angeles, CA, United States) for the two-level analysis with maximum likelihood estimation. In addition, we centered the between-factor variables age and OFTP (covariates) around the grand mean (Hofmann and Gavin, 1998). Order of experimental conditions was entered at the between level of analysis.

RESULTS

Descriptive Statistics

Means, SD, and intercorrelations of main variables are displayed in **Table 1**. As expected, participants' age and OFTP were negatively correlated ($r = -0.65$). However, participants' age was unrelated to preferences for familiar over new teams in all three experimental scenarios, which is inconsistent with Hypothesis 1. In contrast, participants' stable OFTP was negatively related with the preference for familiar over new teams in all three experimental conditions (baseline condition: $r = -0.15$, extended OFTP condition: $r = -0.17$, and limited OFTP condition: $r = -0.12$), which is partly consistent with Hypothesis 2 and our expectations that a low OFTP is associated with rather low preferences for new teams. The correlation in the limited OFTP condition was slightly lower than in the other two conditions but the difference was not significant.[7] Order of conditions was negatively correlated with participants' preference for familiar over new teams in the limited OFTP condition ($r = -0.11$). In this condition, the order condition "baseline – expansion – limitation" lead to a stronger preference for the familiar team as compared to "baseline – limitation – expansion" condition. Moreover, perceived health was correlated with age ($r = -0.12$), OFTP ($r = 0.27$), and team preferences in the baseline ($r = -0.12$), extended OFTP ($r = -0.12$), and limited OFTP ($r = -0.06$) conditions. Based on these correlations, we considered the order of conditions and perceived health as control variables in our analyses. Similar to prior studies (e.g., Fredrickson and Carstensen, 1990), no gender differences were observed with respect to the main dependent variable.

Furthermore, we found moderate correlations on the within-person level for the three team preferences, ICC = 0.48 (Intra-class Correlation; see Quené and van den Bergh, 2004). This ICC score indicates dependency in the data, prescribing additional multilevel analyses in order to avoid an underestimation of the standard error and alpha error inflation (Cress, 2008; Huang, 2017).

Testing Main and Mediation Effects of Age on Team Preference

Multiple logistic regression analyses of participants in the unspecified baseline condition showed no higher preference for the familiar over the new team as a function of participants' age (Hypothesis 1), $b = 0.01$, Wald = 0.16, $p = 0.66$. Thus, Hypothesis 1 was rejected.

However, results showed that age effects on participants' preference for familiar over new teams were mediated by participants' OFTP. The effects between age and OFTP (path a in **Figure 1**), $b = -0.08$, $t = -17.66$, $p < 0.001$, and OFTP and preference for familiar over new teams (path *b*), $b = -0.35$, $Z = -3.61$, $p < 0.001$, were significant. As evident in the test of H1, the total effect between age and preference for familiar over new teams was not significant. However, the total effect consists of the sum of the direct and indirect effect (e.g., MacKinnon et al., 2007; Hayes, 2013). Age was a significant predictor of participants' preference for new over familiar teams after controlling for the mediator OFTP (direct path c'), $b = -0.02$, $Z = -2.12$, $p < 0.05$. If the relation between an independent and a dependent variable becomes larger by including a third variable in the analysis, a suppression effect becomes conceivable (Tzelgov and Henik, 1991; MacKinnon et al., 2000). This implies that opposing signs of the direct and indirect effects could cancel each other out. Indeed, mediation can exist even if the overall relation between X and Y is non-significant (MacKinnon et al., 2000). In addition, the paths between age and OFTP, and between OFTP and team-related preference were significant when controlling for age. As a consequence, we performed a mediation analysis using bootstrapping with bias-corrected confidence estimates (Preacher and Hayes, 2004). We used the 95% bootstrap confidence interval based on 5,000 bootstrap samples to test if the indirect effect is different from zero (Preacher and Hayes, 2008). The results of the analysis showed that age indirectly affected participants' preference for the familiar over the new team through the mediator OFTP ($b = 0.03$; CI = 0.01 to 0.04). The full analysis is shown in **Table 2** and **Figure 1** illustrates the assumed model with effect sizes. The sum of the negative direct (path c' = −0.02) and positive indirect effect (path ab = 0.03) indicates the non-significant total effect (path c = 0.01). This result implies the existence of a suppressor effect or inconsistent mediation (MacKinnon et al., 2007). Together, Hypothesis 2 assuming that OFTP mediates the relation between

[7] Comparing the correlations of OFTP with participants' preferences for familiar over new teams in the baseline and in the limited OFTP condition showed non-significant differences, $z(N = 454) = 0.84$, $p = 0.20$; and similar results were found comparing the correlations of OFTP with participants' preferences for familiar over new teams in the extended and in the limited OFTP condition, $z(N = 454) = 0.50$, $p = 0.31$.

TABLE 1 | Descriptive statistics and correlation among variables.

Variables	*M*	*SD*	1	2	3	4	5	5.1	5.2	5.3	6	7	8	9	10	11
(1) Team preference baseline	0.46	0.50	–													
(2) Team preference expansion	0.49	0.50	0.62**	–												
(3) Team preference limitation	0.62	0.49	0.16**	0.18**	–											
(4) Age	45.98	11.46	0.03	0.03	0.02	–										
(5) OFTP	3.96	1.43	−0.15**	−0.17**	−0.12*	−0.65**	–									
(5.1) Remaining time	3.48	1.64	−0.11*	−0.13**	−0.12*	−0.74**	0.91**	–								
(5.2) Focus on opportunities	4.38	1.62	−0.20**	−0.22**	−0.12*	−0.44**	0.89**	0.73**	–							
(5.3) Focus on limitations$_{recode}$	4.02	1.81	−0.01	−0.02	−0.08	−0.56**	0.79**	0.65**	0.53**	–						
(6) Gender	1.59	0.51	0.06	0.080	0.02	−0.03	−0.02	0.00	−0.06	0.02	–					
(7) Education	–	–	−0.06	−0.08	0.02	−0.05	0.11*	0.10*	0.12**	0.03	−0.08	–				
(8) Subjective health	3.94	0.87	−0.12*	−0.12**	−0.06	−0.12*	0.27**	0.20**	0.27**	0.22**	−0.05	0.20**	–			
(9) Organizational tenure	11.68	10.77	0.14**	0.07	0.05	0.53**	−0.43**	−0.42**	−0.36**	−0.34**	0.02	−0.11*	−0.06	–		
(10) Job tenure	16.07	12.45	0.08	0.07	−0.02	0.58**	−0.41**	−0.44**	−0.31**	−0.34**	−0.02	−0.06	−0.14**	0.60**	–	
(11) Percentage of teamwork	50.50	29.46	0.06	0.01	0.00	−0.02	0.11*	0.07	0.16**	0.07	−0.02	−0.04	0.02	0.01	0.04	–
(12) Order of conditions	–	–	0.03	−0.06	−0.11*	0.05	−0.01	−0.02	−0.01	−0.02	0.01	0.05	0.05	0.03	0.00	−0.06

N = 454. Team preference 0 = new team, 1 = familiar team; and baseline, expansion, and limitation specifies the experimental conditions; occupational future time perspective (OFTP) and its three subscales Remaining Time (RT), Focus on Opportunities, Focus on Limitations$_{recode}$ 1 = limited future time perspective, up to 7 = open-ended future time perspective; gender 1 = male, 2 = female, 3 = not specified; education 1 = without graduation, up to 4 = university degree; % of teamwork in their current job; order of conditions 0 = baseline, expansion, limitation and 1 = baseline, limitation, expansion.
$^{*}p < 0.05$. $^{**}p < 0.01$.

FIGURE 1 | The tested model with effect sizes. The small letters describe the paths of the mediation analysis (c = total; c' = direct; ab = indirect effect). For occupational future time perspective high scores indicate more open-ended future time perspectives, and lower scores more limited ones. Team preference is coded as "1" for the familiar and "0" for the new team.
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$, two-tailed.

TABLE 2 | Mediation analysis of the mediating role of OFTP on the relation between age and participants' (team) preference for familiar over new teams in the baseline condition (between subjects).

Path	Effect	Criterion	Predictor	Coefficient	*SE*
C	YX	Team preference	Age	0.01	0.10
B	YM.X	Team preference	OFTP	−0.35***	0.14
c'	YX.M	Team preference	Age	−0.02*	0.13
A	MX	OFTP	Age	−0.08***	0.04
	Control	OFTP	Health	0.32***	
	Control	Team preference	Health	−0.17	

N = 442. Criterion = Y, team preference in the baseline condition and coded as "1" for the familiar and "0" for the new team. M = mediator OFTP. X = predictor chronological age. Control = control variable subjective health (health).
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, two-tailed.

age and participants' preference for familiar over new teams was supported.

Additionally, we also examined the mediation effects of the three OFTP subscales for exploratory reasons. We found a mediation effect for the subscale Remaining Time, with a result pattern similar to the overall mediation effect of OFTP (i.e., suppressor effect, MacKinnon et al., 2000). The effect between age and Remaining Time (path a), $b = -0.10$, $t = -23.13$, $p<0.001$, and Remaining Time and preference for familiar over new teams (path b), $b = -0.30$, $Z = -3.18$, $p < 0.001$, were significant. Similar to the OFTP mediation analysis, age was a significant predictor of participants' preference for new over familiar teams after controlling for the mediator Remaining Time (direct path c'), $b = -0.03$, $Z = -2.16$, $p < 0.05$. Furthermore, the bootstrapping analysis showed that age indirectly affected participants' team-related preference through the mediator Remaining Time ($b = 0.03$; CI = 0.01 to 0.05). For the subscales Focus on Opportunities and Focus on Limitations, no mediating effect between age and preference for familiar over new teams was found.[8] These results indicate that the subscale Remaining Time

[8]The effect between age and Focus on Opportunities (path a), $b = -0.06$, $t = -9.97$, $p < 0.001$, and Focus on Opportunities and participants' preference for familiar over new teams (path b), $b = -0.30$, $Z = -4.17$, $p < 0.001$, were significant. However, the direct effect of age on preference for familiar over new teams after controlling for the mediator Focus on Opportunities (direct path c') was non-significant, $b = -0.02$, $Z = -1.55$, $p = 0.12$. The effect between age

TABLE 3 | Mediation analysis of the mediating role of RT on the relation between age and participants' (team) preference for familiar over new teams in the baseline condition (between subjects).

Path	Effect	Criterion	Predictor	Coefficient	*SE*
C	YX	Team preference	Age	0.01	0.10
B	YM.X	Team preference	RT	−0.30***	0.09
c'	YX.M	Team preference	Age	−0.03*	0.01
A	MX	Remaining time	Age	−0.10***	0.01
	Control	Remaining time	Health	0.22***	
	Control	Team preference	Health	−0.22	

N = 442. Criterion = Y, team preference in the baseline condition and coded as "1" for the familiar and "0" for the new team. M = mediator RT. X = predictor chronological age. Control = control variable subjective health (health).
$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, two-tailed.

explained most parts of the relation between age and preference for familiar over new teams. The full analysis is shown in **Table 3**.

Effects of the Experimental Manipulation of OFTP

To test whether the contextual variation of (temporary) OFTP affected participants' preferences for familiar over new teams, we used multilevel path modeling with MPLUS 7.4. The ICC score for the preference decisions suggested multilevel analyses to consider the influence of the contextual changes in momentary OFTP. We conducted a two-level analysis since each participant ran through all three conditions (within-subject ICC for the team preferences = 0.48). According to this, we added age, OFTP, and order of the conditions as between-level covariates to capture the effect of the experimental variation on the within-person level. The dependent variable was again participants' preference for the familiar over the new team. The results showed that the contextual expansion of (temporary) OFTP had no influence on participants' preference for familiar over new teams, $b = 0.13$ $p = 0.43$, OR = 0.88. However, the contextual limitation of (temporary) OFTP led to a higher preference for the familiar over the new team, $b = 0.95$, $p < 0.001$, OR = 0.39, even when controlling for participants' stable OFTP scores, age, and order of conditions (see **Table 4**). Thus, Hypothesis 3 was partially confirmed by these data. The contextual limitation of temporary OFTP increased the preference for the familiar over the new team. This evidence supports the assumed causal influence of OFTP on preferences for familiar over new teams. However, we could not show that the contextual expansion of OFTP decreases participants' preference for familiar over new teams. For illustration purposes, **Figure 2** shows the percentage of selections of the familiar team as a function of experimental manipulation and participants' age (median split).

and Focus on Limitation (path a), $b = -0.09$, $t = -13.77$, $p < 0.001$, was significant. However, all other paths were non-significant; Focus on Limitation and participants' preference for familiar over new teams (path b), $b = 0.02$, $Z = 0.29$, $p = 0.77$; age and participants' preference for familiar over new teams after controlling for the mediator Focus on Limitation (direct path c'), $b = 0.01$, $Z = 0.44$, $p = 0.66$.

DISCUSSION

This study investigated the influence of chronological age and OFTP on workers' preference for familiar over new teams. Based on the socioemotional selectivity theory, we expected that older workers prioritize familiar over new teams because their OFTP is rather limited. Thus, we assumed that the effects of workers' age are mediated by OFTP. Moreover, we examined the assumed mediating role of OFTP more rigorously by experimentally manipulating temporary OFTP through a contextual expansion and limitation. In addition to providing evidence for the assumed causal effect of OFTP on preferences for familiar over new teams, the examination whether temporary changes of OFTP can also affect team-related preferences might also provide interesting implications for practical interventions.

TABLE 4 | Multilevel analysis of the effect from experimental expansion and limitation of temporary OFTP on participants' (team) preferences for familiar over new teams (within level).

	Coefficient	*SE*	OR	R^2
Level 1 variables				0.05**
Contextual expansion	0.13	0.17	0.88	
Contextual limitation	0.95***	0.17	0.39	
Level 2 variables				0.13**
Age	−0.03**	0.01		
OFTP	−0.52***	0.10		
Order of conditions	−0.52*	0.21		

N = 442. Team preferences as the dependent variable included the team decisions of all three conditions nested within each participant and coded as "1" for the familiar and "0" for the new team. Contextual expansion = dummy variable for the extended OFTP condition. Contextual limitation = dummy variable for the limited OFTP condition. OFTP is occupational future time perspective. Order of conditions was coded as "0" = baseline, expansion, limitation ($n_{order0} = 237$) and "1" = baseline, limitation, expansion ($n_{order1} = 205$). The R^2 in the logistic regression follows the underlying continuous latent response variable approach (see McKelvey and Zavoina, 1975).
$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, two-tailed.

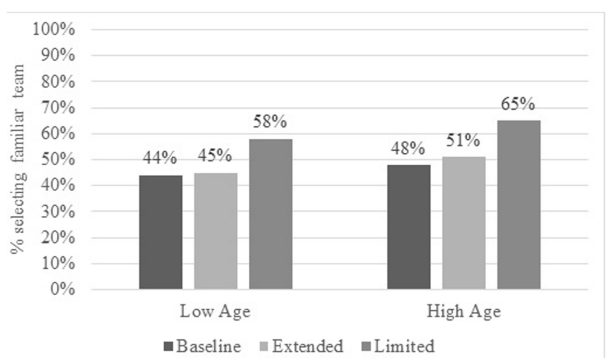

FIGURE 2 | Participants' preferences for the familiar team by age and (experimental) influences on occupational future time perspective (contextual scenarios: baseline, extended, and limited). The two age groups (low and high) were divided by median split at 47 years ($n_{old} = 231$, $M_{old} = 54.86$; $SD_{old} = 4.88$; $n_{young} = 205$, $M_{young} = 35.95$, $SD_{young} = 7.77$).

The hypotheses were examined with 454 workers recruited via an online panel and representing a broad variety of branches and company sizes. Interestingly, we found no total effect of age on workers' preference for familiar over new teams. Instead, the mediation analyses revealed opposing direct and indirect effects of age on workers' preference for familiar teams mediated by OFTP. These opposing effects seem to have counterbalanced each other's influence, resulting in a non-significant total effect (see MacKinnon et al., 2007). In the baseline condition, older workers indicated a more limited OFTP, and a limited OFTP increased the preference for the familiar team, resulting in a positive indirect effect consistent with Hypothesis 2. However, OFTP could not explain the whole effect of age on team-related preference. Somewhat surprisingly, the observed direct effect of age on team-related preference suggested that older workers prioritized the new team over the familiar team more strongly than younger workers in our sample. This result is partly in conflict with Hypothesis 1, and with the assumptions of socioemotional selectivity theory (Carstensen, 2006). We also considered the causal influence of OFTP on participants' preference for familiar over new teams using two different experimental scenarios. Contextually extending temporary OFTP had no effect on participants' preference for familiar over new teams. However, contextually restricting participants temporary OFTP significantly increased the preference for familiar over new teams regardless of age and participants' stable (general) OFTP score. The result for the contextual limitation of OFTP is consistent with our assumption based on socioemotional selectivity theory.

Theoretical Implications

So far, existing research on age and teamwork focused mainly on age effects at the team level, such as age diversity in teams (e.g., Balkundi et al., 2007; Schneid et al., 2016). The results of the current study extend previous research on age effects at work on the individual level and shed light on the relation between age, preference for familiar over new teams, and the mediating effects of OFTP. Socioemotional selectivity theory predicts that people prioritize familiar interaction partners when remaining time is limited (Carstensen, 2006). However, the data of the current study revealed no direct age effects on participants' preference for familiar teams. Interestingly, by including OFTP as control variable in the analysis, older workers were even more likely to prefer new over familiar teams (direct effect in the mediation analysis). These unexpected findings might suggest that variables other than OFTP are involved in the influence of age on preference for familiar over new teams. However, additional analyses of our data did not reveal mediating influences of health, education, tenure, or organizational support on the relation between age and preference for familiar teams. Moreover, exploratory analyses considering OFTP as moderator of the relation between age and team-related preference did not reveal any significant effect, $b = -0.01$, $Z = -1.15$, $p = 0.25$. Nevertheless, future research might consider other age-related process factors. Moreover, socioemotional selectivity theory and associated life-span research often consider 'old age' as 80 years and higher. In contrast, most workers retire from occupational life in their early 60s (OECD, 2010; He et al., 2016). Thus, retiring workers might be too 'young' to be regarded as 'old' for the expected age effect. This suggests the importance of assessing OFTP in addition to chronological age in work-related studies.

However, in accordance with socioemotional selectivity theory (Carstensen, 2006), our results demonstrated that older workers were more likely to prefer familiar over new teams when the effect was mediated by OFTP. By adding OFTP as a third variable, the relation between age and participants' preference for familiar over new teams became larger. We found different signs for the direct and indirect effects of age on participants' preference for familiar over new teams mediated by OFTP, suggesting a suppressor effect (i.e., inconsistent mediation; MacKinnon et al., 2007), which is rare but possible (MacKinnon et al., 2000). These results illustrate the importance of measuring (instead of just assuming) OFTP as a mediating process variable to better understand the relationship between age and participants' team-related preference. Furthermore, in additional analyses we examined three subscales of OFTP: Remaining Time, Focus on Opportunities, and Focus on Limitations (Zacher, 2013). We found that the mediating influence of OFTP is best explained by the subscale Remaining Time, whereas no mediating effect of the other two subscales could be observed. In line with Carstensen's (2006) socioemotional selectivity theory, this result might indicate that with higher age, workers' perceived Remaining Time at work decreases and emotionally meaningful goals, such as familiar relationships, are prioritized. By selecting familiar teams, resources might be better optimized and losses compensated because the potential work situation is already known (see also Baltes and Carstensen, 1996). However, preference for familiar or new teams might additionally be influenced by the job itself or the industry involved. For example, a physically demanding job might decrease workers' health more strongly, with related effects on workers' OFTP. As a result, early retirement might be more likely (e.g., Blekesaune and Solem, 2005) and working with familiar teams might be preferred.

Finally, our study tested the causal effect of OFTP on preferences for familiar over new teams via two experimental variations of temporary OFTP. The results showed that the contextual expansion of temporary OFTP had no effect on participants' preference for familiar over new teams. However, when OFTP was temporarily restricted, workers – regardless of their age – more often preferred the familiar team. The result for the contextual limitation of temporary OFTP corresponds with the assumptions of socioemotional selectivity theory: When time is perceived as limited people select more emotionally meaningful goals and partners (Fredrickson and Carstensen, 1990; Fung et al., 1999; Carstensen, 2006). In the context of teamwork, workers might have preferred the familiar team in the limited OFTP condition because the situation envisioned an approaching end, triggering negative affect and feelings of uncertainty, (job) insecurity (Gottschalk and Moffitt, 1999), or the upcoming separation from their colleagues. Therefore, spending time with emotionally close teams and team members could help to regulate affect and optimize resource usage by, for instance, coping with the approaching end through social support (e.g., Cohen and Wills, 1985), instead of joining unknown teams

with new potential challenges. On a familiar team, workers probably know in advance what they can accomplish, and can adjust their individual effort accordingly. In line with the socioemotional selectivity theory (Carstensen et al., 2003), workers' benefit in preferring the familiar team might be the contact itself that gives rise to positive feelings through a sense of closeness in a situation of uncertainty (i.e., emotion-oriented goals), whereas joining a new team might be related to potential long-term payoff such as learning or career opportunities (i.e., future-oriented goals; see Fung and Carstensen, 2006). In our experimental situation of an organizational bankruptcy, a long-term payoff was unlikely and the preference for the familiar team increased.

The experimentally extended OFTP condition had almost no effect in comparison to the baseline condition. However, we manipulated temporary OFTP in two different domains that both referred to changes in remaining time at work. The limited OFTP condition was realized using an experimental variation of the organizational future time perspective, whereas the extended OFTP condition referred to the occupational future time perspective. Our variation of the limited OFTP condition requires an imminent reaction of the worker, whereas changes in the extended OFTP condition do not demand a direct action. The chosen scenario of extending temporary OFTP probably was too artificial to affect participants' team-related preference or simply not relevant for the younger workers. Specifically, participants were invited to imagine a change of legislation enabling a 10-year delay before retirement. These additional 10 years are hard to imagine and seem to be far in the future, and the perceived time is comparable to an open-ended situation, while the limitation of time – represented in our study by bankruptcy and being unemployed within 1 year – is directly noticeable in the present life and affects the workers immediately. Nevertheless, all three experimental contexts affected participants' team-related preferences as reflected by the order effect of the two randomized scenario conditions. The experimental order "baseline – expansion – limitation" led to no significant increase in the preference for the new team after the baseline condition. However, in the experimental order "baseline – limitation – expansion," as many participants as in the baseline condition preferred the new over the familiar team again in the extended future time condition (even after preferring significantly more often the familiar team in the limited future time condition). At the same time, the overall preference of the new over the familiar team in the extended future time condition was almost the same as in the baseline condition.

In summary, the contextual limitation of temporary OFTP occurred in addition to the more stable effects of general OFTP. This finding suggests that preferences for familiar over new teams might be influenced by changing the context-related time perspective of workers. Moreover, it suggests that workers' OFTP might differ intra-individually. For instance, the occupational future time perspective – which comprises the entire working life – considerably differs from the perceived future time perspective on a specific team in a specific company (i.e., organizational teamwork future time perspective; see also, e.g., Stouthard and Peetsma, 1999).

Practical Implications

This research has various implications for organizations. First, the results show that not just workers' age but also individual OFTP can affect participants' team-related preference. In the current study, age effects on participants' preference for familiar over new teams could only be observed after considering OFTP as a mediating variable. Whether workers can choose a team or are allocated to an existing team, they have their preferences and these preferences are crucial for team members' motivation and commitment. Awareness of age and time-related preferences for teams might help to better understand workers' differences in motivation and commitment as members of occupational teams.

In addition to OFTPs specific to certain occupations or business sectors, individual factors such as pregnancy or illness cannot be foreseen. Paying attention to workers' temporary OFTP helps to anticipate workers' preference for familiar over new teams. In a rapidly changing business environment it is sometimes advantageous when workers want to work in new teams with changing partners. However, at other times, it is advantageous to work in familiar teams. For instance, in the case of an urgent deadline, the decision to work with known co-workers can save time and money, increase efficiency, reduce misunderstandings, and support the regulation of emotions. As our research shows, workers' preferences for familiar over new teams could be influenced by the contextual limitation of temporary OFTP. Finally, the knowledge of OFTP variability could improve HR management and provide new avenues for compensating age-related preferences in the context of occupational teamwork.

Limitations and Future Research

Our study has several limitations. First, the study relies of self-reports. To reduce the influence of common method bias, we followed recommendations by Podsakoff et al. (2012). We assured participants that their answers were anonymous and encouraged them to answer honestly. We confirmed this by underlining that the validity of their personal feedback at the end of the survey depended on their honesty. Furthermore, we collected data from three scenarios in which preferences for familiar over new teams were indicated, and randomized two of these scenarios. This should have minimized the possibility of a common method bias. Second, part of our data is correlational and causal conclusions are therefore limited. However, by using an experimental design with three conditions, we found that the participants' preference for familiar over new teams changed by contextually limiting the temporary OFTP. Thus, we partly showed the causal influence of OFTP. Moreover, most of the results are in line with our assumed model which extends the theoretical lifespan theories to the teamwork context. Furthermore, the model is based on different empirical studies of the age, lifespan, and general work context (Fredrickson and Carstensen, 1990; Fung et al., 1999; Zacher and Frese, 2011; Hertel et al., 2013; Zacher, 2013). By controlling for health and condition order, we reduced the likelihood of third-variable influences. Third, the order of the experimental conditions correlated with participants' preference for familiar over new teams in the

limited OFTP condition ($r = -0.11$, $p < 0.05$). This means that the workers in the condition order "baseline – expansion – limitation" showed a stronger preference for the familiar team in the limited OFTP condition as compared to the workers in the condition order "baseline – limitation – expansion." This correlation might suggest that the (experimental) order effect could explain the influence of the limited OFTP condition on participants' preference for familiar over new teams. To clarify this question, we tested the effects separately for the two condition orders. The experimental influence of the limited OFTP condition appeared in both analyses.[9] In sum, order of conditions strengthened participants' preference for the familiar team in the limited OFTP condition but could not completely explain it. Additionally, by using multilevel analysis it was further possible to assess the influence of condition order and OFTP on the between person level and the influence of the contextual extension and limitation of temporary OFTP on the within person level. These analyses also support the effect of the OFTP-limiting manipulation. It should also be noted that the correlation between general OFTP and participants' team-related preferences was slightly lower in the limited OFTP condition ($r = -0.12$, $p < 0.05$) compared to the baseline ($r = -0.15$, $p < 0.01$) and the extended OFTP condition ($r = -0.17$, $p < 0.01$). However, the differences were not significant. Together, these results support the effect of the experimental limitation of temporary OFTP on the participants' team-related preference even by considering age, OFTP, and condition order.

This study provides a variety of new avenues for future research. First, similar to research showing that future time perspective is domain specific (i.e., different future time perspectives for life domains such as social, career, and leisure; e.g., Peetsma and van der Veen, 2011; Husman et al., 2016), we assume that time perspective also varies for different domains within the context of occupational work. For instance, different domains of OFTPs could be the tenure of a profession, working for the same company, or the time someone is spending with a working team. Future research might differentiate between general and specific domains on the intra-interindividual level in the work context but also inter-individually between subjects (e.g., Peetsma and van der Veen, 2011; Husman et al., 2016). Further, the interaction and influences of these time perspectives on different outcomes of (team)work, such as effort or performance, might be analyzed. As well as the role of OFTP's facet of Remaining Time might be considered in the context of age-related differences regarding workers' preference for familiar over new teams. Second, further mediating and moderating variables which influence age and OFTP might be examined. For instance, Zacher and Frese (2009) analyzed the effects of job complexity and control. For teamwork we assume that autonomy, learning opportunities, and trust of the team members could weaken the relationship between age and OFTP which, in turn, might increase the preference for new teams. Moreover, workers are often free to join the team of their choice. However, at other times the supervisor prescribes the team a worker must join. An interesting question is what happens if a worker has to work in a non-preferred team. Third, contextual factors might be focused on. In this study, we found that the mere imagination of a contextually limited job perspective was sufficient to change participants' preference for familiar teams. Future work might explore conditions that can also contextually extend temporary OFTP, for example, a scenario in which workers expect an extension of their current work contract (organizational future time) or continued work as freelancers after retirement (occupational future time).

[9] The multilevel analyses showed that for both condition orders the contextual expansion of temporary OFTP had no influence on participants' preference for familiar over new teams. The results are for the condition order 0 (baseline, expansion, limitation; $n_{order0} = 237$) $b = -0.05$ $p = 0.83$, OR $= 1.05$; for the condition order 1 (baseline, limitation, expansion; $n_{order1} = 205$) $b = 0.34$, $p = 0.18$, OR $= 0.71$. However, the contextual limitation of temporary OFTP led for both condition orders to a higher preference for the familiar over the new team, condition order 0 (baseline, expansion, limitation; $n_{order0} = 237$) $b = 0.65$, $p < 0.001$, OR $= 0.42$; for the condition order 1 (baseline, limitation, expansion; $n_{order1} = 205$) $b = 1.05$, $p < 0.001$, OR $= 0.35$, even when controlling for age and general OFTP.

CONCLUSION

Based on socioemotional selectivity theory, we tested the relationship between age mediated by OFTP and participants' preference for familiar over new teams. In addition, we experimentally examined the contextual variability of temporary OFTP and its effect on participants' team-related preferences. Overall, our findings show that in the work context the relationship between age and participants' preference for familiar over new teams can be shown only by considering OFTP as mediator. Furthermore, the results establish new ways to affect workers' team-related preference by influencing context-based OFTP. Moreover, it shows the causal influence of OFTP on participants' preference for familiar over new teams in a limited OFTP condition.

AUTHOR CONTRIBUTIONS

LG: Substantial contributions to the conception or design of the work, to the acquisition, analysis, and interpretation of the data for the work; drafting the work; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. GH: Substantial contributions to the conception or design of the work, and to interpretation of data for the work; revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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REVIEW
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Future Time Perspective in the Work Context: A Systematic Review of Quantitative Studies

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A core construct in the lifespan theory of socioemotional selectivity, future time perspective (FTP) refers to individuals' perceptions of their remaining time in life. Its adaptation to the work context, occupational future time perspective (OFTP), entails workers' perceptions of remaining time and opportunities in their careers. Over the past decade, several quantitative studies have investigated antecedents and consequences of general FTP and OFTP in the work context (i.e., FTP at work). We systematically review and critically discuss this literature on general FTP ($k = 17$ studies) and OFTP ($k = 16$ studies) and highlight implications for future research and practice. Results of our systematic review show that, in addition to its strong negative relationship with age, FTP at work is also associated with other individual (e.g., personality traits) and contextual variables (e.g., job characteristics). Moreover, FTP at work has been shown to mediate and moderate relationships of individual and contextual antecedents with occupational well-being, as well as motivational and behavioral outcomes. As a whole, findings suggest that FTP at work is an important variable in the field of work and aging, and that future research should improve the ways in which FTP at work is measured and results on FTP at work are reported.

Keywords: systematic review, future time perspective, FTP, socioemotional selectivity, lifespan

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INTRODUCTION

For several decades, researchers have been investigating phenomena associated with temporal experience (Lewin, 1939; Wallace, 1956; Kastenbaum, 1961). For example, already Lewin (1939) suggested that people of all ages are influenced by their perceptions of the future. Since chronological age is strongly associated with the passage of time, Carstensen (1991) proposed that scholars should take perceptions of time into account when studying human development. Assuming that with age people become increasingly aware that their time is "running out," Carstensen et al. (1999) define general *future time perspective (FTP)* as individuals' perception of their remaining time in life. According to Carstensen's socioemotional selectivity theory (e.g., Carstensen, 1991, 2006; Carstensen et al., 1999), the perception of time plays a fundamental role in the selection and pursuit of goals, in particular goals related to knowledge acquisition, social contact, and emotional experience. For example, the theory proposes that when time is perceived as limited, people emphasize positive emotional states and relationships with close social partners.

Over recent years, several studies have examined general FTP to improve understanding of associations between age and work outcomes (Rudolph, 2016). Seijts (1998) was the first to suggest investigating FTP in the work context. He argued that the future time span workers consider when

making decisions will predict what type of goals they pursue and, consequently, their motivation and performance at work. Moreover, since the end of an individual's career (i.e., retirement) is an important endpoint in life, older workers likely perceive their occupational future time as more limited than their younger colleagues (Stamov-Roßnagel, 2015). However, until 2009, no research had empirically examined antecedents and consequences of FTP in the work context. To address this gap in the literature, Zacher and Frese (2009) adapted FTP to the work context. They defined *occupational future time perspective (OFTP)* as workers' perceptions of remaining time and opportunities in their careers.

Both general FTP and OFTP are examined in the work and organizational psychology literature. In this review article, we use the term "FTP at work" to refer to both general FTP and OFTP investigated in the work and employment context. So far, despite potential theoretical and empirical differences between general FTP (which refers to perceptions of remaining time and opportunities in life in general) and OFTP (which refers to perceptions of remaining time and opportunities in one's career) no systematic review on these constructs exists. In addition, since 2009, several studies conducted in the work context have examined antecedents and/or consequences of either general FTP or OFTP. However, the differences between these constructs may limit comparisons of study results. Moreover, due to a lack of conceptual integration, there is currently no clear agenda for future research on FTP at work, and it is not possible to derive useful practical implications for managers and organizations. Given current changes in employment trends, such as the extension of the remaining time to work due to delayed retirement entry, we believe that it is timely and important to review and integrate the state of the knowledge on FTP at work.

We posit that this systematic review will contribute to the literature in several ways. First, we will distinguish studies that have measured general FTP in the work context and studies that have measured OFTP. Second, we will systematically review quantitative studies that have examined antecedents and/or consequences of FTP at work, and studies that have investigated its role as a mediator or as a moderator. Third, we will identify important conceptual and methodological issues that need to be addressed in future research, and we will outline practical recommendations.

THEORETICAL FRAMEWORK AND OPERATIONALIZATION OF FTP AT WORK

To clarify the two conceptualizations of FTP at work (i.e., general FTP and OFTP), this section aims to define both concepts in further detail before we present the methods and results of our systematic review.

General Future Time Perspective

Early definitions of FTP characterized the construct as "a relatively general tendency to be concerned with future events" (Kastenbaum, 1961, p. 217) or as "the length of the future time span which is conceptualized" (Wallace, 1956, p. 240). Kastenbaum's (1961) definition is closely related to the concept of *future orientation*, which refers to the relatively stable tendency of individuals to adopt a future temporal frame of mind when making decisions (Zimbardo and Boyd, 1999). Individuals with a strong future orientation tend to engage in future-oriented behaviors, such as planning and delaying gratification (Strathman et al., 1994; Qian et al., 2015). Future orientation has often been studied in relation to health and environmental behaviors (e.g., Strathman et al., 1994).

In contrast, Wallace's (1956) definition is related to FTP as defined by Carstensen et al. (1999) in their socioemotional selectivity theory, that is, as individuals' perceptions of their remaining time in life (see also Lang and Carstensen, 2002). According to socioemotional selectivity theory, goals change with age, such that older people prioritize emotionally meaningful goals and relationships with close social partners. By contrast, young people tend to prioritize instrumental goals, such as acquiring knowledge and extending their social networks. Socioemotional selectivity theory proposes that FTP explains these age-related changes in life goals. Empirical research has generally supported this assumption (e.g., Fung et al., 1999; Lang and Carstensen, 2002; Fung and Carstensen, 2004; Carstensen, 2006). FTP as defined by Carstensen et al. (1999) differs from temporal orientation constructs such as Zimbardo and Boyd's (1999) future orientation (see also Shipp et al., 2009). While future orientation refers to rather stable modes of thought and behavior, FTP is a flexible and age-related construct that changes over time and across the lifespan (Cate and John, 2007). The reason for the malleability of FTP is that people become more and more aware that their time in life is running out when they grow older (Carstensen et al., 1999). Example items of Carstensen and Lang's (1996) widely used general FTP scale are "Many opportunities await me in the future" or "Most of my life lies ahead of me" (see **Table 1**).

Experimental studies have also shown that FTP is a malleable construct. For instance, Carstensen and Fredrickson (1998) found that young individuals of approximately the same age, but different in their health status (i.e., HIV negative, HIV positive without symptoms, and HIV positive with symptoms), preferred to spend time with close social partners when their chances of dying soon were higher (i.e., limited FTP). Moreover, FTP can be manipulated. For instance, Fung et al. (1999) induced a limited FTP among young and older participants by asking them to imagine that they will immigrate to another country in a few weeks; they also induced an open-ended FTP by asking participants to imagine that a new medial advance will allow them to live 20 more years than expected. They found that in the limited FTP condition, both young and older individuals preferred familiar social partners. In the open-ended FTP condition, older people's preference for close social partners disappeared. Thus, age differences in the preference for close social partners may disappear when FTP is manipulated. Taken together, these findings suggest that not only individual factors, such as age, but also life circumstances may influence FTP.

According to Carstensen et al. (1999), FTP is a unidimensional and bipolar concept ranging from expansive to limited perceived

TABLE 1 | General FTP and OFTP items.

Research focus	Items
General FTP (Carstensen and Lang, 1996)	(1) Many opportunities await me in the future (2) I expect that I will set many new goals in the future (3) My future is filled with possibilities (4) Most of my life lies ahead of me (5) My future seems infinite to me (6) I could do anything I want in the future (7) There is plenty of time left in my life to make new plans (8) I have the sense time is running out (reverse coded) (9) There are only limited possibilities in my future (reverse coded) (10) As I get older, I begin to experience time as limited (reverse coded)
OFTP (Zacher and Frese, 2009; Zacher, 2013)	(1) Many opportunities await me in my occupational future* (2) I expect that I will set many new goals in my occupational future* (3) My occupational future is filled with possibilities* (4) I could do anything I want in my occupational future (5) There are only limited possibilities in my occupational future (reverse coded) (6) There is plenty of time left in my occupational life to make new plans (7) Most of my occupational life lies ahead of me* (8) My occupational future seems infinite to me* (9) I have the sense that my occupational time is running out (reverse coded) (10) As I get older, I begin to experience time in my occupational future as limited (reverse coded)*

**Items that were included in the original OFTP scale by Zacher and Frese (2009).*

time left. Challenging this notion, Cate and John (2007) argued that an aging person may perceive time as increasingly limited but not necessarily as less full of opportunities. Therefore, they suggested that FTP may be conceived in terms of a focus on opportunities (i.e., perceiving new goals and possibilities in one's remaining lifetime) and as a focus on limitations (i.e., perceiving limitations and constraints in one's remaining lifetime). In a series of cross-sectional and longitudinal studies, Cate and John (2007) provided evidence for this two-dimensional model of FTP. Other authors replicated this two-dimensional structure of FTP, and distinguished between limited (i.e., focus on limitations) and open-ended (i.e., focus on opportunities) FTP (Cozzolino et al., 2009; Rabinovich et al., 2010; Kooij and Van De Voorde, 2011; Kooij et al., 2013). Nevertheless, most studies on general FTP in the work context conceptualized FTP as a unidimensional construct (e.g., Bal et al., 2010; Baltes et al., 2014).

Occupational Future Time Perspective

To adapt FTP to the work context, Zacher and Frese (2009) added the word "occupational" to each item of Carstensen and Lang's (1996) general FTP scale (see **Table 1**). Example items are "Most of my occupational life lies ahead of me" (i.e., perceived remaining time at work) and "Many opportunities await me in my occupational future" (i.e., focus on opportunities at work). Therefore, OFTP refers to workers' perceptions of remaining time and opportunities in their careers. Like general FTP, OFTP has been shown to change with age and over time. For instance, Weikamp and Göritz (2015) found in a six-wave study that OFTP decreases over time such that individuals perceived losses of remaining time and opportunities at work over 4 years. In particular, age appears to be more strongly negatively related to perceptions of remaining time at work, probably because most people retire within a defined age range (Zacher and Frese, 2009; Weikamp and Göritz, 2015). Age is less strongly associated with remaining opportunities at work, which suggest that this dimension of OFTP can be influenced by variables other than age, such as job characteristics (Zacher and Frese, 2009; Zacher et al., 2010).

Similar to Cate and John's (2007) two-dimensional model of general FTP, Zacher and Frese (2009) distinguished two dimensions of OFTP: perceived remaining time at work (i.e., similar to the temporal dimension of general FTP, as defined by Carstensen et al., 1999) and focus on opportunities at work (i.e., similar to general focus on opportunities as defined by Cate and John, 2007). Several researchers have adopted this conceptualization in their studies (e.g., Weikamp and Göritz, 2015). However, similar to studies that investigated general FTP in the work context, studies that measured OFTP differ regarding the way they operationalize OFTP. For instance, some researchers choose to investigate only one dimension of OFTP, such as only focus on opportunities at work (e.g., Zacher et al., 2010; Schmitt et al., 2013b) or only remaining time at work (Kooij and Zacher, 2016); while others examined the two dimensions together (i.e., remaining time and focus on opportunities at work; e.g., Zacher and Frese, 2009; Weikamp and Göritz, 2015). Besides, in a later study, Zacher (2013) used a version of Carstensen and Lang's (1996) FTP scale that was adapted to the work context and provided evidence for three distinct dimensions of OFTP: perceived remaining time, focus on opportunities, and focus on limitations.

METHOD

Inclusion/Exclusion Criteria

We set five inclusion/exclusion criteria before conducting our systematic review. First, since no research had empirically investigated FTP at work until Zacher and Frese (2009), we included only articles that were published between 2009, and December 2016. Second, we included only quantitative-empirical studies on antecedents and consequences of FTP at work and excluded review articles and articles using a qualitative approach. Third, we included only articles written in English language. Fourth, to distinguish studies on FTP at work from studies that investigated trait-like constructs, such as Shipp et al.'s (2009) future orientation, we selected only studies that measured FTP either with the original items from Carstensen and Lang (1996), or with the adapted items from Zacher and Frese (2009) or similar versions of their scale. Finally, we selected only studies on FTP in the work

and employment context; articles that investigated general FTP outside the work domain were excluded. Therefore, we included only studies with samples of workers or job seekers (e.g., Zacher, 2013). Studies that sampled adolescents or students were not included.

Literature Search

We searched the electronic databases Scopus, PsycINFO, Science direct, and JSTOR, using the keyword "FTP." We did not use keywords such as "focus on opportunities," "focus on limitations," or "remaining time" because these keywords identified studies that were not about FTP (for instance, when we used the keywords "remaining time" or "focus on limitations," we found studies that included in their abstracts expressions such as "effects persisted over the remaining time" or "the discussion focuses on limitations"). We found more studies about FTP in the databases Scopus ($k = 263$) and PsycINFO ($k = 303$) than in the databases Sciencedirect ($k = 59$) and JSTOR ($k = 3$). This initial search resulted in 370 articles about FTP, after the removal of duplicates (see **Figure 1**).

In a second step, to select studies about FTP at work, we selected only articles published between 2009 and 2016. The number of studies identified in this step was 159. We then analyzed abstracts to select only quantitative-empirical studies on FTP that have been conducted in the work context, and that used the FTP scale by Carstensen and Lang (1996) or the items adapted by Zacher and Frese (2009). We excluded studies that used the Zimbardo Time Perspective Inventory (Zimbardo and Boyd, 1999; e.g., Anagnostopoulos and Griva, 2012) or the Consideration of Future Consequences Scale (e.g., Arnocky et al., 2014); studies that were conducted with student samples (e.g., Peetsma and van der Veen, 2011), children or adolescents (e.g., Duangpatra et al., 2009), very old adults outside of the work context (e.g., Kozik et al., 2015), and studies that used a qualitative methodology (e.g., Brown et al., 2012). We also excluded conceptual papers (e.g., Froehlich et al., 2016). This procedure resulted in 19 articles.

To ensure that we included all studies on FTP at work, we conducted additional searches in Scopus and Psycinfo with the keywords "FTP" and "focus on opportunities." We found five additional studies that investigated only focus on opportunities at work (Zacher and Frese, 2009; Gielnik et al., 2012; Schmitt et al., 2013a,b; Zacher and Yang, 2016), which resulted in a total of 24 articles. Finally, to ensure that we did not omit the most recent articles on FTP at work (e.g., advance online publications) or articles published in journals that are not yet available in some databases (e.g., *Work, Aging, and Retirement*), we also searched for recent studies on FTP at work in scientific online platforms, such as ResearchGate and Academia.edu. This led us to find nine additional recent studies about FTP at work (e.g., Korff et al., 2016). In total, we found 33 articles that investigated general FTP ($k = 17$) or OFTP ($k = 16$) in the work context (see **Table 2**). Whenever longitudinal analyses were reported, we included relationships based from Time 1 to Time 2 data only. When the study included more than three measurement points, we calculated the average correlation coefficient (e.g., Weikamp and Göritz, 2015).

RESULTS

Since 2009, 33 published studies (see **Table 2**) have investigated the antecedents and consequences of general FTP (see **Figure 2**) and OFTP (see **Figure 3**) in the work context.

Antecedents of Future Time Perspective at Work

General Future Time Perspective

Regarding individual antecedents of general FTP, age, subjective general health, and promotion focus were related to FTP, such that young, healthy workers, and those with a promotion focus had higher levels of general FTP than older and less healthy workers, and those with a prevention focus. In particular, age was negatively related to general FTP ($r = -0.53$, Bal et al., 2013), remaining time ($r = -0.59$, Kooij et al., 2014), open-ended FTP ($r = -0.58$ for sample 1 and $r = -0.67$ for sample 2; Kooij et al., 2013), and focus on opportunities ($r = -0.44$, Zacher and de Lange, 2011), and positively to limited FTP ($r = 0.31/0.35$, Kooij et al., 2013).

Subjective general health was positively related to open-ended FTP ($r = 0.16$, Kooij and Van De Voorde, 2011; $r = 0.13/r = 0.17$, Kooij et al., 2013) and negatively to limited FTP ($r = -0.16$; Kooij and Van De Voorde, 2011; $r = -0.12/r = -0.18$, Kooij et al., 2013). Moreover, Zacher and de Lange (2011) showed that a promotion focus had a positive effect on focus on opportunities ($r = 0.47$), while a prevention focus had a positive effect on focus on limitations ($r = 0.41$). Finally, for the sake of completeness, we note that sociodemographic variables, such as education and gender, have often been studied as control variables (e.g., Bal et al., 2013; Kooij et al., 2013; Yeung et al., 2013), but researchers did generally not hypothesize specific effects.

Regarding contextual antecedents of general FTP, Korff et al. (2016) reported that human resource management (HRM) systems were positively associated with general FTP ($r = 0.24$). In particular, they found relationships with motivation enhancing HRM practices (i.e., incentive compensation, internal promotion, and performance appraisal; $r = 0.26$), but not for knowledge, skills, and abilities practices neither for opportunity enhancing practices. Oostrom et al. (2016) showed that idiosyncratic deals for tasks and work responsibilities (i.e., voluntary and personalized arrangements between individual employees and their employers regarding education, tasks, or promotions) were positively related to general FTP ($r = 0.30$).

Occupational Future Time Perspective

As far as OFTP is concerned, younger age appears to contribute to the perception of more remaining time and opportunities left at work, and good mental health and selection, optimization, and compensation (SOC) strategies (i.e., a set of adaptive self-regulation strategies; Baltes and Baltes, 1990) are positively related to focus on opportunities. More specifically, age was strongly negatively related to remaining time at work ($r = -0.68$, Froehlich et al., 2016; $r = -0.64$, Kooij and Zacher, 2016; average $r = -0.71$, Weikamp and Göritz, 2015; $r = -0.82$, Zacher and Frese, 2009) and positively to constrained perceived remaining time ($r = 0.81$, Kochoian et al., 2016). To a lesser extent, age was

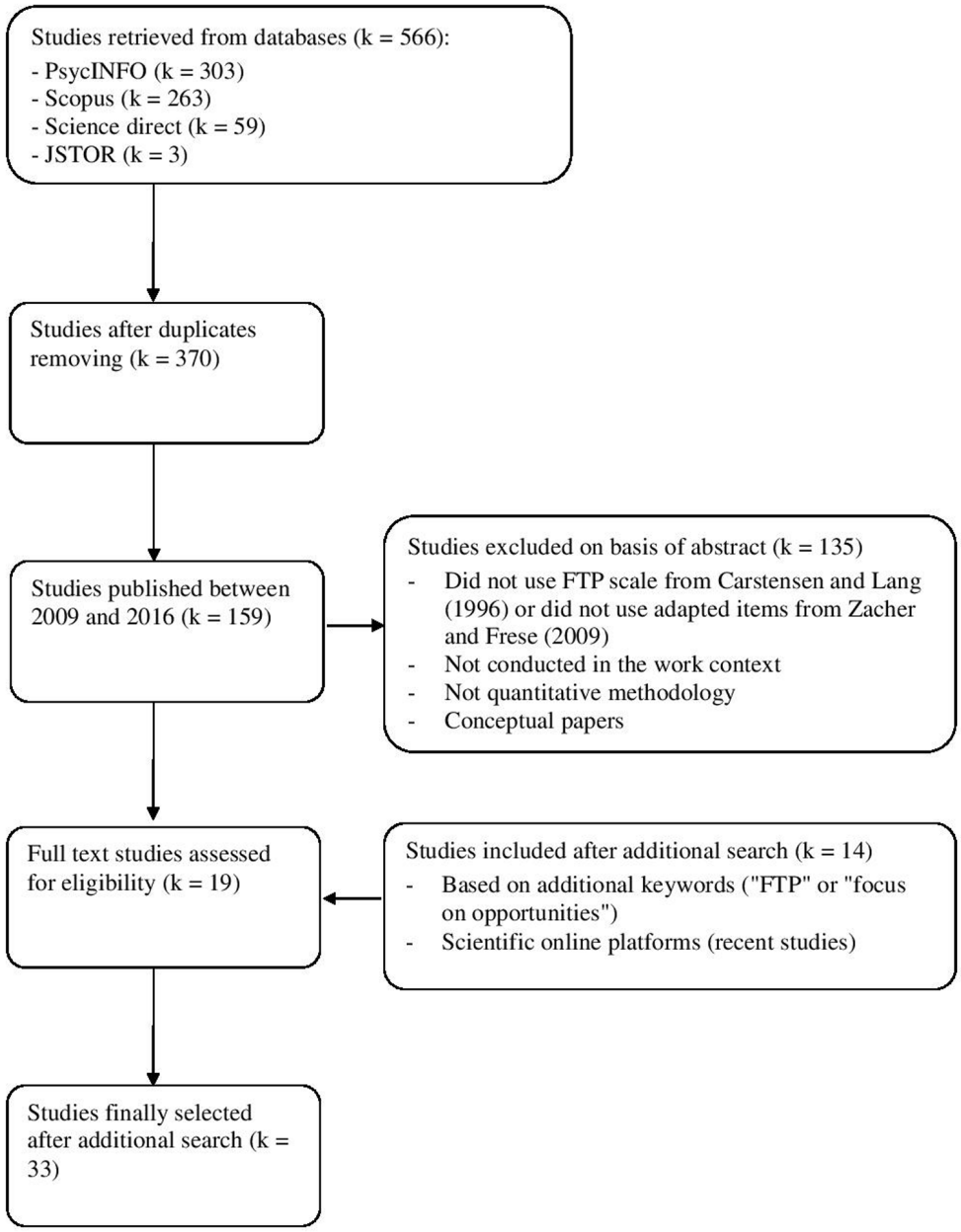

FIGURE 1 | Flow chart literature search process.

negatively related to focus on opportunities at work ($r = -0.50$, Froehlich et al., 2016; $r = -0.41$, Gielnik et al., 2012; $r = -0.48$, Gielnik et al., 2016; $r = -0.43$, Kochoian et al., 2016; average $r = -0.44$, Weikamp and Göritz, 2015; $r = -0.60$, Zacher and Frese, 2009; $r = -0.72$; Zacher and Frese, 2011; $r = -0.50$, Zacher et al., 2010). Moreover, mental health ($r = 0.20$, Gielnik et al., 2012), optimism ($r = 0.40$, Schmitt et al., 2013a), and using SOC strategies ($r = 0.09$, Zacher and Frese, 2011) were positively associated with focus on opportunities.

Regarding personality, Zacher and Frese (2009) included Big Five personality traits as control variables, and found that extraversion and conscientiousness were, respectively, positively and negatively related to both focus on opportunities ($r = 0.24$, $r = -0.28$) and remaining time ($r = 0.15$, $r = -0.22$). Moreover, Zacher (2013) found positive correlations between proactive personality and focus on opportunities ($r = 0.35$) and remaining time ($r = 0.25$). Again, gender and education have often been studied as control variables (e.g., Zacher and Frese, 2009; Weikamp and Göritz, 2015). For instance, Weikamp and Göritz (2015) found effects of both gender and education, such that women and people with higher educational degrees perceived themselves as having more remaining opportunities at work.

TABLE 2 | Empirical studies on future time perspective (FTP) at work published over the past decade.

Authors and year	Sample[a] and design	Measure and dimensions	Antecedents[b]	Consequences[b]
General FTP at work				
Unidimensional operationalization				
(1) Bal et al., 2013	Sample 1: 117 employees, mean age = 37 years, cross-sectional; Sample 2: 217 employees, mean age = 54.8 years, cross-sectional	FTP (10 items), general FTP	*Age (–)	*Continuance commitment (–) *Normative commitment (–)
(2) Bal et al., 2010	176 post-retirement workers, 65–79 years, cross-sectional	FTP (10 items), general FTP		*Employer developmental fulfillment (+) *In-role obligations (–) *Citizenship obligations (–) *High performance obligations (n.s.)*
(3) Baltes et al., 2014	104 older contracts workers, mean age = 69.20 years, three-wave study	FTP (10 items), general FTP	*Promotion focus (n.s.)*	*Promotion focus (+)
(4) De Lange et al., 2011	90 employees, 22–61 years, two-wave study	FTP (seven items), general FTP	/	*Work motivation (n.s.)*
(5) Korff et al., 2016	913 employees, mean age = 41.9 years, cross-sectional	FTP (10 items), general FTP	*HRM systems (*Motivation enhancing practices [+]; *Knowledge, skills and abilities enhancing practices [n.s.]*; *Opportunity enhancing practices [n.s.])*	*Job satisfaction (+) *Affective organizational commitment (+)
(6) Oostrom et al., 2016	244 employees, 45–65 years, cross sectional	FTP (10 items), general FTP	*Tasks and work responsibilities i-deals (+)	*Employability (+)
(7) Park and Jung, 2015	555 employees, 18–57 years, cross sectional	FTP (10 items), general FTP	/	*Occupational self-efficacy (+) *Career commitment (+) *Organizational commitment (+)
(8) Sia et al., 2015	234 female employees, 40–45 years, cross-sectional	FTP (10 items), general FTP	/	*Physical, emotional, and cognitive work engagement (+)
(9) Treadway et al., 2010	291 managers, mean age = 30.6 years, cross-sectional	FTP (10 items), general FTP (and OFTP)	/	*Career networking (+ for general FTP; *n.s. for OFTP*) *Community networking (+ for general FTP; *n.s. for OFTP*)
(10) Treadway et al., 2011	291 employees, mean age = 30.6 years, cross-sectional, sample overlap with [9]	FTP (10 items), general FTP	/	*Continuance commitment (–) *Affective commitment (n.s.)*

(Continued)

TABLE 2 | Continued

Authors and year	Sample[a] and design	Measure and dimensions	Antecedents[b]	Consequences[b]
(11) Yeung et al., 2013	67 Chinese clerical employees, 19–58 years, 14-day experience sampling study	FTP (10 items), general FTP	/	*Momentary task performance (+)
Bidimensional operationalization				
(12) Akkermans et al., 2016	186 taxi employees, mean age = 55.01 years, cross-sectional	Focus on opportunities (FO) (three items), remaining time (RT) (three items)		*Intrinsic work motivation (+: RO and RT) *Extrinsic work motivation (+ for RT; *n.s. for RO*) *Motivation to continue working (+ for RT; *n.s. for RO*)
(13) Kooij et al., 2013	Study 1: 385 health care employees, mean age = 45.7 years, cross-sectional; Study 2: 1169 university employees, mean age = 42.5 years, sample overlap with [15]	FTP (five items), open-ended FTP, limited FTP	*Age (− for open-ended FTP; + for limited FTP)	*Growth motivations (+ for open-ended FTP; − for limited FTP [only in Sample 2]) *Esteem motivations (+ for open-ended FTP*; n.s. for limited FTP*) *Security motivations (n.s.)* *Generativity motivations (n.s.)*
(14) Kooij et al., 2016	287 university employees, mean age = 45.38 years, two-wave study, sample overlap with [13,15,17]	FTP (10 items), open-ended FTP, limited FTP	/	*Job crafting (increasing job resources and challenging job demands; decreasing hindering JD) (+ for open-ended FTP; *n.s. for limited FTP*)
(15) Kooij and Van De Voorde, 2011	660 university employees, mean age = 43.9 ears, two-wave study	FTP (10 items), open-ended FTP, limited FTP	*Subjective general health (+ for open-ended FTP; − for limited FTP)	*Development motives (+ for open-ended FTP; − for limited FTP), *Generativity motives (+ for limited FTP; *n.s. for open-ended FTP*)
(16) Zacher and de Lange, 2011	85 employees, mean age = 43.41 years, two-wave study	FTP (six items), focus on opportunities, focus on limitations	*Age (− for focus on opportunities; *n.s. for focus on limitations*) *Promotion orientation (+ for focus on opportunities; *n.s. for focus on limitations*) *Prevention orientation (+ for focus on limitations; *n.s. for focus on opportunities*)	*Promotion orientation (n.s.)* *Prevention orientation (n.s.)*
Only remaining time				
(17) Kooij et al., 2014	301 university employees, 19–67 years, four-wave study, sample overlap with [13,15]	FTP (four items), remaining time	*Age (−)	*Promotion focus (+) *Growth motives (n.s.)*
Occupational FTP				
Unidimensional operationalization				
(1) Bal et al., 2015	168 employees, 21–70 years, cross-sectional	OFTP (three items), overall OFTP (until retirement)	*Age meta-stereotypes (−) *Negative age stereotypes (n.s.)*	*Intention to retire (−)

(Continued)

TABLE 2 | Continued

Authors and year	Sample[a] and design	Measure and dimensions	Antecedents[b]	Consequences[b]
(2) Ho and Yeung, 2016	199 Chinese clerical workers, 20–64 years, experimental study (scenarios)	OFTP (10 items), overall OFTP	/	*Psychological distress (−) *Job stress (n.s.)*
Bi(tri)dimensional operationalization				
(3) Froehlich et al., 2016	282 employees, mean age = 41.85 years, cross-sectional	OFTP (seven items), focus on opportunities (FO), remaining time (RT)	*Age (− for FO and RT)	*Employability (*Anticipation and optimization [+ for FO; *n.s. for RT*]; *Personal flexibility [+ for FO*; n.s. for RT*]; *Occupational expertise [n.s.]*)
(4) Kochoian et al., 2016	560 workers, 21–64 years, cross-sectional	OFTP (eight items), focus on opportunities (FO), constrained remaining time (RT)	*Age (+ for constrained RT; − for FO)	*Learning self-efficacy (+ for FO; − for constrained RT) *Learning value (+ for FO; *n.s. for constrained RT*)
(5) Weikamp and Göritz, 2015	2180 workers, 18–65 years, six-wave study	OFTP (six items), focus on opportunities (FO), remaining time (RT)	*Age (− for RT and RO)	/
(6) Weikamp and Göritz, 2016	312 workers, 21–64 years, three-wave study	OFTP (five items), focus on opportunities (FO), remaining time (RT)	/	*Job satisfaction (+ for FO; *n.s. for RT*) *OCBO > OCBI (+ for FO; *n.s. for RT*)
(7) Zacher, 2013	182 older job seekers, 43–77 years, cross-sectional	OFTP (10 items), focus on opportunities (FO), perceived remaining time (RT), focus on limitations	/	**Job search intensity*
(8) Zacher and Frese, 2009	176 workers, 19–60 years, cross-sectional	OFTP (six items), focus on opportunities (FO), remaining time (RT)	*Age (− for FO; − for RT) *Job complexity and job control (+ for FO; *n.s. for RT*)	/
Only focus on opportunities				
(9) Gielnik et al., 2012	84 business owners, 24–74 years, cross-sectional	OFTP (five items), focus on opportunities	*Age (−) *Mental health (+)	*Venture growth (+)
(10) Gielnik et al., 2016	201 small business managers, 23–83 years, five-wave study	OFTP (five items), focus on opportunities	*Age (−)	*Business growth (+)
(11) Schmitt et al., 2013a	124 business owners, mean age = 52.7 years, two-wave study	OFTP (four items), focus on opportunities	*General optimism (+) *Work engagement (n.s.)*	*Work engagement (+) *General optimism (n.s.)*

(Continued)

TABLE 2 | Continued

Authors and year	Sample[a] and design	Measure and dimensions	Antecedents[b]	Consequences[b]
(12) Schmitt et al., 2013b	Study 1: 174 employees of a manufacture, 16–64 years, cross-sectional; Study 2: 64 administrative employees, 20–62 years, daily diary study (5 days)	OFTP (five items), focus on opportunities	/	*Work engagement (+)
(13) Zacher and Frese, 2011	133 employees, 16–65 years, cross-sectional	OFTP (four items), focus on opportunities	*Age (−) *Job complexity (+) *Use of SOC strategies (+)	/
(14) Zacher et al., 2010	168 employees, 19–64 years, cross-sectional	OFTP (three items), focus on opportunities	*Age (−) *Job complexity (+)	*Work performance (+)
(15) Zacher and Yang, 2016	649 employees, 18–74 years, cross-sectional	OFTP (three items), focus on opportunities	*Organizational climate for successful aging (+)	*Job satisfaction (+) *Organizational commitment (+) *Motivation to continue working after official retirement age (+)
Only remaining time				
(16) Kooij and Zacher, 2016	Study 1: 175 employees, 19–69 years, cross-sectional; Study 2: 149 employees, mean age = 35.4 years, two-wave study	OFTP (three items), remaining time	*Age (−) *Work centrality (+)	*Learning goal orientation (+) *Attitude toward learning and development (+)

FTP, Future time perspective (when items used refer to the future "in general"; Carstensen and Lang, 1996; Lang and Carstensen, 2002); OFTP, occupational future time perspective (when items used were adapted to the work context, Zacher and Frese, 2009); FO, focus on opportunities; RT, remaining time. [a]*Age range of the sample is provided whenever available; otherwise, mean age is reported.* [b]*Antecedents/outcomes with an asterisk were significantly related to FTP at work; antecedents/outcomes in italics were not significantly related to FTP at work.*

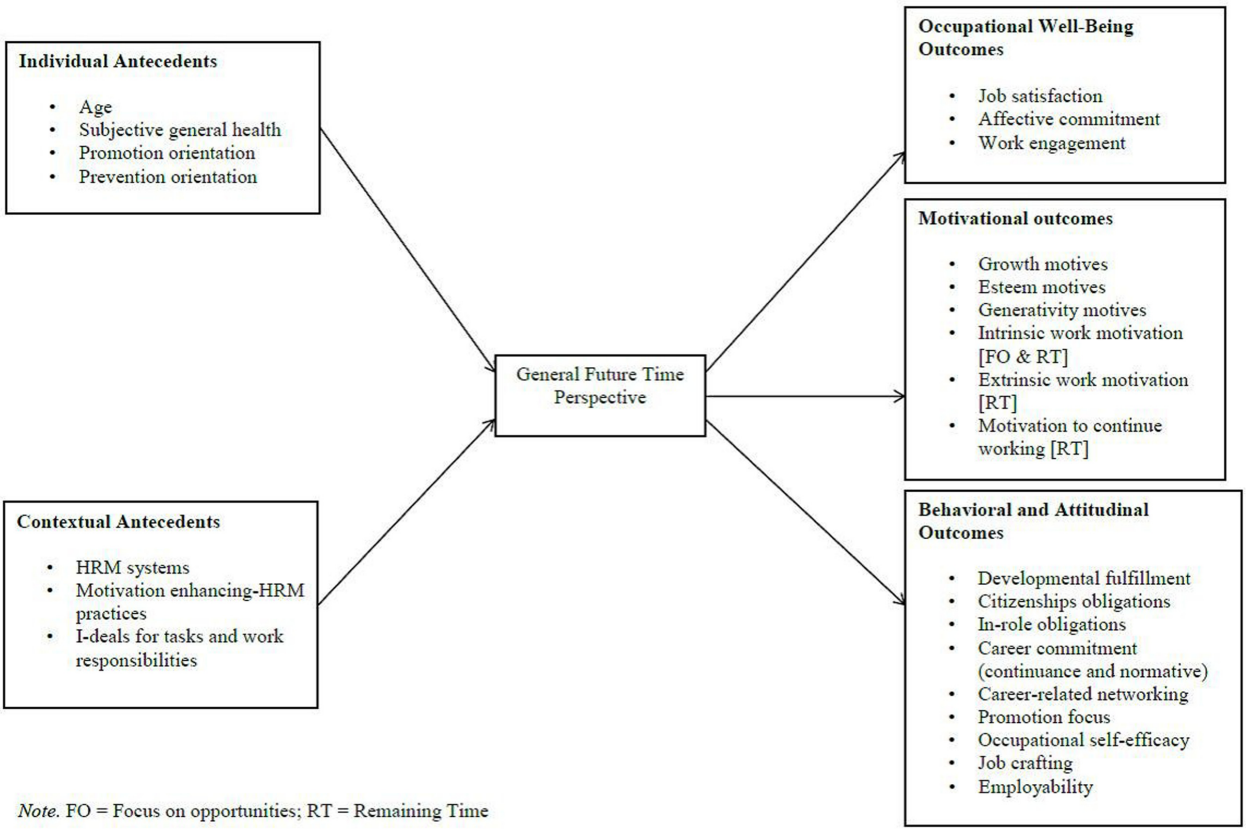

FIGURE 2 | Antecedents and consequences of general future time perspective in the work context.

However, other studies did not find significant effects of gender (e.g., Ho and Yeung, 2016; Weikamp and Göritz, 2016).

Occupational future time perspective has also been shown to be related to contextual variables. Zacher and Frese (2009) and Zacher et al. (2010) showed that job complexity was positively associated with focus on opportunities ($r = 0.17$, $r = 0.20$). More recently, the influence of the organizational climate has also been shown. Bal et al. (2015) reported that the more older workers perceived that they were negatively stereotyped by their younger colleagues, the more their OFTP was reduced ($r = -0.26$). Conversely, Zacher and Yang (2016) found that an organizational climate for successful aging, defined as shared perceptions about organizational practices to facilitate successful aging at work, was positively associated with focus on opportunities ($r = 0.38$).

Consequences of Future Time Perspective at Work

General Future Time Perspective

Regarding occupational well-being outcomes, general FTP was positively associated with job satisfaction ($r = 0.17$, Korff et al., 2016), affective organizational commitment ($r = 0.17$, Korff et al., 2016), career ($r = 0.38$) and organizational commitment ($r = 0.34$, Park and Jung, 2015), as well as physical ($r = 0.22$), emotional ($r = 0.48$), and cognitive ($r = 0.31$) engagement (Sia et al., 2015).

Regarding motivational consequences, workers with an open-ended FTP were more motivated to develop themselves at work ($r = 0.27$, Kooij and Van De Voorde, 2011; $r = 0.32/0.22$, Kooij et al., 2013) and to feel recognition, status, power, and prestige (i.e., esteem motivations) ($r = 0.25/0.14$, Kooij et al., 2013). In contrast, workers with a limited FTP were more motivated by generativity goals ($r = 0.12$, Kooij and Van De Voorde, 2011). However, regarding generativity motives, Kooij et al. (2013) did not find a significant relationship. Finally, Akkermans et al. (2016) found that both focus on opportunities and remaining time in life were positively related to intrinsic work motivations (both $r = 0.40$), extrinsic work motivations ($r = 0.31$ for focus on opportunities and $r = 0.30$ for remaining time), and motivation to continue to work ($r = 0.27$ for focus on opportunities and $r = 0.36$ for remaining time). However, when they tested their structural model, Akkermans et al. (2016) found that only focus on opportunities was related to intrinsic motivation ($\beta = 0.32$), while only remaining time was related to extrinsic motivation ($\beta = 0.30$) and motivation to continue working ($\beta = 0.35$).

For attitudinal and behavioral consequences, Bal et al. (2010) found that general FTP is positively associated with employer developmental fulfillment (i.e., workers' perceptions that their employer has fulfilled his/her obligations regarding development, such as providing them career support and mentoring; $r = 0.28$). They did not find a significant bivariate relationship with

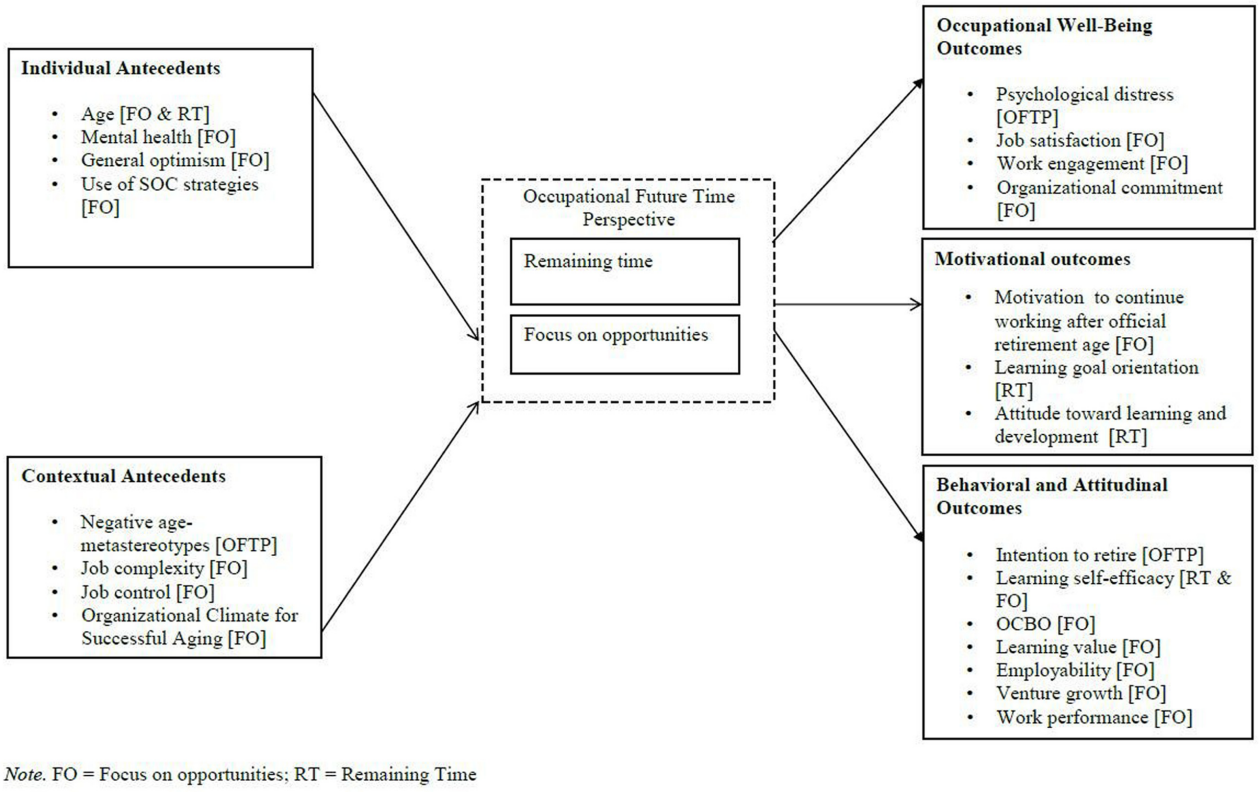

FIGURE 3 | Antecedents and consequences of occupational future time perspective.

employee obligations (i.e., resources they owe to their employer). However, when they tested a structural model, they found significant negative relationships of general FTP with both in-role obligations (e.g., quality of work and cooperation with colleagues; $\gamma = -0.16$) and citizenship obligations (e.g., being flexible about the work and working hours; $\gamma = -0.25$), but not with high performance obligations. Moreover, general FTP is positively associated with career commitment ($r = 0.38$, Park and Jung, 2015) and career-related networking ($r = 0.22$, Treadway et al., 2010). In addition, workers with high general FTP have a stronger promotion focus ($r = 0.38$, Baltes et al., 2014; $r = 0.36$, Kooij et al., 2014), higher occupational self-efficacy ($r = 0.45$, Park and Jung, 2015), and feel more employable ($r = 0.22$ for occupational expertise; $r = 0.37$ for anticipation and optimization; $r = 0.42$ for personal flexibility; $r = 34$ for corporate sense, and $r = 0.33$ for balance, Oostrom et al., 2016). Finally, Kooij et al. (2016) found that open-ended (but not limited) FTP was positively associated with job crafting behaviors (i.e., behaviors that employees engage in to improve the fit between their job and their personal needs), such as increased job resources and challenging job demands ($r = 0.20$) and decreased hindering job demands ($r = 0.12$).

General FTP has also been shown to have indirect effects through individual variables or work-related variables. For instance, general FTP has a positive indirect effect on the use of SOC strategies, through increased promotion focus (indirect effect = 0.06, Baltes et al., 2014); a negative indirect effect on turnover intention via career commitment (indirect effect = −0.25) and organizational commitment (indirect effect = −0.26; Park and Jung, 2015); and indirect positive effects on work engagement (indirect effect = 0.09) and job performance (indirect effect = 0.09) through job crafting (Kooij et al., 2016).

Occupational Future Time Perspective

Regarding associations of OFTP with well-being, Ho and Yeung (2016) reported a negative relationship between OFTP and psychological distress ($r = -0.28$), but a non-significant relationship with job stress. Moreover, our systematic review showed that only focus on opportunities has been investigated in relationship with well-being outcomes. Focus on opportunities was positively related to job satisfaction ($r = 0.23$, Weikamp and Göritz, 2016; $r = 0.33$, Zacher and Yang, 2016), work engagement ($r = 0.27$, Schmitt et al., 2013a; $r = 0.31$, Schmitt et al., 2013b), and organizational commitment ($r = 0.33$, Zacher and Yang, 2016).

Regarding motivational outcomes, Zacher and Yang (2016) showed that focus on opportunities was positively related to motivation to continue working after official retirement age ($r = 0.09$). Investigating perceived remaining time only, Kooij and Zacher (2016) reported positive relationships with growth motives ($r = 0.34$ for learning goal orientation; $r = 0.45$ for attitude toward learning and development).

Regarding attitudinal and behavioral outcomes, Bal et al. (2015) found that overall OFTP was associated with lower intentions to retire ($r = -0.19$). Moreover, Kochoian et al. (2016) investigated and distinguished perceived remaining time and focus opportunities. They showed that both were positively related to learning self-efficacy ($r = 0.52$ for focus on opportunities, $r = -0.37$ for constrained perceived remaining time) and learning value ($r = 0.28$ for focus on opportunities, $r = -0.19$ for constrained perceived remaining time). However, when they tested their hypotheses, they found that focus on opportunities had positive effects on both learning self-efficacy ($\beta = 0.45$) and learning value ($\beta = 0.25$), while constrained perceived remaining time had a negative effect on learning self-efficacy ($\beta = -0.14$) only. In the same way, Weikamp and Göritz (2016) as well as Froehlich et al. (2016) investigated both dimensions of OFTP and found that only focus on opportunities (and not remaining time) was positively associated with organizational citizenship behavior directed toward the organization (OCB-O; $r = 0.29$, Weikamp and Göritz, 2016) and employability ($r = 0.30$ for anticipation and optimization, $r = 0.34$ for personal flexibility, Froehlich et al., 2016). Finally, studies that investigated only the dimension focus on opportunities found positive relationships with work performance ($r = 0.19$, Zacher et al., 2010) and venture growth (i.e., changes in sales, profit, transaction volume, income, and number of employees; $r = 0.33$, Gielnik et al., 2012).

Future Time Perspective at Work as a Mediator

General Future Time Perspective

Most studies have investigated general FTP as a mediator in relationships between age and work motives. For instance, Kooij et al. (2013) found that the negative relationships of age with both growth and esteem motives were mediated by an open-ended FTP, suggesting that these types of motives decrease with age because of an age-related decrease in open-ended FTP. However, they did not find that a limited FTP mediated the positive relationship between age and generativity motives. Thus, generativity motives increased with age but not with limited FTP. In a subsequent study, Kooij et al. (2014) found that perceived remaining time mediated the negative relationship between age and promotion focus.

Moreover, a few studies showed that general FTP mediated relationships between job characteristics and work-related outcomes. Oostrom et al. (2016) found that FTP mediated the positive relationships between idiosyncratic deals for tasks and work responsibilities, and employability in a sample of older workers. Korff et al. (2016) found that motivation enhancing HRM practices within the organization foster employees' FTP, which in turn heightens affective organizational commitment.

Occupational Future Time Perspective

Occupational future time perspective has also been shown to act as a mediator in relationships between age and work outcomes. Studies that distinguished between perceived remaining time and focus on opportunities found that only focus on opportunities mediated the negative relationship between age and employability (Froehlich et al., 2016), and between age and learning value (Kochoian et al., 2016). In other words, older workers perceive less remaining opportunities at work and, consequently, they perceive themselves as less employable and they consider learning and development activities at work as less valuable. In addition, Kochoian et al. (2016) found that both remaining time and focus on opportunities mediated the negative relationship between age and learning-self efficacy. Investigating only perceived remaining time, Kooij and Zacher (2016) found that it mediated the negative effects of age on learning goal orientation and on attitude toward learning and development. Zacher et al. (2010) and Gielnik et al. (2012, 2016) investigated only focus on opportunities. Gielnik et al. (2012) found that it mediated the negative relationship between business owners age and venture growth. Using growth modeling analyses, Gielnik et al. (2016) found that focus on opportunities mediated the moderating effect of small business managers' age on the relationship between time and business performance. Finally, Zacher et al. (2010) found that focus on opportunities mediated the negative relationships between age and work performance.

Similar to research on general FTP, OFTP also has been shown to mediate relationships between job characteristics and work outcomes. Zacher et al. (2010) found that focus on opportunities mediated the positive relationship between job complexity and work performance, such that employees in high-complexity jobs performed better because they had a higher focus on opportunities at work. Moreover, Bal et al. (2015) found that overall OFTP mediated the positive relationship between negative age meta-stereotypes and intention to retire, such that workers who had internalized negative age stereotypes had a lower OFTP and consequently, stronger intentions to retire.

Future Time Perspective at Work as a Moderator

General Future Time Perspective

Future time perspective has been shown to moderate the employer-employee relationship. For instance, Bal et al. (2010) and De Lange et al. (2011) found that FTP moderated the relations between psychological contract fulfillment and employee obligations. In particular, Bal et al. (2010) found that the relations of economic and socio-emotional fulfillment (i.e., when employees believed that their employers has fulfilled their obligations regarding economic and socioemotional needs) with employee obligations (i.e., in-role obligations, citizenship obligations, and high performance obligations) were stronger among post-retired workers with high FTP than among post-retired workers with low FTP (Bal et al., 2010). In other words, workers with an open-ended FTP reacted more strongly to psychological contract fulfillment in relation to employee obligations, which suggest that the level of felt obligations among low FTP workers is less dependent on how they perceive employer obligations to be fulfilled (Bal et al., 2010). Similarly, De Lange et al. (2011) showed that the negative relationship between relational contract breach and work motivation was stronger among workers with a high FTP, suggesting that workers with a high FTP are more strongly affected by the way that employers

behave toward them. However, a high FTP may also be a buffering resource that prevents high FTP workers against the negative impact of job stressors, such as perceived gender discrimination. In particular, Sia et al. (2015) found in a sample of female middle-aged employees that the negative relationships between perceived gender discrimination and emotional and cognitive work engagement become weaker when FTP was high.

Other studies suggest that the moderating effect of FTP depends on the independent and dependent variables under investigation. More precisely, it seems that workers tend to behave according to the needs that are most important for them, that is, socioemotional needs when FTP is low, and instrumental needs when FTP is high. For instance, Treadway et al. (2010) found that politically skilled individuals (i.e., individuals who are effective in the development, maintenance and recognition of social network) with a high FTP engaged more in career-related networking behaviors (e.g., to give business contacts a phone call to stay in touch) than politically skilled individuals with a low FTP. Moreover, Treadway et al. (2011) found that when work interfered with family, workers with a low FTP experienced lower continuance commitment, while those with a high FTP reacted to family interference with work by decreasing their level of affective commitment. Bal et al. (2013) found that socioemotional fulfillment contributes to higher continuance commitment only for low FTP workers, while high FTP workers had higher normative commitment when they received socioemotional fulfillment. Finally, Yeung et al. (2013) investigated effects of social work-related values (values related to affiliation and collaboration with coworkers) on job performance through job satisfaction, and found that the effects of these values were stronger positive among employees with low FTP. As a whole, these results are congruent with assumptions of socioemotional selectivity theory.

Occupational Future Time Perspective

Results of our systematic review showed that workers' behaviors are associated with their OFTP and the congruent most important needs. Investigating coping behaviors, Ho and Yeung (2016) found that relative to those with limited OFTP, who preferred passive coping strategies, those with an open-ended OFTP preferred problem-focused and proactive coping strategies. Moreover, they found that OFTP moderated the effect of problem-focused strategies on psychological distress, such that problem-focused strategies reduced psychological distress only among workers with an open-ended OFTP. When they investigated effects of "organizational FTP" (i.e., perceived remaining time and opportunities left in the current organization), Treadway et al. (2010) found that politically skilled individuals with a limited organizational FTP were more involved in community-based networking (e.g., to attend meetings of civic and social groups, clubs and so forth) than their counterparts with an open-ended organizational FTP.

Similar to FTP, some studies indicated that OFTP may be a personal resource for workers. For instance, Schmitt et al. (2013b) found that job control, as an external resource of the work environment, is positively related to work engagement among employees with a low focus on opportunities, and not among employees with a high focus on opportunities. Similar to results from Sia et al. (2015), these results support the notion of OFTP as a compensatory resource, since a high level of focus on opportunities compensates for low levels of job control in predicting work engagement. As far as remaining time is concerned, Zacher (2013) showed that proactive personality predicts greater job search intensity when perceived remaining time is low compared to when it is high.

Finally, personal, work, and organizational resources may buffer the negative direct effect of age on focus on opportunities and on remaining time, as well as the negative indirect effects on work outcomes. For instance, Zacher et al. (2010) found that job complexity buffers the negative relationship between age and focus on opportunities, and weakens the negative indirect effect of age on work performance. In other words, when the work context offers high levels of job complexity, older workers are better able to maintain high level of focus on opportunities, and indirectly, they perform better at work. In the same way, Zacher and Yang (2016) found that older employees in organizations with a positive organizational climate for successful aging had a higher focus on opportunities than older employees who did not work in an organization with such climate. Finally, Kooij and Zacher (2016) showed that high work centrality buffered the negative relationship between age and remaining time, as well as the negative indirect effects of age on learning goal orientation and on attitudes toward learning and development.

DISCUSSION

In this article, we presented a comprehensive systematic review of the quantitative-empirical literature on FTP at work. Our review highlights that FTP at work has been measured and reported in various ways: some authors measured general FTP, and others measured OFTP. Authors further operationalized FTP at work as either unidimensional or bidimensional. Various individual and contextual variables are related to both general FTP and OFTP which, in turn, are related to occupational well-being, as well as motivational, attitudinal, and behavioral outcomes. Some studies investigated FTP and OFTP as mediators in relationships between age and work outcomes, and in relationships between job characteristics and work outcomes. Other studies investigated FTP and OFTP as moderators of relationships between person/contextual characteristics and work outcomes. In the following section, we will first summarize and integrate our findings.

Summary of Findings

Results of the systematic review showed that findings are quite similar regarding antecedents and consequences of both general FTP and OFTP. As a whole, more research has investigated the work-related outcomes associated with general FTP and with the dimension focus on opportunities of OFTP. In the following sections, we will summarize results about FTP at work, and we will outline when differences were observed between general FTP and OFTP.

Antecedents of FTP at Work

With regard to individual antecedents, studies showed that FTP at work is associated with age, subjective health, optimism, and regulatory focus. Among contextual antecedents, our systematic review showed that both organizational characteristics, such as HRM systems and organizational climate for successful aging, as well as work characteristics, such as job control and job complexity, are related to FTP at work. Although age had the strongest negative relationship with FTP at work, several studies found that the relationship became weaker when workers have high personal (e.g., work centrality, Kooij and Zacher, 2016) or contextual resources (e.g., job control, Zacher and Frese, 2009).

Consequences of FTP at Work

Our systematic review showed that FTP at work, especially the dimension focus on opportunities, is positively associated with general and occupational well-being (e.g., work engagement). Consistently with socioemotional selectivity theory (Carstensen et al., 1999), FTP at work is in general positively related to growth and esteem motives, and negatively to generativity motives. With some differences depending on the type of measure, FTP at work is also positively related to work-related motives and motivation to continue working. Finally, FTP at work is positively related to a wide range of positive worker attitudes and behaviors, such as job crafting (Kooij et al., 2016) and lower intention to retire (Bal et al., 2015).

FTP at Work as a Mediator and as a Moderator

Studies that investigated FTP at work as a mediator found that it mediated the negative relationships between age and development-oriented attitudes, such as growth motives, promotion focus, and employability. These results suggest that development-oriented attitudes decline with age because of an age-related decrease in open-ended FTP. Moreover, FTP at work explained relationships between job characteristics and work outcomes, such as positive effects of idiosyncratic deals on employability, positive effects of HRM systems on affective organizational commitment, or positive effects of job complexity on work performance.

Findings from studies on FTP at work as a moderator showed that it moderated the relationships between psychological contract fulfillment and employee obligations; political skill and networking behaviors; work-family conflict and commitment; and stressful work situations and coping strategies. Consistent with socioemotional selectivity theory, workers with an open-ended FTP seem to be more concerned with instrumental goals, such as psychological contract fulfillment, career-related networking behaviors, continuance commitment, problem-focused and proactive coping strategies, while workers with a limited FTP emphasize more socio-emotional goals, such as community based-networking, affective commitment, social work-related values, and passive coping strategies.

Theoretical Implications

Our review of the literature showed that over the past decade, several studies were conducted to understand the role of FTP in the work context. However, some important issues remain to be solved in future research. Our suggestions for future research are summarized in **Table 3**.

Socioemotional Selectivity Theory

Future time perspective is a core construct in socioemotional selectivity theory (Carstensen et al., 1999). Socioemotional selectivity theory states that age-related changes in motives are due to changes in FTP, such that younger individuals focus more on instrumental and growth motives while older individuals focus more on socioemotional motives and relationships with close social partners. Results of our systematic review showed that FTP at work is indeed related to increased growth motives (e.g., Kooij and Van De Voorde, 2011; Kooij et al., 2013). Regarding socioemotional motives, conceptualized through the concept of generativity, results were less consistent. Results on the role of FTP at work as a mediator or as a moderator also confirmed that instrumental motives and attitudes decline with age because of an age-related decrease in open-ended FTP. Moreover, workers with an open-ended FTP seem to be more concerned with instrumental goals, while workers with a limited FTP emphasize more socio-emotional goals.

According to socioemotional selectivity theory, FTP is a flexible, cognitive-motivational, and age-related construct that changes over time (Zacher and Frese, 2009). Findings from experimental studies (e.g., Fung et al., 1999) showed that not only individual factors, but also contextual variables (e.g., life circumstances), may influence FTP. Our systematic review confirmed that other factors than age may influence FTP at work. However, these studies have mainly focused on subjective health and self-regulation strategies as individual antecedents. Regarding contextual antecedents, some work and organizational

TABLE 3 | Summary of future research suggestions regarding future time perspective at work.

Research focus	Research directions for studies in the work context
FTP at work antecedents	• Additional individual antecedents (e.g., personality, gender) • Additional contextual antecedents (e.g., task and skill variety, ageism, work-family interface)
FTP at work consequences	• Additional consequences (e.g., psychological health, socio-emotional motives, general well-being, intention to retire) • Distinguish dimensions (i.e., focus on opportunities and remaining time)
FTP at work as a mediator and moderator	• Status of FTP (e.g., personal resource?) • Role of FTP in the JD-R model (e.g., moderator and/or mediator?)
Research design	• Longitudinal designs • Experimental designs (e.g., vignette)
Measurement of FTP at work	• Measure OFTP more than general FTP • Emphasize the difference between the two concepts
Dimensions of FTP at work	• Measure both dimensions (focus on opportunities and remaining time) • Test the factorial structure of FTP at work • Investigate specific antecedents and consequences of both dimensions

characteristics have been investigated. In the following section, we will summarize suggestions for future research on antecedents and consequences of FTP at work.

Antecedents of FTP at Work

Our systematic review showed that both general FTP and OFTP are influenced by similar individual and contextual antecedents. Therefore, we do not distinguish between future research suggestions for general FTP and OFTP.

Individual antecedents

We suggest that further studies investigate the effects of personal resources other than subjective health, optimism, and regulatory focus. In particular, personality variables such as extraversion, conscientiousness, and proactive personality might contribute to an extended FTP at work. For instance, when Zacher (2013) investigated the mediating effect of OFTP to explain the moderating role of age on the relationship between proactive personality and job search intensity, he found positive correlations between proactive personality and focus on opportunities and with remaining time at work. Moreover, controlling for Big Five personality traits, Zacher and Frese (2009) found that only conscientiousness was negatively related to focus on opportunities at work, while Cate and John (2007) found positive relationship between conscientiousness and general focus on opportunities. While Zacher and Frese (2009) explained these results by the fact that conscientious employees may focus more strongly on their present tasks and duties, Cate and John (2007) argue that conscientiousness help individuals to plan and take advantage of future opportunities. These contradictory findings highlight that future studies should take into account potential context effects to better understand the associations between personality and FTP.

The role of gender for FTP at work also requires further investigation. While some studies found gender differences in OFTP (e.g., Zacher and Frese, 2009; Treadway et al., 2010; Bal et al., 2015; Weikamp and Göritz, 2015), such that women seem to have a stronger focus on opportunities and to perceive more remaining time at work, other studies did not find significant effects (e.g., Ho and Yeung, 2016; Weikamp and Göritz, 2016). The fact that women seem to perceive themselves as having more remaining time and opportunities at work is somewhat surprising. According to Weikamp and Göritz (2015), due to the glass ceiling effect, women should perceive fewer opportunities at work than men. Moreover, the fact that they have to disrupt their work schedule because of parental leave could also lead them to perceive less remaining time at work (Weikamp and Göritz, 2015). Weikamp and Göritz (2015) suggested that this unexpected pattern may be due to their sample being composed of more educated women than the general population, which might have resulted in greater focus on opportunities. Future studies should therefore control for education when investigating gender differences in FTP at work.

Contextual antecedents

Work characteristics that are perceived as situational resources have been shown to extend employees' FTP at work (e.g., Zacher et al., 2010). Future studies should investigate effects of other job resources that are particularly important for older workers. For instance, Zaniboni et al. (2013) found that increased task variety had stronger negative effects on burnout and turnover intentions among younger workers compared to older workers, while increased skill variety led to lower turnover intentions among older workers than younger workers. These results were consistent with predictions of socioemotional selectivity theory. On the one hand, task variety is likely to increase work-related knowledge that is important for future career development, which is more important for younger workers. On the other hand, skill variety will allow increasing work-related emotional-regulation goals, and increasing gratifying experiences in the present, which is most important for older workers (Zaniboni et al., 2013). On this basis, future studies could examine if positive associations of task variety and skill variety with burnout and turnover intentions are moderated by FTP at work, and if FTP explains the moderating role of age on these associations.

Moreover, it would also be interesting to analyze variables that are likely to reduce FTP at work, such as ageism. As reported by Bal et al. (2015), negative age meta-stereotypes were associated with fewer perceived opportunities until retirement. Unexpectedly, the relations were stronger among workers with a low self-categorization as an older person. These results suggest that negative stereotypes constitute a threat to workers' self-image, especially among those who strive to maintain a positive self-image. In turn, workers might adapt by perceiving their occupational future as more limited (Bal et al., 2015). As suggested by Bal et al. (2015), more research is needed to further validate these ideas, and to investigate if the affective (i.e., prejudice) and the behavioral consequences (i.e., discrimination) of stereotypes have similar effects on FTP at work.

Finally, contextual antecedents of FTP at work related to the work-family interface have not been studied so far. However, the work-family interface may influence perceptions of remaining time at work. For instance, Raymo and Sweeney (2006) found that work-family conflict was positively related to preferences for retirement. Moreover, changes in motives depicted by socioemotional selectivity theory suggest that individuals are likely to place more importance on family relative to work when they grow older (Thrasher et al., 2015). In a study on the moderating role of general FTP in the relationship between work-family conflict and organizational commitment, Treadway et al. (2011) found negative correlations between general FTP and both work-family conflict and family work conflict. Therefore, we recommend that future studies investigate whether work-family conflict may affect perceptions of remaining time and focus on opportunities at work. Moreover, future research could investigate if the positive side of the work-family interface, such as work-family enrichment, is positively related to FTP at work. To the extent that work-family enrichment generates resources which help workers to manage work and family life (Mauno et al., 2015; McNall et al., 2015), and lead them to remain within the company (Balmforth and Gardner, 2006; Wayne et al., 2006; McNall et al., 2015), high levels of work-family enrichment might be associated with increased FTP at work.

Consequences of Future Time Perspective at Work

Our systematic review showed that both general FTP and OFTP have positive consequences on occupational well-being, motivation, and behavior at work. Regarding OFTP, more research investigated the consequences associated with focus on opportunities. In the following sections, we will outline our suggestions for future research on the consequences of the specific dimensions of FTP at work.

Occupational well-being outcomes

With the exception of a study by Ho and Yeung (2016) that reported a negative relationship between OFTP and psychological distress as measured with the General Health Questionnaire (Goldberg, 1972), we did not find studies that investigated consequences of FTP at work for general health. Instead, research on general FTP and OFTP has focused on consequences for workers' attitudes and occupational well-being, such as affective commitment or work engagement. However, it would be interesting to investigate whether both dimensions of FTP at work are related to psychological health, since both dimensions of general FTP seem to have unique associations with health outcomes. For instance, Kozik et al. (2015) found that a high focus on opportunities was associated with less depressive symptoms and higher morale, while a low focus on limitations was associated with fewer hair cortisol. Future research should further explore if focus on opportunities and remaining time are differently related to psychological health. In particular, the expanded job demands-resources (JD-R) model by Xanthopoulou et al. (2007), which takes into account the role played by personal resources may be a suitable theoretical framework. From this perspective, it might be interesting to investigate whether focus on opportunities is a personal resource that is positively related to a positive psychological state of mind, such as work engagement, while constrained perceived remaining time (i.e., focus on limitations) is a demand that is negatively related to health, such as increased burnout.

Motivational outcomes

Consistent with socioemotional selectivity theory, FTP at work is related to increased growth motives, and mediated the negative effect of age on growth motives (e.g., Kooij and Van De Voorde, 2011; Kooij et al., 2013). Kooij and Van De Voorde (2011) and Kooij et al. (2013) conceptualized socioemotional motives as generativity, which refers to the concern of adults to nurture and guide younger generations (Erikson, 1963; McAdams and de St. Aubin, 1992). In the workplace, the generativity motive is defined as the preference for job features that pertain to teaching, training, and sharing skills with younger generations (Kooij et al., 2013). Results on the relationship between FTP at work and generativity motives were less consistent. While Kooij and Van De Voorde (2011) found positive relationships between limited FTP and generativity motives, Kooij et al. (2013) did not find significant relationships. It might be that generativity motives are not the best way to conceptualize socioemotional motives, especially in the work context. Future studies should use other measures of socioemotional motives, such as Yeung et al. (2013) who measured social work-related values that assess the perceived importance for social interactions and harmonious relationships with colleagues in the workplace. As shown by these authors, the positive effects of social work-related values on job performance were moderated by FTP at work, such that effects were stronger positive among employees with limited general FTP. Future studies could go further and investigate if a limited FTP at work predicts increased socioemotional motives.

Moreover, as older workers seem to experience increased level of emotional well-being (Scheibe et al., 2016), it would be interesting to test if a limited FTP explains increased well-being at the end of people's careers. However, this proposition may raise some conceptual concerns, since research has previously shown that increased OFTP is positively associated with well-being outcomes, such as less psychological distress (Ho and Yeung, 2016) or increased job satisfaction (Weikamp and Göritz, 2015). In other words, an open-ended FTP at work is positively associated with positive well-being outcomes. Therefore, assuming that a limited FTP at work is positively associated with well-being outcomes would contradict previous findings. However, while Ho and Yeung (2016) treated OFTP as one-dimension scale and investigated general well-being, Weikamp and Göritz (2015) distinguished between both dimensions and investigated effects on work-related well-being. They found that only focus on opportunities was related to job satisfaction. On this basis, we suggest that future studies distinguish between remaining time and focus on opportunities, and investigate effects on general well-being too. In particular, limited remaining time could be positively related to general well-being rather than to work-related well-being, such as job satisfaction. As an example, couples who live in a satisfactory marriage are more prone to retire early than couples in conflict-laden marriages (Kubicek et al., 2010). In other words, high quality of relationships with family might lead people to perceive remaining time at work as limited. This perception, in turn, may be related to workers' positive general well-being.

Behavioral and attitudinal outcomes

Our systematic review showed that fewer studies have investigated the behavioral consequences associated specifically with remaining time at work. Despite the fact that focus on opportunities seem to be more strongly associated with work-related variables than remaining time at work (Froehlich et al., 2016), it may be that extended perceptions of remaining time at work are related to variables such as intention to remain within the organization or intention to retire. For instance, Bal et al. (2015) found that higher global OFTP was related to lower intention to retire. Moreover, Akkermans et al. (2016) recently found that remaining time in life (but not focus on opportunities) was positively related to motivation to continue working. The fact that Bal et al. (2015) found significant effects for the global measure of OFTP while Akkermans et al. (2016) found significant effects for general remaining time only may be explained by what was measured when they referred to time. While Bal et al. (2015) measured OFTP until retirement, Akkermans et al. (2016) measured remaining opportunities and remaining time in life in general. These results suggest that intention to remain within the organization would be

influenced only by the dimension remaining time. Since Bal et al. (2015) treated OFTP as a unidimensional variable, it should be interesting to replicate their study by distinguishing the two dimensions of OFTP, and to explore if, similarly, intention to retire is more strongly predicted by perceived remaining time. In a similar vein, future studies could investigate whether focus on opportunities has an indirect effect on intention to remain through improved attitudes at work (such as job satisfaction), while remaining time might have direct effect on attitudes. To date, there are not enough studies to draw definite conclusions regarding this question.

Future Time Perspective at Work as a Mediator and Moderator

So far, the lion's share of studies has investigated FTP at work as a moderator or as a mediator in the relationships between age, job characteristics, and work outcomes. On the one hand, some studies found that FTP at work buffers negative associations of job demands or of a lack of job resources with work engagement. Indeed, FTP at work has been shown to be a compensatory resource that can be useful when workers face high job demands (e.g., gender discrimination, Sia et al., 2015) or a lack of job resources (e.g., job control, Schmitt et al., 2013b). On the other hand, FTP at work has been shown to mediate associations between positive job characteristics and work outcomes. For instance, Korff et al. (2016) showed that FTP at work mediated the positive relationship between motivation-enhancing HRM practices and affective organizational commitment.

Results from these studies suggest that FTP at work constitutes a personal resource that can either moderate or mediate positive relationships between job characteristics and work outcomes. However, the simultaneous presence of both moderation and mediation hypotheses and associated empirical findings in the literature may raise the question whether FTP at work plays a systematic role in the relationships between job characteristics and work outcomes. Moreover, there appears to be a lack of a theory to argue why FTP at work acts either as a mediator or as a moderator in these relationships.

In our view, this issue may be related to the various roles of personal resources in the JD-R model (Xanthopoulou et al., 2007). As highlighted by Schaufeli and Taris (2014), personal resources (i.e., the psychological characteristics that are generally associated with resiliency and that refer to the ability to control and impact one's environment successfully) may play at least five different roles in the JD-R model. For instance, some studies found that personal resources moderate the relationships between job characteristics and well-being outcomes (e.g., Van den Broeck et al., 2011), while others found that personal resources mediate this relationship (e.g., Xanthopoulou et al., 2007).

To clarify the role played by FTP at work, future studies should systematically test and compare different conceptualizations of the relationships between job characteristics, FTP at work, and work outcomes. Moreover, studies that investigated FTP at work either as a mediator or as a moderator should refer to a strong theoretical background to support their hypotheses. To this end, the expanded Job Demands-Resources model by Xanthopoulou et al. (2007), which takes the role of personal resources (i.e., self-efficacy, organizational-based self-esteem, and optimism) into account, as well as conservation of resources theory (Hobfoll, 1989), which suggests that employees working in a resourceful environment will become more confident and optimistic about their future at work, may be informative.

Future research could also integrate OFTP with general theories of work and aging, such as the action regulation across the adult lifespan (ARAL) framework (Zacher et al., 2016). Based on action regulation theory, the ARAL framework suggests that workers regulate their actions by developing and selecting goals, orienting themselves in the environment, planning, monitoring the execution of behavior, and processing feedback. Zacher et al. (2016) argued that aging and age-related changes in person and contextual factors impact on this action regulation process. Change in OFTP might be an important mediating mechanism in this regard. For instance, OFTP might influence whether young, middle-aged, and older workers set short- or long-term goals (Seijts, 1998), and what kind of information workers prioritize when processing external feedback (Wang et al., 2015). Integrating OFTP with the ARAL framework appears to be an important step toward an improved, theory-based understanding of how work behavior changes across the working life span.

Research Design

Regarding the research designs of articles included in our review, we note that the majority of studies were cross-sectional. Future studies should make use of longitudinal designs more often to test the causal direction of relationships, and to assess the dynamics of FTP at work. Results from a longitudinal study with six measurement waves over 4 years showed that OFTP decreased over time, and that the rate of decrease in OFTP was associated with age (Weikamp and Göritz, 2015). In particular, the study found that workers perceived fewer remaining time and opportunities over time, and younger workers felt that their remaining time decreased faster than older workers did. Thus, the relationship between age and FTP at work might not be linear and future studies should investigate further how FTP at work decreases over time and depending on age. Furthermore, as suggested by Weikamp and Göritz (2015), future studies could investigate whether FTP as conceptualized by Cate and John (2007), which distinguishes between focus on opportunities and focus on limitations, decreases also depending on age. Finally, a longitudinal design would also be useful to assess whether effects of both dimensions of FTP at work on work outcomes are always linear and positive, or whether they might also be curvilinear under certain circumstances. For instance, future research could investigate whether perceiving a lot of remaining time at work has positive effects when workers are not satisfied at work.

In addition, future studies could induce a limited vs. an open-ended OFTP in experiments or through situational vignettes. Such designs have already been used in studies assessing effects of open-ended vs. limited general FTP on preferences for social partners (e.g., Fung et al., 1999; Fung and Carstensen, 2004). To apply this to the work context,

future studies could, for instance, manipulate the official age for retirement through a vignette, and see if this affects workers' perceived remaining time and focus on opportunities at work.

Measurement of Future Time Perspective at Work

A major issue regarding current research on FTP at work concerns the use of different measurement instruments. Some researchers have either measured general FTP, which involves remaining time and opportunities in life in general, while others measured OFTP, which entails remaining time and opportunities at work. Perceptions of remaining time *in life* (i.e., general FTP) make salient the subjective life expectancy, whereas perceptions of remaining time *to work* (i.e., OFTP) make salient the expected age for retirement. Moreover, the items of the OFTP scale focus on the work sphere, whereas general FTP has a more global focus. For instance, general FTP may refer to time left and opportunities in the work sphere but also in the private sphere. Furthermore, using a measure of general FTP or OFTP may lead to different results. For instance, Treadway et al. (2010) measured general FTP (i.e., perceptions of time left in life in general) and OFTP (i.e., perceptions of time left in a specific organization). Results showed that FTP, but not OFTP, was related to career and community networking behaviors, such as giving business contacts a phone call to stay in touch or attending meetings of civic and social groups.

Finally, our systematic review showed that most studies conducted in the workplace did not clearly specify whether they measured general FTP or OFTP. To be less ambiguous, we suggest that future studies conducted in the work context use the OFTP scale, because it has been specifically adapted to the work context. If researchers are interested in investigating effects of general FTP in worker samples, we recommend that they explain why they measure general FTP instead of OFTP, and describe the difference between the two constructs (e.g., see Akkermans et al., 2016).

Dimensions of Future Time Perspective at Work

Another issue concerns the structure of FTP at work. The original scale developed by Carstensen and Lang (1996) was initially conceived as unidimensional, but contains items assessing both remaining time and focus on opportunities. While several researchers (e.g., Cate and John, 2007; Zacher and Frese, 2009) found that FTP at work is best described by two dimensions, most studies on FTP at work implicitly assume that the FTP scale is unidimensional, but they do not test this assumption. However, some authors who assessed the structure of general FTP found that a two-factor model, with remaining time and focus on opportunities, fitted the data better than a one-factor model (e.g., Kooij et al., 2014). On this basis, we recommend that researchers systematically test whether a two-factor model of FTP at work fits the data better than a one-factor model.

Moreover, future studies should systematically test whether focus on opportunities and remaining time have different antecedents and consequences. Some studies suggest that both dimensions may differ with regard to the relationships they have with individual and organizational variables. Regarding its antecedents, focus on opportunities seems to be more strongly related to working conditions than remaining time. For instance, Zacher and Frese (2009) found that focus on opportunities (but not remaining time) was associated with work characteristics (i.e., job control and job complexity). As mentioned by Weikamp and Göritz (2015), people who change their job or team, or get a new supervisor, will probably perceive themselves as having more or less opportunities after the change. On the one hand, these kinds of work-related changes seem less likely to influence perceptions of remaining time at work. On the other hand, perceptions of remaining time at work are more strongly related to age than focus on opportunities, probably because most people retire within a narrowly defined age range.

Regarding the consequences, Weikamp and Göritz (2016) found that focus on opportunities (but not remaining time) has positive relationships with job satisfaction and organizational citizenship behavior. Moreover, Froehlich et al. (2016) as well as Kochoian et al. (2016) found that only focus on opportunities (but not remaining time) was positively associated with employability and learning value. These results suggest that focus on opportunities is more directly related to work outcomes than remaining time. This may explain why we found more studies that investigated only the concept focus on opportunities and its relationships with work outcomes. Today, there are not enough studies to develop differentiated hypotheses for focus on opportunities *and* remaining time. We thus recommend that researchers include both dimensions in their studies and investigate whether they have the same relationships with individual and contextual antecedents.

Interestingly, some results of mediation analyses suggest that remaining time may be an antecedent of focus on opportunities. For instance, Kooij et al. (2014) reported that perceived remaining time mediated the negative relationship between age and promotion focus, which is related to focus on opportunities (Zacher and de Lange, 2011). Future studies could investigate the lagged relationships between both dimensions, and test whether remaining time is an antecedent of focus on opportunities, and whether they interact to predict work outcomes.

Practical Implications

Our review showed that an increased FTP at work is associated with positive consequences for individuals (e.g., less psychological distress, increased employability) and organizations (e.g., lower intention to retire, increased work performance). Since perceptions of remaining time and focus on opportunities are positively associated with contextual variables, such as positive work characteristics, organizations should aim to improve these job characteristics. For instance, managers could be trained to redesign jobs to allow for more autonomy (i.e., job control) and more challenging tasks (i.e., job complexity). To enhance FTP at work among older workers, practitioners could change job characteristics that are particularly important for this group of workers. For instance, managers could increase skill variety to allow older workers to make full use of their experience-based knowledge (Truxillo et al., 2012).

Organizational climate may also influence perceptions of remaining time and focus on opportunities at work. To decrease negative age stereotypes, training on how to manage age-diversity

could be provided to managers. As an example, Ries et al. (2013) designed and implemented such training for managers. Results showed that the training had a positive impact 4 months later, by increasing appreciation of age diversity, and by reducing age stereotypes of supervisors (Ries et al., 2013). In addition, other interventions could be implemented to create an organizational climate that supports all age groups, and to reduce negative age stereotypes. For instance, intergenerational contact has been shown to be negatively related to ageism and turnover intentions (Iweins et al., 2013; Henry et al., 2015). Moreover, applying age-inclusive HR practices (e.g., age-neutral recruiting activities, equal access to training for all age groups) can positively influence perceptions of an organization-wide age diversity climate (Böhm et al., 2014).

Finally, the use of SOC strategies has been shown to be positively related to focus on opportunities (Zacher and Frese, 2011; Baltes et al., 2014). Therefore, SOC training could be provided to employees to teach them how to better select their work goals, optimize goal pursuit, and compensate for the loss in relevant resources (Moghimi et al., 2016). To this end, the SOC training developed by Müller et al. (2015) may be an important tool for organizations. During the training, each participant choses a specific goal, develops an action plan to achieve this goal in an optimal way, and considers alternative strategies to face the possible hindrances during goal pursuit. The goals have to be either to cope more effectively with an important job demand, or to activate a valued job resource. Applying this training among nurses working in a community hospital, Müller et al. (2015) observed a trend that the proposed SOC training increased mental well-being, especially among nurses who were strongly committed to the intervention. Since the use of SOC strategies is particularly beneficial for maintaining older workers' focus on opportunities (Zacher and Frese, 2011), especially when they have a low-complex job, organizations should provide them with training on the use of SOC strategies.

KEY CONTRIBUTIONS AND CONCLUSION

In our systematic review, we summarized quantitative-empirical studies on FTP at work. Despite a growing number of studies conducted on this topic, there are still many opportunities for future research. With regard to conceptual issues, for example, researchers could investigate additional antecedents (e.g., gender, personality, work-family interface) and further consequences of FTP at work (e.g., psychological health, socioemotional motives, retirement outcomes). Moreover, we identified several methodological issues and areas for future research (e.g., dimensionality of scales, longitudinal and experimental designs).

More specifically, our systematic review contributes to the literature by identifying four important areas for future research. First, more research is needed regarding the role of FTP at work for explaining age differences in emotional functioning and well-being. As highlighted in the review, results regarding relationships of FTP at work with socioemotional motives (e.g., generativity) were not consistent. Moreover, the use of FTP as an explanatory variable for observed age differences in emotional functioning has recently been questioned (Grühn et al., 2016). Future research could investigate whether a limited FTP at work, consistent with predictions of socioemotional selectivity theory, is positively associated with subjective well-being among older workers, and whether FTP at work acts as an explanatory mechanism.

Second, the role of FTP at work for relationships between work characteristics and work outcomes should be clarified. Our review identified many studies that investigated FTP at work as either a mediator or as a moderator in these relationships. Future research should test and compare different conceptualizations of the relations among job characteristics, FTP at work, and work outcomes. A strong theoretical background is also needed to determine how FTP at work should be integrated in such models.

Third, our review identified a lack of consistency regarding the way FTP at work is measured and analyzed. There is a need for systematic research that simultaneously tests and compares relationships of general FTP and OFTP with antecedents and outcomes. The results could be informative as to whether the general items by Carstensen and Lang (1996) or the adapted items by Zacher and Frese (2009) lead to the same conclusions. Moreover, further research is needed regarding the consequences of conceptualizing FTP at work as having one, two, or even three dimensions (i.e., including a focus on limitations; Zacher, 2013).

Fourth and finally, the majority of studies we reviewed were based on self-reports at a single point in time and non-experimental designs, and thus do not allow drawing conclusions about causality. Since FTP at work has been shown to decrease over time (Weikamp and Göritz, 2015), it is crucial that the research design of future studies takes into account the role of time. Another potential study opportunity is to examine whether, similarly to general FTP in non-work specific samples, FTP at work can be manipulated in samples of workers.

In summary, the results of our systematic review showed that both general FTP and OFTP are associated with various individual and contextual antecedents, and that extended perceptions of remaining time and focus on opportunities are, in general, associated with positive individual and work-related outcomes. Thus, our findings suggest that individual workers and organizations may benefit from extended perceptions of remaining time and focus on opportunities at work.

AUTHOR CONTRIBUTIONS

HH: substantial contributions to the conception or design of the work; drafting the work; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. HZ, DD: substantial contributions to the conception or design of the work; revising it critically for important intellectual content; final approval of the version to be published; agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Is There a Downside of Job Accommodations? An Employee Perspective on Individual Change Processes

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By modifying the work environments, work routines, and work tasks of employees with health restrictions, organizations can effectively help them continue to perform their jobs successfully. As such, job accommodations are an effective tool to secure the continued employment of aging workers who develop disabilities across their life span. However, while accommodations tackle health-related performance problems, they might create new challenges on the part of the affected employee. Building on the organizational change and accommodations literatures, we propose a theoretical framework of negative experiences during accommodation processes and apply it to qualitative data from group interviews with 73 manufacturing workers at a German industrial company who were part of the company's job accommodation program. Although problems associated with health-related impairments were mostly solved by accommodation, affected employees with disabilities reported about interpersonal problems and conflicts similar to those that typically occur during organizational change. Lack of social support as well as poor communication and information were raised as criticisms. Furthermore, our findings indicate that discrimination, bullying, and maltreatment appear to be common during accommodation processes. To make accommodation processes more successful, we derive recommendations from the organizational change literature and apply it to the accommodation context. We also emphasize unique characteristics of the accommodation setting and translate these into practical implications.

Keywords: aging workforce, job accommodation, workplace accommodation, disability, impairment, interpersonal conflicts, organizational change

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INTRODUCTION

Organizations are confronted with a growing number of persons with physical impairments and disabilities, and many of these health impairments are due to individual aging processes (WHO, 2011; Boehm and Dwertmann, 2015). A primary trigger of this development is a societal phenomenon often referred to as *demographic change* (Dychtwald et al., 2004; Kulik et al., 2014): Due to the combined effects of low birthrates and increased longevity, the average ages of entire nations as well as their workforces are rising. To maintain the long-term employability of individuals in organizations is a primary corporate challenge of our time (Bal et al., 2013; Zacher and Yang, 2016).

In addressing this challenge, the present study raises the question: How can workplaces be accommodated to enable employees with disabilities to work in ways that both add value for a firm and are satisfying for an affected individual? Job accommodations encompass "modifications in the job, work environment, work process, or conditions of work that reduce physical and social barriers" (Colella and Bruyère, 2011, p. 478). Thus, accommodations establish new working conditions and equal opportunities for a wide range of individuals with health restrictions. In this study, we apply a broad definition of disability as being an "umbrella term for impairments, activity limitations and participation restrictions, referring to the negative aspects of the interaction between an individual (with a health condition) and that individual's contextual factors (environmental and personal factors)" (WHO, 2011, p. 4). Although disabilities can affect individuals of all age groups, there is a high correlation of age and disability (Colella and Bruyère, 2011; WHO, 2011). That is, older workers tend to experience more significant health limitations, putting their further employment at risk. As such, our research question entails important implications for organizations dealing with the challenge of an aging workforce in general and the increasing prevalence of disabilities in particular.

In answering the above-noted research question, the present study makes three important contributions to the literature. As a first contribution, we seek to shed light on the experiences of accommodation recipients during the actual accommodation process and thus expand the focus from an *accommodation requester's view* to a *recipient's view*. To date, accommodation research has been approached mainly from the view of the employing organization or from the perspective of colleagues working with a person with a disability. These streams of research have provided important insights into the preconditions that increase the likelihood of an accommodation being granted (Florey and Harrison, 2000) and the requirements under which colleagues tend to perceive accommodations to be justified (Colella, 2001). However, there has been surprisingly little research from the perspective of the primary actors in the accommodation process, i.e., employees with disabilities themselves (Balser and Harris, 2008). As one important exception, Baldridge and colleagues (Baldridge and Veiga, 2001, 2006; Baldridge and Swift, 2013, 2015) as well as Davison et al. (2009) considered the perspective of employees with disabilities and systematically examined their tendency to *request* accommodations. Specifically, these studies focused on identifying factors that prevent employees with disabilities from requesting future job accommodations. While these studies constitute important steps toward understanding the psychological processes associated with *accommodation requests*, scholars have largely neglected the question of what employees actually experience *after* the accommodation has been requested and granted, and the present study aims at closing that gap.

As a second contribution, the present study seeks to *provide insights regarding the challenges associated with job accommodations*, with the goal to understand critical success factors and to derive recommendations about how to improve such processes within organizations. Consequently, the present study focuses on examining *negative* experiences among accommodation recipients in a systematic, differentiated manner. Notably, the bulk of prior research has primarily focused on the *benefits* of job accommodations for employees and organizations. That is, many studies assume that after the granting of an accommodation, the situation improves for the affected employees, since their health issues are potentially solved and their further employment is secured (Schartz et al., 2006; Colella and Bruyère, 2011). We agree that accommodations are an indispensable opportunity to ensure the employability of older people developing disabilities throughout their working lives and to increase the productivity of employees and organizations (Solovieva et al., 2011; Solovieva and Walls, 2013). At the same time, we argue that once granted, accommodations also lead to novel and unexpected challenges for employees, especially new interpersonal problems and team conflicts.

From a theoretical point of view, we use two major streams of research that support our focus on negative experiences during job accommodations. First, we build upon the large stream of *job accommodation, aging, and disability research*. Here, prior studies show that when thinking about *requesting* job accommodations, employees with disabilities fear serious psychological and social consequences that prevent them from asking for an accommodation (Baldridge and Veiga, 2001, 2006; Baldridge and Swift, 2013, 2015). Moreover, negative past experiences in requesting accommodations affect the likelihood of individuals requesting future accommodations (Davison et al., 2009). These findings prompted Colella and Bruyère (2011) to ask whether "these concerns on the part of people with disabilities [are] justified?" (p. 479), which echoes the need to apply a more fine-grained perspective on the negative experiences of employees during accommodation processes. In addition, studies in the domain of aging clearly show that older employees are frequently confronted with negative attitudes and discriminatory behavior against them, stemming from negative stereotypes on the part of coworkers and supervisors (North and Fiske, 2012; Bayl-Smith and Griffin, 2014; MacDonald and Levy, 2016). Given that most of these stereotypes refer to older workers being less productive and adaptive (e.g., Abrams et al., 2016), it seems likely that employees with all kinds of health restrictions are confronted with similarly negative experiences at work.

Second, the *literature on organizational change* has traditionally focused on employees' negative experiences during change processes (e.g., Coch and French, 1948; Paterson and Cary, 2002; Kiefer, 2005). As a central assumption, in the present study, we suggest that accommodation processes can be understood as individual-level change processes. That way, we posit that many of the employees' experiences during accommodation processes can be compared to experiences during organizational change processes, allowing for a transfer and combination of extant research findings. Overall, shedding light on the specific negative experiences and reactions of accommodation recipients enables an enhanced understanding of critical success factors for job accommodation processes. These insights should be helpful in preventing detrimental consequences for the affected individual and, finally, the employing organization.

As a third and final contribution, the cultural and organizational context of the present study allows us to advance existing job accommodation literature by *complementing the US-based studies* that to date have characterized research on workplace accommodations. While it is specified in the Americans with Disabilities Act (ADA) that accommodation requests are typically raised by employees themselves, accommodation processes might run differently in other countries. In Germany, where this study was conducted, every employee with an official disability status has a legal right to receive workplace accommodations (§ 81 SGB IX[1])—however, it is not officially defined *who* initiates the workplace accommodation (e.g., the employee, the employer, or a third party such as the work council). In the context of this study, accommodation requests are "imposed from the outside," i.e., by supervisors. Specifically, supervisors initiate job accommodations in response to the fact that employees are unable to meet performance requirements owing to his or her disability. In our view, this institutional difference might impact findings on accommodations' effectiveness, since employees might perceive externally imposed accommodations more negatively.

Taken together, this study seeks to: (1) direct attention to the accommodation recipients' perceptions *during* and *after* the actual accommodation; (2) shed light on the downsides of job accommodations in order to derive success factors helping organizations to effectively implement their accommodation processes; and (3) internationalize the accommodation literature by investigating processes in a non-US setting that are not requested by employees. To obtain such comprehensive insights into accommodation recipients' experiences, we apply a qualitative approach. Using the method of template analysis (King, 1998), we develop a coding framework based on theoretical insights from both the organizational change and accommodation literatures and apply it to interview data from accommodation recipients of a large German industrial company.

THEORETICAL FRAMEWORK

Accommodations as Individual-Level Change Processes

The notion of change, which is an integral part of the accommodation concept, can take the form of a "change in duties, a change in a valuable commodity, a change in the physical conditions of work, a change in the tools of work, a change in resources available to coworkers, or even a change in location" (Colella, 2001, p. 101). Although we propose that organizational change processes and job accommodation processes share important similarities, findings from the organizational change literature cannot be entirely transferred to the accommodation context. An important difference concerns the level of analysis. In contrast to organizational-level change processes, job accommodation processes primarily occur at the individual level. That is, although colleagues working directly with an accommodation recipient are often also affected by a change, job accommodation processes primarily affect single employees and their immediate work environments. By contrast, organizational-level change processes typically affect many employees simultaneously. Furthermore, the reason for an accommodation is an individual-level problem, that is, an employee's health restriction rather than an organizational-level issue or a management decision. Despite these different reference points, we posit that organizational change processes (as *collective change processes*) and accommodation processes share three important features that allow us to understand accommodations as *individual-level change processes*.

First, both organizational change processes and accommodation processes are characterized by an *intentional goal to approach a challenge/an existing problem and to achieve an improved future state* (Beckhard and Harris, 1987). Organizational change can be directed at various corporate challenges (e.g., business acquisitions, process improvements, technology changes; Smith, 2002). Similarly, job accommodation processes derive from a situation that is in some way problematic, i.e., an employee's health impairments interfere with the performance expectations of his or her job. Accommodation processes thus aim to create a work environment in which employees can perform key functions of their jobs and can receive the same benefits of employment as others (Vernon-Oehmke, 1994).

Second, from the accommodation recipient's perspective, both processes share the *novelty* associated with the changed workplace situation—a feature individuals often perceive as threatening and harmful (Rafferty and Griffin, 2006). In both processes, employees are required to adapt to a new working environment, including potentially changed behaviors, duties, locations, or colleagues (Holt et al., 2007; Oreg et al., 2013). Likewise, job accommodations often require employees to adapt to new working situations, which also involve novel tasks or skills.

Third, both process types have a strong *affective significance* for individuals. In line with affective events theory (Weiss and Cropanzano, 1996), work-related processes have the potential to elicit intensive affective reactions in employees. Change processes are also interpreted as work events that provoke various affective reactions including stress, anxiety, or resistance, which—in turn—influence work attitudes such as job satisfaction or turnover intention (e.g., Ashford, 1988; Kiefer, 2005). Similarly, for accommodation recipients, the situation of being impaired in their jobs and being dependent on their employer's help can certainly be a profound landmark in their work lives, especially for individuals who acquired their disability during their employment. Therefore, it can be assumed that the perception of the accommodation process might also exert a critical influence on affected employees' wellbeing. Owing to these commonalities, we propose that accommodation experiences should be perceived and analyzed similarly to organizational change experiences and that they might elicit affective reactions comparable to typical reactions to change.

[1]SGB IX (Sozialgesetzbuch IX [Social Security Statute Book IX]) of (2007). Rehabilitation und Teilhabe behinderter Menschen. Allgemeine Regelungen (Rehabilitation and inclusion of individuals with disabilities. General regulations). Essen: Fachverlag CW Haarfeld GmbH.

Stakeholders in the Accommodation Process

Job accommodations are inherently social processes that influence and are influenced by other actors in the social environment surrounding an accommodation recipient (Gates et al., 1998; Gates, 2000). Thus, we suppose that many conflicts and problems experienced during the accommodation phase will be interpersonal. Besides the accommodation recipients themselves, several parties are involved in a typical accommodation process.

To begin with, the affected employees' *coworkers* may be directly affected by the change (García et al., 2005). Such interpersonal problems might stem from feelings of distributive injustice due to the differential treatment a single person in a group is provided when receiving an accommodation (Colella, 2001). An accommodation may be perceived as unfair by coworkers for various reasons (Paetzold et al., 2008): First, it may seem that the accommodation recipient's job becomes easier (reducing his or her inputs) while the outcome remains the same as that of others. Second, coworkers might feel that their own inputs become higher (more difficulty, inconvenience, stress) through a colleague's accommodation. Third, coworkers sometimes view accommodations as valuable and desirable outcomes given to another person but not to oneself (e.g., an ergonomic chair). Fourth, scarce resources that could also be used for other purposes might be spent for job accommodation purposes. This phenomenon is also known from the aging literature—individuals often experience a sense of "resource tension" (North and Fiske, 2013, 2016), meaning that younger versus older individuals compete for scarce resources such as job opportunities (MacDonald and Levy, 2016). The perception of unfairness by coworkers is thought to be stronger if employees work together in very interdependent ways (Colella, 2001). In such situations, an accommodation and the related job easing for one employee can cause a direct deterioration for others, since they must often take over especially difficult or exhausting elements of this employee's job. Another difficulty exists for individuals whose health impairments are not directly visible. When the reason for a job accommodation is invisible or unclear, coworkers tend to believe that the person might "fake" a health-related problem, calling into question the reason for an accommodation (Colella, 2001; Paetzold et al., 2008). An additional source of conflict between accommodation recipients and their coworkers may be the perception that a workgroup's performance is weakened by having employees with health restrictions in the team. Especially when performance is measured or even rewarded at a team level, tensions between coworkers may arise (Paetzold et al., 2008).

Besides coworkers, *supervisors* or *managers* are primary stakeholders in the accommodation process (Gates, 2000) as they are in charge of organizing the implementation of a change and are directly interacting and communicating with accommodation recipients. Supervisors might have strong concerns about employees with disabilities for several reasons. First, similar to coworkers, they might think that these employees are incapable of high performance and therefore lower the workgroup's overall performance. Indeed, prior research has shown that supervisors often perceive employees with disabilities as helpless and dependent (Baron and Neuman, 1996). Second, owing to these employees' disability, age, or health status, supervisors might feel that these employees are different from themselves (demographic dissimilarity; Turban and Jones, 1988), worsening their relationship quality with individuals with disabilities (Colella and Varma, 2001; Dwertmann and Boehm, 2016). Third, job accommodations might in many cases run counter to the business objectives that supervisors are pursuing, i.e., cost effectiveness or operating efficiency, a contradiction that might create further reservations toward employees with disabilities.

Finally, there may be other stakeholders in the accommodation process, especially in large organizations. Here, supervisors often do not organize the accommodation process on their own, but receive support from *specialized departments*, such as HR departments or company physicians (Colella and Bruyère, 2011). For them, accommodations typically generate additional work, possibly leading to negative feelings toward an employee with a disability.

An a Priori Model of Potential Experiences during the Accommodation Process

As described above, we assume that accommodation processes share some important characteristics with general change processes, which allows us to transfer knowledge from organizational change to develop an a priori model of experiences during accommodation processes. In doing so, we build on Oreg et al. (2011) review of organizational change in which the authors introduce a comprehensive framework describing individuals' *change reactions* (affective, cognitive, and behavioral reactions to change), and also *change antecedents* triggering these reactions (e.g., characteristics of the change recipient or the internal change context). In the present study, we draw upon and extend the framework by Oreg et al. (2011) to introduce a model of experiences during the accommodation process (see **Figure 1**).

As outlined above, the present study primarily seeks to identify recipients' negative experiences during accommodation processes. Although organizational change processes are sometimes accompanied by positive employee reactions such as satisfaction (Jones et al., 2005) or commitment (Walker et al., 2007), that research focus is in line with the majority of studies associating change processes with various forms of psychological distress (Kiefer, 2005; Oreg et al., 2011). For the accommodation context, we propose that most of these negative experiences stem from the *absence of supportive conditions* during the process. A large proportion of past research on organizational change has identified such supportive conditions in the organizational environment that are critical for change success, including change participation (Bordia et al., 2004), communication (Lewis and Seibold, 1998), or trust in management (Morgan and Zeffane, 2003). This indicates that the absence of such supportive conditions will put change success at a risk. Similarly, from the accommodation recipient's perspective, the lack of such supportive boundary conditions will probably cause individual problems and conflicts during the accommodation phase and will likely provoke negative affective reactions. While

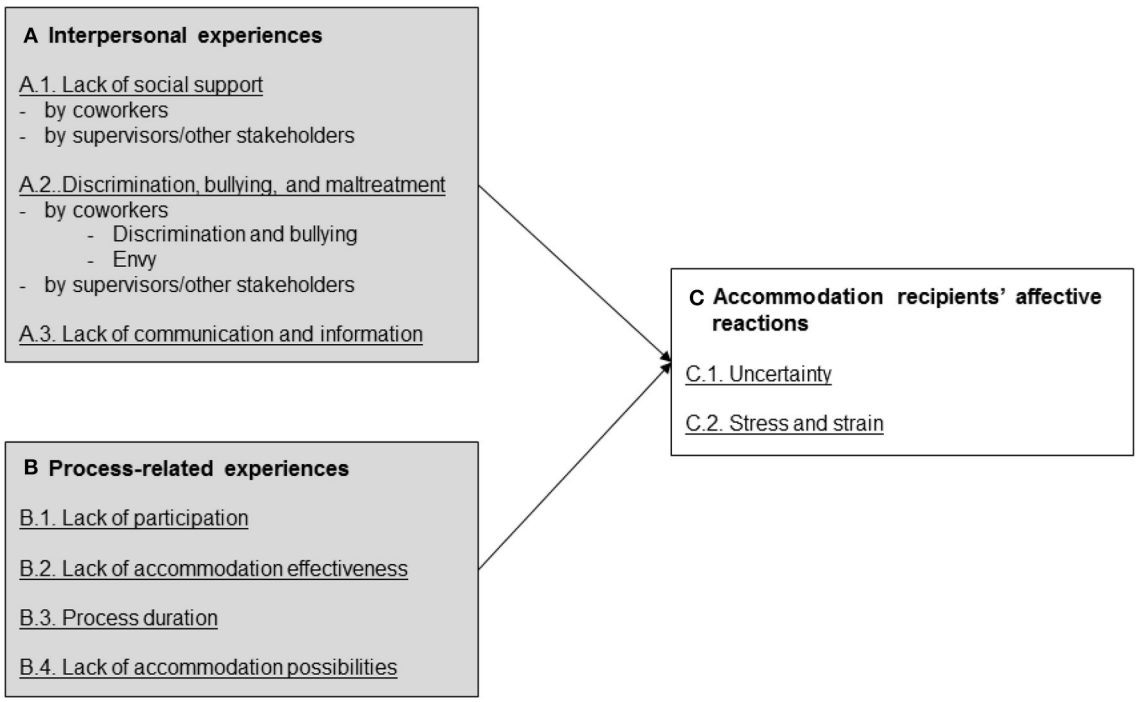

FIGURE 1 | Model of negative experiences during the accommodation process.

our theoretical model focuses on negative experiences, our qualitative analysis also considers the positive perceptions of accommodation recipients in order to provide a holistic picture of accommodation experiences.

Negative Interpersonal Experiences during the Accommodation Process

The interpersonal experiences presented might stem from interactions with the different stakeholders described above, i.e., coworkers, supervisors, and specialized departments.

Lack of social support

Social support can be defined as "the availability of helping relationships and the quality of those relationships" (Leavy, 1983, p. 5). In general, social support is a powerful resource that buffers stress reactions (Viswesvaran et al., 1999) and helps an employee to manage work demands (Lysaght et al., 2012). The importance of social support has been emphasized in the organizational change literature and in studies on disability, aging, and accommodations alike. That is, during organizational change, social support shown by coworkers and supervisors/further stakeholders is a critical success factor for change initiatives (e.g., Eby et al., 2000). Likewise, for employees with disabilities, Baumgärtner et al. (2014) show that social support is positively related to job performance, especially for individuals with low self-efficacy (Baumgärtner et al., 2014). In the same manner, receiving social support from both coworkers and supervisors is crucial for the satisfaction and well-being of older employees, since it can buffer negative effects of age discrimination (MacDonald and Levy, 2016). In the accommodation context, social support can be provided by all the different stakeholders involved in the process. In workgroups, support and cooperation are important success factors for the implementation of an accommodation (Colella, 2001). Gates (2000) also suggests that supervisor support is essential for accommodation recipients and thus, if missing, a potential source of perceived problems.

Discrimination, bullying, and maltreatment

Employees with disabilities tend to belong to a minority in the workforce (Lengnick-Hall et al., 2008) who are confronted with comparable challenges as other marginalized groups (Ruggs et al., 2013). In particular, their disability makes them susceptible to stereotyping and stigmatization (Moore et al., 2011). This is also true for older employees in general who are confronted with negative age-related stereotypes and discrimination (e.g., North and Fiske, 2012). Given such stigmatization and the detrimental implications job accommodations might have on their colleagues, as outlined above, it seems likely that accommodation recipients are not perceived as very desirable team members (Miller and Werner, 2007). This might lead to the devaluation and exclusion of affected employees from workgroup activities (Stone and Colella, 1996). One specific phenomenon we also expect to observe in this context is that accommodation recipients might be confronted with expressions of *envy* from their coworkers. From a distributive justice perspective, Colella (2001) argues that coworkers often perceive others' accommodations as *unequal treatment* and as *unfair* because they imply more favorable working conditions.

In addition to avoidance and exclusionary behavior, we expect that coworkers' reservations against accommodation recipients also give rise to more overt hostile interpersonal behavior including open conflicts, discrimination, or bullying. Especially bullying seems likely in an accommodation situation, as members of minority groups are frequently victims of discrimination (Fine and Asch, 1988; Green et al., 2005), particularly if they have a disability that makes some accommodation necessary (Baldridge et al., 2015). Moreover, according to Salin (2003), changes to the status quo, such as workgroup composition changes but also more general organizational change processes, can serve as a trigger of bullying. Finally, increasing the number of employees with disabilities in a team also means increasing the workgroup's diversity—which, in turn, has also been shown to increase the incidence of aggressive workplace behavior owing to difficulties in communication, mutual stereotyping, and social categorization (Van Knippenberg and Schippers, 2007). Besides the discrimination and bullying conducted by coworkers, hostile behavior from supervisors is a common phenomenon known in literature (*vertical aggression*; e.g., Cortina et al., 2001). One possible explanation is that a perceived power imbalance is a prerequisite for bullying, which is especially a problem for employees belonging to minority groups (Salin, 2003). We therefore assume that accommodation recipients are likely to perceive discrimination, maltreatment, or bullying not only from coworkers but also from supervisors and other authorities in the organization.

Lack of communication and information

Another well-known success factor for organizational change is the communication and information about the change process on the part of the management or superiors (Lewis and Seibold, 1998; Elving, 2005). Providing employees with change-related information can help them to feel better prepared and better able to deal with a change (Bordia et al., 2004). Indeed, systematic communication has been shown to reduce uncertainty during organizational change (Schweiger and DeNisi, 1991) and to increase employees' perceived procedural justice, trust, and commitment (Gopinath and Becker, 2000).

Likewise, accommodation recipients should receive reasonable information about change processes from supervisors and other responsible stakeholders. Communication should keep a recipient updated at any point of the accommodation process and should include information about *what* the next steps are in the accommodation process, *when* these steps will be performed, *how* the accommodation will be implemented, and *who* the responsible contact person is for the process. In case this information is insufficient, this should be perceived as a considerable negative aspect of the accommodation by the affected employees.

Negative Process-Related Experiences during the Accommodation Process

Beyond these interpersonal problems and conflicts, there are certain negative experiences inherent in the accommodation process itself. These refer to unique circumstances we expect to accompany the accommodation process in organizational practice (Solovieva and Walls, 2013).

Lack of participation

Participation refers to the extent of accommodation recipients' involvement during the process, especially with regard to planning and implementing the individual change (cf. Oreg et al., 2011). Having control over the process, i.e., having the opportunity to raise one's voice and being sincerely listened, should increase the perceived procedural justice of accommodation recipients (Martin et al., 2005). Moreover, participative decision-making is associated with reduced levels of physical and psychological stress (Bordia et al., 2004), and increased perception of control (Sagie and Koslowsky, 1996). In the case of workplace accommodations, seeking accommodation recipients' input during the process increased their satisfaction with the accommodation (Balser and Harris, 2008). Moreover, the feeling of actively shaping one's own career increases life satisfaction, especially of employees with disabilities (Santilli et al., 2014). As a consequence, we assume that a lack of participation during the accommodation process can result in negative experiences for affected employees.

Lack of accommodation effectiveness

Job accommodations aim at eliminating (or significantly reducing) difficulties associated with the health problems in everyday work. However, just like organizational change processes that are not always successful (Reichers et al., 1997), job accommodations might not reach their intended effect but might be perceived as ineffective (Solovieva and Walls, 2013). For instance, for an employee suffering from back problems who cannot carry out overhead work, an accommodated job involving bending over will not ease day-to-day work. Due to organizational constraints, however, it will sometimes be impossible to entirely solve the existing problem through job accommodations. From the perspective of an accommodation recipient, however, the perception that "accommodations aren't helping" (Solovieva and Walls, 2013, p. 203) can be expected as a central issue in the process.

Process duration

Another potential problem associated with organizational constraints can be the length of the process. Especially for severe health problems, providing a job accommodation can take a long period of time, for instance owing to organizational measures to be followed or financial resources that must be provided. Such delays might appear burdensome for employees and might hinder the process from being judged as successful.

Lack of accommodation possibilities

Employers report that a lack of accommodation possibilities is a common reason for not granting accommodations to employees (Solovieva and Walls, 2013). Indeed, most organizations are not geared to provide many workplace accommodations. Especially private enterprises operating in competitive markets often depend on their employees' flexibility in order to be able to quickly adapt to external circumstances. Adapting workplaces to individual employees' needs reduces this flexibility

(e.g., job rotations). Therefore, accommodation requests may pose a challenge and considerable financial effort to such companies and in many cases, providing accommodations is no simple undertaking—presumably a severe disadvantage from an employee perspective.

Accommodation Recipients' Negative Affective Reactions

We suppose that the affective reactions mentioned below are consequences of the interpersonal and process-related experiences introduced above.

Uncertainty

Change processes are often accompanied by aversive feelings of uncertainty and anxiety (Ashford, 1988; Bordia et al., 2006). During the accommodation phase, employees often do not know how their future working situation will look like and whether an accommodation will lead to an improvement. Uncertainty can even take the form of change-related anxiety arising from an actual or perceived threat of loss (Paterson and Cary, 2002). Within accommodation processes, perceived threats of loss might include being transferred to another position, losing one's previous coworkers; salary reduction due to alterations in job design, etc. Moreover, job-related know-how and skills often cannot be transferred to a new work environment, which might result in a loss of prestige, reputation, and personal resources.

Stress and strain

Organizational change processes can be seen as disruptions in work life and thus stressful life events (Cartwright and Cooper, 1993). The increased stress levels during organizational change also arise from uncertainty over the future (Ashford, 1988). For the context of workplace accommodations, we propose that stress and strain will be consequences of the feeling of uncertainty on the one hand. On the other hand, interpersonal problems and conflicts during an accommodation could be direct causes of stress and strain. Especially, social stressors including discrimination, bullying, and maltreatment are likely to be associated with higher stress levels (Hansen et al., 2006).

METHOD

Organizational Setting

Our study was conducted in a large manufacturing plant (15,000 employees) of a German industrial company. Throughout the study process, we took the following steps in order to ensure that all ethical research standards were fulfilled. First, the study was carried out in accordance with the Declaration of Helsinki (1964) and its later amendments. Second, our approach followed the official recommendations of the Association of German Professional Psychologists. Third, we obtained the approval of the company's work council for conducting this study and closely worked together with the data protection officer in designing this study. A strict data protection agreement was signed that closely regulated all data collection, storage, analysis, and reporting procedures. Since, in the business context, work council approval is comparable to the evaluation of a university ethical committee, further ethical approval was not required for this study in accordance with the national and institutional guidelines.

Workers in this plant were on average 40.4 years old, 89.1% were male; 13.8% of manufacturing staff had some kind of job-related health restrictions diagnosed by a (company) physician, and 4.4% had an official German disability ID documenting a disability status. The manufacturing tasks are mostly executed by teams of 8–12 employees. The team members typically rotate through the different jobs performed by the team on an hourly basis, i.e., every employee works at up to eight different workstations during one workday. Owing to this interdependent work organization, employee job flexibility is crucial for enabling job rotation.

As a result of an aging workforce and a growing number of physical or mental health problems in this organization, the company established a systematic process to deal with manufacturing employees who fail to achieve expected standard performance on the production line. The primary objective of this process is to realize an individual workplace accommodation in order to increase individual work productivity while maintaining job rotation; ideally, employees should be enabled to reach the standard performance of non-impaired workers again. Typically, the accommodation procedure is initiated by a supervisor in response to prolonged health restrictions that have caused a performance deficit. Possible interventions are discussed and agreed upon in a round table consisting of a supervisor, an HR specialist, a company physician, a work council member, and—in some cases—an accommodation manager. Implemented workplace accommodations take three primary forms: (1) Transfer to another more suitable workplace, For instance, owing to shoulder problems and subsequent surgery, an employee was no longer capable of fulfilling the overhead tasks in his or her current workplace. Therefore, the employee was transferred to a workplace without overhead work. (2) Ergonomic adjustment of the original workstation. For instance, due to an irreversible damage of a hip joint, an employee was no longer capable of performing his or her current manufacturing task, which required permanent standing and walking. Therefore, the workplace was adjusted by providing a moveable seat and by rearranging the positions of the manufacturing components. Thus, work tasks could be fulfilled equally efficiently while seated. (3) Changes in working conditions. For instance, owing to several herniated disks and a subsequent spinal fusion of the lower back, an employee was no longer capable of working at any of the eight workstations of his or her team (job rotation). Therefore, the employee was excluded from job rotation and was permanently assigned to a single workspace in his or her former team. Because there was only low back strain, he or she was able to fully perform the required task.

Participants

Our study sample consisted of 92 randomly selected accommodation recipients. All participants were workers in the factory, working in different steps of the manufacturing process, with most jobs being physically demanding. Of these 92 invited employees, 73 finally participated in our study

(79% response rate). These employees had different kinds of health restrictions, all of which had impeded them to perform their initial jobs successfully in the past. As a consequence, all participants of our study were currently part of the company's job accommodation program or had undergone the accommodation process in the past two years. Participants' age ranged between 18 and 58 years; mean age was 46.6 years (6.6 years above the manufacturing department's mean age). The majority of participants (90.6%) was male. On average, participants were transferred 1.8 times during their accommodation phase. The mean process duration was 11.0 months.

Data Collection

We conducted 15 focus group interviews applying a variation of the *nominal group technique* (Delbecq et al., 1975). In this form of groupwork, participants individually generate ideas in response to specific guiding questions. We chose this technique in order to receive a wide variability of non-biased responses in a time efficient manner. Additionally, the topic of workplace accommodations was considered a sensitive issue that might not be easy to talk about. This was aggravated by the fact that most participants did not know each other prior to the group interview. The nominal group technique has been proven effective in studies with client populations dealing with similarly sensitive topics such as severe physical disabilities (e.g., Elliott and Shewchuk, 2002). In our study, participants were first welcomed by a company's accommodation process manager who ensured absolute confidentiality, introduced the independent focus group facilitators, and then left the room. The two facilitators then provided information about the 2 h procedure to follow. After filling out a short demographic questionaire, the participants were asked to individually write down their ideas and impressions, guided by the following two questions: (1) *What types of positive aspects occurred during your accommodation process?* (green metaplan cards) (2) *What types of negative aspects or problems occurred during your accommodation process?* (red metaplan cards). Afterwards, all notes were shared with the group, collected and roughly clustered on a board by the facilitator. This procedure helped ensure that participants could speak up if their card content was misunderstood. Finally, there was a group discussion on the generated aspects during which participants were also encouraged to write down any new aspect arising from the discussion.

Owing to very strict laws and regulations governing data protection, especially concerning health-related topics in this company and in Germany in general, we were not permitted to audiotape or videotape the nominal group sessions. We used the metaplan cards written by the participants as subject to the qualitative analysis. In cases where comments on the metaplan cards were too short or hard to understand, the facilitator directly asked the participant for further explication during the discussion phase; the comments were then added by the facilitator, using original terms. Following the sessions, the facilitators documented the results by taking photographs. Both researchers then jointly wrote a session reflection summarizing their observations (e.g., group atmosphere, displayed emotions, and key discussion topics).

Analysis

For the analysis, we adopted a procedure in between an inductive and a deductive approach. *Template analysis* (King, 1998) is a suitable way to build on existing theories; at the same time, it also leaves enough space for unanticipated themes emerging from the data. The method starts out with an a priori template of codes, expands it while analyzing the data, arriving at a final template (Crabtree and Miller, 1992). In this way, the approach enabled us to verify and advance the theoretical framework developed above. The template analysis approach has generally been proven effective in other organizational studies dealing with similar topics such as leaders' negative emotions (Lindebaum and Fielden, 2011) or tensions and challenges associated with diversity and inclusion management (Donnelly, 2015).

All metaplan cards from the nominal group sessions were digitized and imported into MaxQDA. Following the approach by Randall et al. (2007), the two researchers who had been present during the group sessions interactively worked together on the process of coding each comment. While comparing the metaplan cards to the initial theoretical framework, there were two possible coding outcomes (Randall et al., 2007): Either the segment of text was coded in line with the theoretical framework (**Figure 1**), or the template had to be modified or supplemented. In multiple iterative steps, each separate metaplan content was re-examined with the revised template until a final template was reached. To enhance the coding's reliability, two further researchers who had not been involved in the group interviews independently repeated the coding process, using the final template. With an agreement over 90%, the two resulting templates were very similar, apart from minor exceptions. These exceptions especially referred to the names given to the unexpected categories that came up during the data analyses. The final category names for unexpected topics were then derived by means of a group discussion among all researchers.

Beyond the negative aspects of accommodation processes which were coded into the proposed framework, we also analyzed positive aspects. Here, we used the neutral overarching categories *interpersonal experiences*, *process-related experiences*, and *accommodation recipients' affective reactions*. Subcategories within these broad themes were generated in an exploratory manner while working through the data.

RESULTS

In sum, we collected 285 metaplan cards, of which 218 (76%) referred to the question concerning issues and problems during the accommodation process; 17 metaplan cards had to be excluded owing to unrelatedness to the guiding questions or incomprehensibility. Some participants noted several content aspects on one single card; thus, the 268 metaplan cards subject to the analyses resulted in 276 codings (208 negative and 68 positive codings). The final template, including the frequencies of the codes referring to our negative guiding question, is shown in **Table 1**, while the positive counterpart is provided in **Table 3**. Exemplary quotes for the negative aspects of job accommodations can be found in **Table 2**, while quotes capturing

TABLE 1 | Final categorization of recipients' negative experiences (the percentage of total negative codings appears in parentheses).

	Category	No. of times mentioned		Sum
A.	**Interpersonal experiences**			**109 (52.4%)**
A.1	Lack of social support		38 (18.3%)	
	By coworkers	6 (2.9%)		
	By supervisors/other stakeholders	21 (10.1%)		
	Unknown referent	11 (5.3%)		
A.2.	Discrimination, bullying, and maltreatment		50 (24.0%)	
	By coworkers	23 (11.1%)		
	Discrimination and Bullying	4 (1.9%)		
	Envy	5 (2.4%)		
	Conflict Old vs. Young	14 (6.7%)		
	By supervisors/Other stakeholders	20 (9.6%)		
	Unknown referent	7 (3.4%)		
A.3.	Lack of communication or information		21 (10.1%)	
B.	**Process-related experiences**			**81 (38.9%)**
B.1.	Lack of participation		2 (1.0%)	
B.2.	Lack of accommodation effectiveness		14 (6.7%)	
B.3.	Process duration		23 (11.1%)	
B.4.	Lack of accommodation possibilities		13 (6.3%)	
B.5.	Feeling of dehumanization		5 (2.4%)	
B.5.	Other process-related problems and conflicts		24 (11.5%)	
C.	**Accommodation recipients' affective reactions**			**18 (8.7%)**
C.1.	Uncertainty		5 (2.4%)	
C.2.	Stress and strain		13 (6.3%)	
				208 (100%)

the positive aspects of job accommodations can be found in **Table 4**.

Negative Interpersonal Experiences (109 Codings, 52% of Total)

Lack of Social Support (38 Codings, 18% of Total)

Participants referring to a lack of social support stated for instance that they had to organize their job accommodation without the help of supervisors or central functions such as HR. Other support-related comments concerned the lack of consideration and appreciation for accommodation recipients and a lack of understanding for the person's disability. *Supervisors and other stakeholders* (HR department, company physicians) were more often identified as sources of a lack of support *(21 codings, 10% of total)* than *coworkers (11 codings, 5% of total)*.

Discrimination, Bullying, and Maltreatment (50 Codings, 24% of Total)

Coworkers were mentioned slightly more frequently as sources of discrimination, bullying, and maltreatment *(23 codings, 11% of total)* than *supervisors and other stakeholders (20 codings, 10% of total)*. Discriminatory behavior from supervisors was especially characterized by insulting and disrespectful communication to the respondents. Participants also felt threatened and placed under pressure (e.g., threat of dismissal). In statements referring to *coworkers*, participants reported false accusations, being called liars, or being derided (*4 codings, 2% of total)*. We were also able to identify codings referring to *envy by coworkers (5 codings, 2% of total)*. That is, coworkers envied accommodation recipients for having received more favorable job conditions (e.g., "some of my colleagues are envious of my new workplace and try to give me even more work to do"). Additionally, owing to a high number of similar comments in the category *discrimination, bullying, and maltreatment*, a new subcategory arose from the data analysis that we did not expect a priori. We found that quite a few participants mentioned statements we refer to as the *conflict old vs. young (14 codings, 7% of total)*. Such statements criticized equal performance expectations, irrespective of age and competition for desirable workplaces (e.g., "with my performance, I must compete with younger, fitter employees; this is not ok"). Some participants claimed that younger employees were favored by supervisors or other stakeholders (e.g., "young workers are preferred"). Other statements also implied negative attributions towards younger employees (e.g., "young employees are too sniveling").

Lack of Communication or Information (21 Codings, 10% of Total)

Participants often criticized the absence of a dedicated contact person concerned with the accommodation process and a lack of feedback on the handling of their individual case. They also stated that they were not heard by supervisors and that communication between process stakeholders was poor.

Negative Process-Related Experiences (81 Codings, 39% of Total)

Lack of Participation (2 Codings, 1% of Total)

The lack of possibility to participate in the accommodation process was criticized only twice. From our initial framework, we expected a significantly larger number of comments.

Lack of Accommodation Effectiveness (14 Codings, 7% of Total)

Participants criticizing the lack of situational improvement stated especially that their health restrictions (e.g., no overhead work)

TABLE 2 | Quotes of recipients' negative experiences.

	Category	Quote
A.	**Interpersonal experiences**	
A.1	Lack of social support	
	By Coworkers	"Coworkers do not show understanding, especially when the disability is not directly visible."; "Lack of sympathy on the part of my coworkers."
	By supervisors/other stakeholders	"I had to look for a new workplace myself, without support of my supervisor."; "My supervisor does not care about how employees with disabilities feel."
	Unknown referent	"I have never been taken seriously with my disability."; "I had to handle the accommodation on my own, no help."
A.2.	Discrimination, bullying, and maltreatment	
	By coworkers	
	Discrimination and bullying	"Coworkers: Bullying!"; "Colleagues sneer at me."
	Envy	"Some of my colleagues are envious of my new workplace and try to give me even more work to do."; "Envy of others" (healthy) colleagues
	Conflict old vs. Young	"With my performance I have to compete with younger, fitter employees, this is not okay."; "'Easy' workplaces are occupied by young employees."
	By supervisors/Other stakeholders	"My supervisor threatened to fire me."; "Supervisor talks to me in an insolent and insulting way."
	Unknown referent	"I was called a liar."; "False accusations."
A.3.	Lack of communication or information	"Unknown point of contact – didn't know who to turn to."; "Arrangements between HR, work council, supervisor, company physicians: poor communication."
B.	**Process-related experiences**	
B.1.	Lack of participation	"Round table: no result, no participation."; "No participation/voice with my supervisor."
B.2.	Lack of accommodation effectiveness	"I must perform tasks I actually should not do at my new workplace."; "Doctor's restrictions are disrespected."
B.3.	Process duration	"It all took very long."; "Too long (two years)."
B.4.	Lack of accommodation possibilities	"Not enough workplaces suitable for accommodation recipients."; "No 'easy' workplaces available."
B.5.	Other process-related problems and conflicts	"I was downgraded in my wage group."; "New shift (carpool)."
C.	**Accommodation recipients' affective reactions**	
C.1.	Uncertainty	"Uncertainty about whether one is allowed to stay at this workplace."; "Uncertainty."
C.2.	Stress and strain	"Stress through too many job transfers."; "Performance pressure from above."
C.3.	Feeling of dehumanization	"Individual problems are not noticed—people are seen as numbers."; "Quality and quantity; people are forgotten."

were not respected or that no accommodation measures had been taken at all.

Process Duration (23 Codings, 11% of Total)

Participants claimed that they had waited a long time until the final implementation of an accommodation, or that they had been transferred too many times during the process.

Lack of Accommodation Possibilities (13 Codings, 6% of Total)

The major aspect was the absence of "easy" (i.e., less strenuous) work for accommodation recipients. Many participants also criticized that such jobs were increasingly outsourced or combined with additional tasks.

Data analysis resulted in two new categories classified as unexpected process-related issues. We called them *feeling of dehumanization (5 codings, 2% of total)* and o*ther process-related problems and conflicts (24 codings, 12% of total).* Statements classified as *feeling of dehumanization* refer to participants' perceptions of being "treated like numbers" and not being acknowledged as individuals but being reduced to one's work output (e.g., "Individual problems are not noticed. People are seen as numbers"). The second new category, *other process-related problems and conflicts*, arose because some metaplan content did not match the existing codes. Issues raised in this category were mostly very specific individual disadvantages in the accommodation process (e.g., "loss of carpooling opportunity due to shift change"), or perceptions that could count as "single opinions" not mentioned by other participants.

Negative Accommodation Recipients' Affective Reactions (18 Codings, 9% of Total)

Uncertainty (5 Codings, 2% of Total)

Most statements in this category referred to doubts and uncertainty about the future, especially concerning job security.

Stress and Strain (13 Codings, 6% of Total)

On the one hand, participants reported stress and strain emerging from the job accommodation itself, especially resulting from a high number of job transfers and treatment by other process stakeholders. On the other hand, respondents also emphasized

TABLE 3 | Final categorization of recipients' positive experiences (the percentage of total positive codings appears in parentheses).

	Category	No. of times mentioned		Sum
A.	**Interpersonal experiences**			**30 (44.1%)**
A.1	Social support		28 (41.2%)	
	By coworkers	8 (11.8%)		
	By supervisors/other stakeholders	20 (29.4%)		
A.2.	Communication or information		2 (2.9%)	
B.	**Process-related experiences**			**37 (54.4%)**
B.1.	Participation		4 (5.9%)	
B.2.	Effectiveness of accommodation		24 (35.3%)	
B.3.	Short process duration		7 (10.3%)	
B.4.	Others		2 (2.9%)	
C.	**Accommodation recipients' affective reactions**			**1 (1.5%)**
C.1.	Certainty/Job retention		1 (1.5%)	
				68 (100%)

that they felt stressed by high workloads in their teams and the pressure to perform. Besides the codings for affective reactions, also other codings classified into different categories were emotionally charged. Some codings reflected feelings of concern (e.g., "it's a matter of sink or swim"), others revealed a bitter, cynical tone (e.g., "more and more people in suits and less and less workers"), some sounded disappointed and sad (e.g., "nobody asks you how you feel"). These findings were also strongly supported by the impressions gained during the nominal group sessions and summarized in the session reflections. Researchers observed that some participants reacted very emotionally when talking about their accommodation process, which was revealed by intonation, facial expressions, and body language.

Positive Aspects of the Accommodation Process

Although this study's focus lies in examining negative experiences during accommodation processes, participants were likewise asked to report about their positive experiences. Overall, 68 metaplan cards referred to such positive experiences during the recipients' accommodation process. These positive experiences were analyzed separately and represent 24% of all codings. The final template, including frequencies of the codes concerning the positive guiding question, are displayed in **Table 3**.

Positive Interpersonal Experiences (30 Codings, 44% of Total)

In contrast to the preceding analysis of negative aspects, interpersonal experiences were not mentioned most frequently but were exceeded by process-related experiences. The major interpersonal strength was *social support from supervisors and other stakeholders (20 codings, 29% of total positives),* with most statements referring to a fairly practical, instrumental kind of support (e.g., "my former supervisor personally fought for my transition").

Positive Process-Related Experiences (37 Codings, 54% of Total)

Overall, positive codings were most frequently referring to process-related experiences. Thereby, the most frequently mentioned process-related strength was *accommodation effectiveness (24 codings, 35% total positives)*. Statements in this subcategory mostly referred to workplace aspects that had improved owing to the accommodation (e.g., "less physical strain now").

Positive Accommodation Recipients' Affective Reactions (1 Coding, 1% of Total)

Compared to the preceding analysis of negative aspects, positive affective reactions were extremely rare. In fact, only one positive statement was provided that referred to the certainty of knowing that he or she can keep the accommodated workplace until retirement.

DISCUSSION

Prior research on workplace accommodations has provided important insights for scholars and organizations to better understand how individuals and organizations request, manage, and perceive workplace accommodations. Still, some important gaps in the literature remained; our study sought to address these. Most importantly, we sought to develop a systematic view of job accommodations by focusing on recipients' negative experiences during and after the job accommodations. In contrast to prior work, our study investigated job accommodations in a later chronological phase (i.e., after being granted and implemented) and in a context in which supervisors (instead of employees) initiate the job accommodations.

In sum, the high number of negative statements made in the focus group interviews indicates that negative experiences are a substantial part of accommodation processes (Baldridge and Veiga, 2006; Davison et al., 2009). On the one hand, the analysis of accommodation recipients' positive experiences shows that job accommodations tend to solve practical problems employees are struggling with; on the other hand, accommodations seem to generate a wide range of other challenges that have not yet received the attention they deserve (Colella and Bruyère, 2011). Notably, we consider this company to be a best practice example in systematically dealing with employees with disabilities and their related health impairments. Therefore, it is even more remarkable that we were able to identify this wide range of negative experiences among accommodation recipients in this

TABLE 4 | Quotes for recipients' positive experiences.

	Category	Quote
A.	**Interpersonal experiences**	
A.1	Social support	
	By coworkers	"Help and support from colleagues"; "Accepted by coworkers: we get along well"
	By supervisors/other stakeholders	"My supervisor is supporting me"; "Former supervisor personally fought for my transition"
A.2.	Communication or information	"Good communication between the responsible parties in the process"
B.	**Process-related experiences**	
B.1.	Participation	"My proposals for the configuration of the new workplace were considered"; "Autonomy in designing my workplace"
B.2.	Effectiveness of accommodation	"I found an appropriate workplace"; "The new workplace is good"; "Less physical strain now"
B.3.	Short process duration	"All worked out very quick"; "Quick transfer"; "Immediate action"
B.4.	Others	"Funding by the German Federal Pension Insurance was possible"
C.	**Accommodation recipients' affective reactions**	
C.1.	Certainty/Job retention	"I know that I can keep this workplace until I retire (safety)"

company. The findings highlight the relevance of this topic, since even very well managed accommodation processes can lead to negative experiences and reactions among employees. Interestingly, most of these negative experiences do not stem from aspects directly related to the accommodation process—instead, accommodation success largely seems to depend on the social environment of the employees at work, especially their relationships with coworkers and supervisors.

Our findings also support our proposition that there are important similarities between individual accommodation processes and broader organizational change processes. Comparable to an organizational change process (Kiefer, 2005), an accommodation can be interpreted as a critical, affect-laden change experience that is associated with feelings of stress, strain, and uncertainty. In addition, some supportive conditions known from organizational change settings seem to also be applicable to accommodation contexts. Especially a supportive environment (Vakola and Nikolaou, 2005) seems to be significant for accommodation recipients, since our analysis revealed many corresponding complaints. Other supportive conditions known from organizational change research that became apparent in the accommodation process are communication and information (Lewis and Seibold, 1998) or change effectiveness (Reichers et al., 1997). In the following, we will discuss the implications of the study's main findings—including unexpected findings that arose during data analyses—and derive practical recommendations for organizations.

Negative Interpersonal and Process-Related Experiences during Accommodation Processes

The most frequently reported negative experiences referred to interpersonal issues, especially perceived discrimination, bullying, and maltreatment. Surprisingly, while we initially expected coworkers to primarily engage in discrimination, bullying, and maltreatment, participants often reported of supervisors being the sources for such hostile behavior, almost as often as coworkers. This *vertical aggression* (Cortina et al., 2001) carried out by authorities indicates that leaders might have strong considerations against employees with disabilities that become noticeable during the accommodation process. Furthermore, we found participants reporting about conflicts between old and young employees during data analysis. On the one hand, the statements suggest that these participants were confronted with phenomena such as stereotyping and perceived age discrimination (ageism; Rupp et al., 2006; Bal et al., 2011). This might be explained by the *poor performance* and *resistance to change* stereotypes (Posthuma and Campion, 2009; Kunze et al., 2013), which are often held about older employees. However, on the other hand, participants expressed negative stereotypes against *younger* employees themselves, reinforcing that ageism can occur in both directions—against old and young employees (Kunze et al., 2011).

As compared to interpersonal issues, process-related issues were less frequently mentioned as a negative experience, the most common problem being long process duration. Some participants also criticized insufficient accommodation effectiveness; however, the positive evaluations revealed that *improvement of the situation* was also considered to be the major strength by most participants. Interestingly, perceptions of social support from coworkers and supervisors were very heterogeneous, with 38 negative comments and 28 positive comments. Since positive and negative aspects were raised by different employees, we conclude that these experiences are highly individual. In particular, supervisors and work groups seem to differ concerning the support level they provide toward their followers/colleagues with health restrictions. This important finding clearly calls for interventions such as awareness and leadership trainings offered throughout the organization.

Concerning process-related aspects, our data analysis also revealed an unexpected finding, i.e., the *feeling of dehumanization* that participants experienced. The concept of dehumanization is not entirely new to the research, though. Dehumanizing others, i.e., denying others "qualities associated with meaning, interest, and compassion" (Barnard, 2001, p. 98) is a phenomenon that sometimes affects the perception of people with disabilities (Haslam, 2006). Moreover, dehumanization to the extent that

a person is seen as "object- or automaton-like" (Haslam, 2006, p. 258) is more likely to occur in an environment that is dominated by technology, just like in our research setting in the manufacturing industry.

Employee-Initiated vs. Supervisor-Initiated Job Accommodations in a Non-US Setting

Another goal of our study was to examine job accommodations in a non-US setting. It is striking that most prior studies have focused on accommodation requests by employees (e.g., Baldridge and Veiga, 2006). This seems to be due to the fact that accommodation requests represent a bottleneck in the US ADA-based system, which is why research on this topic is crucial. Nevertheless, in contrast to the US context where a person with a disability is usually expected to initiate the accommodation process, in our study's context, accommodations are initiated by supervisors based on prior performance deficits. We believe that the experiences that participants reported in the present study correspond to experiences of accommodation recipients in different organizational contexts. However, the fact that the accommodations in this study context had been initiated by the supervisor (instead of self-initiated) might be important to consider while interpreting our findings. As an example, the fact that many participants criticized a lack of support from their supervisors might seem surprising, given that those supervisors actively initiated these workplace accommodations for their employees. However, as we know from the field of organizational change, affected employees' acceptance of change largely depends on the sense of agency, competence, and internal control that they feel during the process (Amiot et al., 2006; Oreg et al., 2011). That way, some participants in our study reported that they would have wished to be more deeply involved in the accommodation process by their supervisors, to be asked for their individual needs and requirements, etc. Thus, since the participants in our study might perceive the process as rather externally imposed, they might experience the accommodation more negatively as compared to self-initiated accommodations. At the same time, some of the experiences defined in our model might be even stronger in the context of employee-initiated accommodation processes, such as bullying by coworkers (being called a liar etc.). To sum up, while our study is non-comparative, was conducted in only one German organization, and thus does not allow for causal interpretations, our results still seem to imply that supervisor-initiated accommodation processes might be particularly prone to critical employee reactions, especially if they are not backed by increased levels of social support demonstrated by the leader.

Practical Implications

An important contribution of our study is to derive success factors helping organizations to implement accommodation processes more effectively. Based on the comparability of change and accommodation processes, we propose that accommodation managers can learn from the comprehensive knowledge available in change management literature. Just as organizational change processes, job accommodations must also be actively managed and accompanied. Research has suggested many critical factors for successful change reaching from "soft" factors (e.g., employee motivation, leadership styles, or corporate culture) to "hard" factors (including project evaluation, project teams' skills, clear communication, and a limitation of additional workload) (Sirkin et al., 2005). We will now explicate some factors that appear to be most relevant for job accommodation processes, based on our study results.

Sufficient Communication and Information

During organizational change, goals and purposes of change must be clearly communicated (Elving, 2005) for employees to feel better prepared and able to deal with change (Bordia et al., 2006). Moreover, communication reduces uncertainty and cynicism (Schweiger and DeNisi, 1991) and increases perceived procedural justice, trust, and commitment (Gopinath and Becker, 2000). Likewise, we recommend that, during the accommodation process, accommodation recipients should receive detailed and pro-active information about their future work environment, the reasons for specific chosen accommodations, and how the process will proceed. In addition, supervisors and other responsible parties should receive dedicated training on the accommodation process in order to increase their process knowledge and to improve communication quality.

Sufficient Resources

Concerning change initiatives, necessary resources must be made available, including skillful personnel and work capacity (Amiot et al., 2006; Rafferty and Griffin, 2006). Appropriately skilled change managers are crucial if change goals are to be met. Equally, we recommend that job accommodation processes should be ideally accompanied by an accommodation manager responsible for the planning and implementation of the process. This should also allow a fairly flexible and individualized treatment of every unique case. Additionally, accommodation processes might require further resources, for instance, training of different stakeholders or the redesign and accommodation of individual workplaces.

Sufficient Monitoring

Successful change initiatives are characterized by frequent project reviews that help identify problems in early stages, making corrective action possible (Sirkin et al., 2005). Likewise, looking at the high individualization of problems during job accommodations, there should be a sufficient monitoring and feedback mechanism indicating whether or not an accommodation was successful. Especially by asking accommodation recipients about their satisfaction with the process, future accommodations can be improved.

Inclusive Climate

Finally, issues such as discrimination, bullying, being envied, and conflicts between older and younger employees seem to arise often in the accommodation context. In this regard, recent research in the diversity domain suggests that creating an inclusive climate (Nishii, 2013; Dwertmann and Boehm, 2016) might be a key to success. Inclusion is defined as the "degree to which an employee perceives that he or she is an esteemed member of the workgroup through experiencing treatment that satisfies his or her needs for belongingness and uniqueness" (Shore et al., 2011, p. 1265). Therefore, promoting an inclusive

climate that actively promotes diversity in the workgroup might create a culture in which all employees are equally valued—irrespective of their age or disability status.

Individualized Leadership

Our findings show that many complaints raised by study participants referred to very unique issues (category other process-related problems and conflicts), suggesting that many problems during accommodation processes are highly individual and depend on every employee's unique circumstances. As a consequence, supervisors should individualize their leadership behavior to the unique needs and requirements of every accommodation recipient, instead of applying a "one-size-fits-all" approach. Supporting this view, Kensbock and Boehm (2015) have shown that individualized consideration, as part of an overall transformational leadership style, can be a successful strategy in fostering the health and job performance of employees with disabilities.

Limitations and Future Research

A first potential limitation refers to the metaplan data we used for our qualitative analysis. It is certainly more recommendable to record interview data via audio or video in order to draw from a more extensive and rich dataset. However, owing to organizational restrictions, we were unable to do so. We did not have the impression that the data were not suitable for template analysis, though, since only a small number of metaplan cards had to be excluded due to incomprehensibility. At the same time, we experienced high openness when discussing these sensitive issues. Participants highly valued the fact that we guaranteed full anonymity and that we conducted no audio or video recording. Our claim of anonymity was more credible and less risky to trust in without taping. Otherwise, in our view, the willingness to talk about health-related issues, to discuss personal impairments and limitations, and to openly criticize their employer, supervisors, and other staff would have been significantly lower. This potential increase in data reliability and validity might compensate for the loss in data richness. We also made sure that we understood the metaplan cards in the right way by letting the participants explain their cards and clustering them in front of the group. This procedure gave particpants the space to speak up if their card's wording seemed to be misunderstood by the facilitators or other participants. This led to an additional validation of the data. Moreover, the session reflections provided additional data that was considered when interpreting the results.

A second limitation refers to the generalizability of our findings. Our study was conducted in a research context that might show special features concerning accommodations: In the production industry, employees work together in highly standardized, automated, and interdependent ways. Future research should apply our framework to other work contexts to check applicability. Future research should thus set out to generalize the proposed framework to other contexts and industries, especially looking at industries in which the degree of interdependence is not as high (e.g., office-dominated work). Furthermore, since our study was conducted in only one organization, future research should test the generalizability of our findings across organizational boundaries. In particular, organizational culture might play a crucial role in determining how accommodation processes are implemented by the management and perceived by the employees.

Third, one could ask whether the negative perceptions reported by the accommodation recipients might be driven by the health restriction itself, which might have negatively affected their job satisfaction. Indeed, there is empirical support for a negative relationship between sickness and job satisfaction (Faragher et al., 2005; Pagán and Malo, 2009). However, other research has shown that employees with disabilities are not per se less satisfied with their jobs, but that it depends largely on the organizational context, including the flexibility to provide suitable accommodations (Baumgärtner et al., 2015) or the organizational culture (Schur et al., 2009). Moreover, even if it might be that these negative perceptions cannot be exclusively attributed to the accommodation process itself, they might still have a negative impact on many important outcomes, such as commitment and turnover. As studies have shown for related fields such as perceived discrimination, "employees' beliefs, whether or not they are consistent with reality, affect their behaviors" (Ensher et al., 2001, p. 53). In addition, we think that our approach to ask participants about *both* positive and negative aspects of the accommodation process gave them the opportunity to reflect upon the accommodation process in a well-balanced way, thus preventing an overly negative mindset affecting their judgments.

Finally, some of our study results might reflect workplace aspects that are not limited to employees with health-related issues or disabilities. For instance, non-impaired workers might also report that they feel insufficiently supported by colleagues or a supervisor, or that they perceive an increasing dehumanization of production practices. Therefore, subsequent studies might include the perspective of further stakeholders in the process, such as supervisors and coworkers, to gain a more complete picture of accommodation processes.

Above all, qualitative methods do not seek to provide a statistical generalization, but rather to produce descriptions that help to determine possibly contrasting and contradictory trends in social processes, in this case, within the experiences of accommodation recipients. In turn, this might help to expand and generalize theory as opposed to test theory. Therefore, in order to gain a more generalizable understanding of the individual issues arising from job accommodations, further research is necessary, which should also include quantitative methods. Nevertheless, we hope that our study contributes to a better understanding of job accommodation processes and provides a solid foundation for future research.

AUTHOR CONTRIBUTIONS

JK acted as the lead author who collected the data and was responsible for data analysis and manuscript preparation.

SB led the overall research project, was responsible for the research design and wrote parts of the manuscript. KB collected the data and assisted in data analysis and manuscript preparation.

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"I WILL SURVIVE" A Construct Validation Study on the Measurement of Sustainable Employability Using Different Age Conceptualizations

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Though the importance of sustainable employability throughout people's working life is undisputed, up till now only one attempt for a conceptual definition has been made (van der Klink et al., 2016). Following the suggestions to further refine and improve this definition recently put forward by Fleuren et al. (2016), we propose an approach to sustainable employability that is based on the Ability-Motivation-Opportunity (AMO) framework, and incorporates three indicators: the ability, the motivation, and the opportunity to continue working, respectively. As sustainable employability is considered to be an important aspect of successful aging at work, this study used four different conceptualizations of aging at work to set up convergent and divergent validity of our operationalization of sustainable employability: calendar age, organizational age (job and organizational tenure), functional age (work ability), and life-span age (partner and children). We formulated several hypotheses that were tested by analyzing data from an online survey among 180 employees from Dutch public service organizations who filled out a questionnaire on different age concepts, and their ability, motivation, and opportunity to continue working. Multiple regression analyses were performed, and results showed that the four conceptualizations of aging were differently related to the three indicators of sustainable employability. Life-span age, in terms of having children, had the strongest negative relationship with the ability to continue working, organizational age (i.e., organizational tenure) had the strongest negative relationship with the motivation to continue working, and functional age had the strongest negative relationship with the opportunity to continue working. Moreover, functional age was significantly negatively related to the other two indicators of sustainable employability too, while life-span age appeared to enhance the ability and motivation to continue working (in terms of having children) and the perceived opportunity to continue working (in terms of having a partner). Calendar age was only important for the opportunity to continue working and appeared

to have a negative association with this outcome variable. These results lend support to our proposed operationalization of sustainable employability by showing that the three indicators are differently related to different age conceptualizations thus expanding previous research on the conceptualization of sustainable employability.

Keywords: sustainable employability, calendar age, organizational age, functional age, life-span age, successful aging, ability, motivation and opportunity to continue working

INTRODUCTION

Given the aging and dejuvenization of the working population (Philips and Siu, 2012), and the expected shortages in employees' skills in the future (World Economic Forum, 2016), it is of utmost importance to focus on their employability and prolonging their working life until, or even beyond, their official retirement age. The use of the term "employability" goes back to the fifties of the previous century when it was supposed to be an important determinant for securing a job, in particular, to make sure that one had paid work in the (near) future (Feintuch, 1955). Over the past decades, researchers continuously adapted the conceptualization of employability to the existing labor market situation, and different purposes, interventions, target groups, measures, and activities were discerned (see Thijssen et al., 2008). The valuable historical outline drawn by Versloot et al. (1998) clarifies that there has been an evident shift over the years in what exactly the employer's stake might be. All in all, the notion of life-time employment has been gradually replaced by the notion of life-long employability (Hillage and Pollard, 1998; Forrier and Sels, 2003; Fugate et al., 2004; Rothwell and Arnold, 2007; Van der Heijden et al., 2009). In today's new economy, with its ever-increasing market pressures, leaner organizations, and rapid changes in requirements (Lazarova and Taylor, 2009), focusing upon sustainable employability or the sustainability of individuals' careers over time is of utmost importance (Van der Heijden and De Vos, 2015; Veld et al., 2015; Van Dam et al., 2017).

Employability research can be divided in input- and outcome-based approaches (see Forrier et al., 2015, for more detailed information). In this contribution, an outcome-based approach is used focusing on indicators of outcomes that are associated with the likelihood to continue working (see for instance Berntson et al., 2006; Rothwell and Arnold, 2007; Wittekind et al., 2010; De Cuyper et al., 2012; Vanhercke et al., 2014). As such, sustainable employability can be considered to be an important aspect of successful aging at work (Zacher, 2015), and denotes the degree to which an employee is willing and able to carry out his/her current and future work (Van Vuuren, 2011). Just like sustainable development is vital for retaining world's natural resources (United Nation's Brundtland Commission, WCED, 1987), sustainable employability is vital for retaining employees' (income) resources and their ability, motivation and opportunity to continue working. Individual workers' sustainable employability comprises that employees are working in such a way that they are able to meet their own needs and labor market requirements in the present, without compromising their ability to meet these in the future (see also Van der Heijden et al., 2016). It implies that workers are capable and motivated to handle changes over time, both in themselves and in the labor market (Sanders et al., 2015). In addition, according to van der Klink et al. (2016) sustainable employability means that workers enjoy the necessary conditions that allow them to make a valuable contribution to the organization as well as to their own benefit through their work, now and in the future, while safeguarding their health and welfare.

Recently, Fleuren et al. (2016) critically reflected on the latter definition of van der Klink et al. (2016) and give five suggestions to optimize this definition: (1) explain what aspects of employment constitute someone's sustainable employability as in its current definition by van der Klink et al. (2016), the concept seems to be predicted by itself in the form of a capability set; (2) do not deal with sustainable employability as a characteristic of both the person and the job, simultaneously, instead, one should disentangle them; (3) do not rely on the unpredicted assumption that achieving value in work inherently leads to sustainable employability; (4) do not formulate sustainable employability in such a way that the concept only applies to employed individuals; and (5) specify better how the inherently longitudinal dimensions of sustainable employability should be addressed.

Obviously, the sustainable employability concept is highly complex and one needs more than one indicator to adequately operationalize it. In particular, sustainable employability requires a work context that facilitates employees by providing opportunities to continue working and, at the same time, an employee's attitude and motivation to exploit these opportunities. Correspondingly, we argue that sustainable employability asks for three conditions to be met: first, employees need to have the *ability* to continue working; second, they need to have the *motivation* to continue working; and third, they need to have the *opportunity* to continue working (Semeijn et al., 2015; Van der Heijden et al., 2015). Ability, motivation and opportunity are the key components in the Ability-Motivation-Opportunity (AMO) framework of individual performance (Appelbaum et al., 2000; Boxall and Macky, 2009) which states that HRM practices should be designed in such a way that they stimulate all three components. Building upon the suggestions by Fleuren et al. (2016), we propose an approach to sustainable employability that is based on the AMO framework, thus adding to the scholarly literature in this field. We argue that sustainable employability is an individual attribute, which applies to all (potential) workers, including the unemployed and self-employed ones. In the current study, we will build upon the AMO distinction and will use three indicators. The first indicator refers to the degree to which individuals believe that they are able to work and

to continue working, even beyond their retirement age (Van der Heijde and Van der Heijden, 2006; Geuskens et al., 2012). The second indicator refers to the motivation to work and to continue working (see also Geuskens et al., 2012). The third indicator comprises the opportunity to work now and in the future, or one's perceived labor market opportunities (Vanhercke et al., 2014, p. 593), and refers to "the individual's perception of his/her possibilities of obtaining and maintaining employment." Thus, we propose that sustainable employability is an individual attribute, we do not use a definition in which antecedents are included, and we specify which aspects constitute someone's sustainable employability. We acknowledge that sustainable employability may have many causes, amongst others, whether people realize value in their work. Moreover, we argue that our definition of sustainable employability applies to all possible categories of workers, including the unemployed, and in our conceptualization the longitudinal dimension is incorporated as well by asking the employees about their expectations for the future.

In addition, we will investigate the relationships of four different age conceptualizations with the three distinct indicators of sustainable employability. Given the fact that earlier research on aging at work and sustainable employability is limited and conceptually diverse (see also Kooij et al., 2008), it is important to incorporate multiple subjective age conceptualizations, over and above calendar age, being an objective measure, only (see also Cleveland et al., 1997). Calendar age is just a proxy measure for many complex changes related to aging (Hall et al., 2007), and the older people get, the more experience they accumulate, and the more heterogeneous they become (Staudinger and Bowen, 2011). Subjective age or age perceptions reflect "characteristics of the individual (e.g., physical appearance), but they are also affected by the context in which a person works or interacts" (Cleveland et al., 1997, p. 240), and appear to be associated with individual characteristics, such as work competence, health and changes in major life roles (Cleveland and Shore, 1992). As such, these more specific aging measures might be a better predictor of (some of) the indicators of sustainable employability than calendar age.

To summarize, the main objective of our study is to investigate the association between aging and sustainable employability using a broader conceptualization for both constructs. More specifically, we will examine the convergent and divergent validity of our operationalization of sustainable employability by relating the three indicators of sustainable employability outlined above with four different age conceptualizations. In this way, we aim at a better understanding of the conceptualization and operationalization of sustainable employability. As will be explicated in more detail in the paragraphs below, we expect differential relationships of the four different conceptualizations of age with the three indicators of sustainable employability. Therefore, the three indicators of sustainable employability are not combined into one overall construct. Moreover, based on the results of our study, we discuss possible directions for management, HR practitioners and workers themselves on how to protect and enhance sustainable employability over the life span.

HYPOTHESES

Toward Different Conceptualizations of Aging at Work

Aging at work can be seen as a multi-dimensional process indicating changes in psychological, physical, social as well as societal functioning across time (De Lange et al., 2006; Kooij et al., 2008), and is argued to affect individual employees on the personal, organizational, and societal levels (cf. Sterns and Miklos, 1995; Kooij et al., 2008). Sterns and Doverspike (1989) proposed five different approaches comprising chronological, organizational, functional, psychosocial, and life-span development to measure age-related changes, due to health, career stage, and family status, among others, across time. As individuals with the same chronological (or objective) age may differ in terms of these age-related changes, a more elaborate conceptualization of aging, including subjective measures, is needed to better understand the impact of aging on sustainable employability.

Calendar age, or chronological age, refers to the time passed since one's date of birth. *Organizational* age refers to the aging of individuals in jobs and organizations, which is more commonly referred to as seniority, and job or organizational tenure (years of service), or as career stage (Kooij et al., 2008). *Functional* or performance-based age comprehends a worker's ability to perform certain tasks on a daily basis (Sharkey, 1987). *Psychosocial* or subjective age comprises the social perception of age, and refers to how old an individual feels, looks and acts, with which age cohort the individual identifies, and how old the person desires to be (Kaliterna et al., 2002; Stephan et al., 2012). It also involves age norms applied to an individual with respect to an occupation, company, or society (e.g., stereotypes of older workers). The concept of *life-span* age emphasizes the intra-individual changes due to individuals moving through (older) adulthood, and relates to behavioral changes at any point in the life cycle. Life-span age can, for example, be measured by life stage or family status (number and age of dependents, marital status; Sterns and Doverspike, 1989; Sterns and Miklos, 1995; De Lange et al., 2006). Substantial events—such as getting married, having children, and experiencing loss of a loved one all mark transitions of one position or "social identity" to another one.

The Impact of Aging at Work on Sustainable Employability

Over the past decades, *life-span theories* have started to focus on more complex, multi-dimensional or dynamic conceptualizations of the aging process (De Lange et al., 2015). Concrete, both the life-span theory of Selection Optimization and Compensation (Baltes, 1987; Baltes and Baltes, 1990; Baltes et al., 1999) and Socio-emotional Selectivity Theory (Carstensen, 2006) highlight the importance of conservation of resources through self-regulatory compensatory goal-related choices and coping strategies. However, despite recent developments in life-span theories incorporating broader age conceptualizations, an elaborate overview of earlier empirical research examining their relationships with sustainable employability is still missing. Therefore, we cannot borrow from a firm and sound theoretical

framework to support our assumptions; yet, we will build upon all relevant empirical evidence that, to the best of our knowledge, exists. In the following sections, we will go into the scholarly literature and will formulate 12 hypotheses.

Calendar Age and Sustainable Employability

Calendar, or objective, age is by far the most widely used conceptualization to study the impact of aging on sustainable employability. The Netherlands Working Conditions Cohort Survey (Geuskens et al., 2012) investigated the differences between age groups of older workers regarding their ability and motivation to continue working. This survey is based on samples aged 45 and older, and showed a positive relationship between calendar age and perceived ability to continue working until the age of 65 (Ybema et al., 2010; Geuskens et al., 2012). Employees between 60 and 63 years more often indicated that they were able to continue working until the age of 65 than younger employees. According to Geuskens et al. (2012), this probably reflects a selection process, that is, the "healthy worker effect," implying a selection of healthy older workers who remain in employment (McMichael, 1976). Oude Hengel et al. (2012) also found proof of this healthy worker effect in a large sample of Dutch construction workers between 15 and 64 years in the Netherlands Working Conditions Survey, where the older ones indicated to be more able to continue working in their current profession than the younger ones. As our current study sample consists of people who are currently (still) working, we hypothesize:

> Hypothesis 1a: Calendar age is positively related to the ability to continue working.

Motivation to continue working is a relatively new concept (e.g., Kooij et al., 2014; Akkermans et al., 2016), and refers to both intrinsic and extrinsic motivation to work, and work values and their fulfillment (De Wind et al., 2015). Up to now, the concept has gained increasing attention given its importance for successful retention of older workers (Kanfer and Ackerman, 2004; Stamov-Roßnagel and Hertel, 2010; Kanfer et al., 2013), and, herewith as an indicator of the sustainable employability of the workforce.

Results of studies on the relationship between calendar age and the motivation to continue working are inconsistent. Geuskens et al. (2012) found that older age was positively related to the willingness to continue working until the age of 65 in a representative sample of the Dutch working population aged 45 and above. However, Oude Hengel et al. (2012) revealed that older construction workers were less willing to continue working than their younger colleagues. This latter finding is in line with the Socio-emotional Selectivity Theory (Carstensen, 1995), which states that individuals select and pursue goals in alignment with their (working) life's time horizon. In particular, in case individual workers have a limited future time perspective, they are inclined to seek psychological well-being and short-term benefits. On the contrary, when they view their remaining time as open-ended, individual goals to acquire knowledge, experience novelty, etc. become more important (Carstensen, 2006). Building upon Socio-emotional Selectivity Theory, we assume that older people perceive their remaining time and opportunities as more limited, and, as a result, are less motivated to continue working (see also De Lange et al., 2011). Specifically, we expect them to focus on different goals outside working life, such as deepening existing relations with people in their private life.

In a similar vein, the Selection Optimization and Compensation theory (Baltes and Baltes, 1990) proposes that, with advancing age, individuals will allocate fewer resources to growth, due to age-related losses in resources, such as the perception of time (e.g., Freund and Ebner, 2005). When people are younger, and time is perceived as expansive, open-ended, development goals aimed at optimizing the future are relatively more important (Bal et al., 2010). Reversely, in case of a limited future time perspective, the utility of further development is likely to decline, as individuals perceive that development goals are unlikely to be attainable in the limited lifetime remaining. Otherwise stated, age-related decline in future time perspective is claimed to shift attention away from development goals, and, as a consequence, reduce the strength of growth-related motives at work and self-regulation strategies (De Lange et al., 2011; Kanfer et al., 2013), herewith reducing the employee's motivation to continue working. Based on this line of reasoning, we hypothesize the following:

> Hypothesis 1b: Calendar age is negatively related to the motivation to continue working.

Self-perceived labor market opportunities or perceived employability (Van der Heijden et al., 2009; Forrier et al., 2015) lie at the core of a positive process that leads to optimal employee functioning (Vanhercke et al., 2014). Previous studies, in general, have found negative relationships between calendar age and perceived labor market opportunities (e.g., Van der Heijden et al., 2009; De Cuyper et al., 2011; Van Vuuren et al., 2011). The lower employability of older workers can be due to age discrimination in organizations as shown in fewer investments in older employees, less appreciation of older employees and less opportunities to engage in interesting tasks, job transitions and development activities (Finkelstein and Farrell, 2007; Billet et al., 2011; Truxillo et al., 2012). Therefore, we hypothesize the following:

> Hypothesis 1c: Calendar age is negatively related to the opportunity to continue working.

Organizational Age and Sustainable Employability

In line with what has been stated in the previous paragraphs regarding the healthy worker effect (McMichael, 1976), we hypothesize the following:

> Hypothesis 2a: Organizational age is positively related to the ability to continue working.

Although Kooij et al. (2008), on the basis of a meta-analysis of 24 empirical and nine conceptual studies, concluded that most age-related factors can have a negative impact on the motivation to continue to work of older people, they were less certain about the impact of organizational age. On the one hand, they found that organizational aging has a negative effect on the motivation to continue working because of skill obsolescence, but, on the other hand, a positive effect as well, probably due to the rise in salary with increasing seniority. Given these mixed findings, we have formulated the following non-directional hypothesis:

Hypothesis 2b: Organizational age is associated with the motivation to continue working.

Regarding job and organizational tenure, previous research has shown the danger of experience concentration (Thijssen, 1996) or skill obsolescence (Schalk et al., 2010) which comprises that people have been specializing themselves so strongly, and over such a long period of time that it is hard for them to find or to learn another job and to stay employable (see also Van der Heijden and Thijssen, 2003). As the labor market has changed tremendously over the past years, due to a combination of the ever-increasing speed in developments, increasing globalization and demands on productivity, creativity, and flexibility, employees are required to continuously update their occupational knowledge and skills (Berntson et al., 2006; Van der Heijde and Van der Heijden, 2014) during their entire career. The increasingly volatile "new" work environment (Berntson et al., 2006) requires that, in order to remain competitive on the internal and external labor market (Klein Hesselink and Van Vuuren, 1999), employees need to regularly change tasks, jobs, and/or organizations. Therefore, we hypothesize:

Hypothesis 2c: Organizational age is negatively related to the opportunity to continue working.

Functional Age and Sustainable Employability

Functional age has to do with employees' ability to perform certain tasks on a daily basis (Sharkey, 1987), and reflects cognitive abilities and physical health (Sterns and Doverspike, 1989; Kooij et al., 2008). Geuskens et al. (2012) found that poor physical health (i.e., the occurrence of musculoskeletal symptoms) is negatively related to the ability to continue working. In an 11-year follow-up study among 818 active employees, Ilmarinen et al. (1997) found that the mean Work Ability Index (WAI) declined significantly for both genders due to chronological aging and work context factors. As the normative age trajectory is a decline in health and work ability, we hypothesize the following:

Hypothesis 3a: Functional age is negatively related to the ability to continue working.

Functional age also has a negative impact on the motivation to continue working (Kooij et al., 2008). More specifically, studies by Oude Hengel et al. (2012) and by Geuskens et al. (2012) revealed that poor health was negatively related to the motivation to continue working until the age of 65 among respectively construction workers and among older employees in general. Possibly, this can be explained by the fact that employees with poor health have to invest more effort in performing their work, which is depleting not only their physical but also their motivational resources. As the normative age trajectory is a decline in health and work ability, we hypothesize:

Hypothesis 3b: Functional age is negatively related to the motivation to continue working.

Finally, work ability appeared to have a positive relationship with employability in Dutch studies among employees in primary education (Van Vuuren et al., 2011; Van Vuuren and Marcelissen, 2013). As the normative age trajectory is a decline in health and work ability, and people with a decline in work ability will generally be less likely to keep their current job or find a new one, we hypothesize:

Hypothesis 3c: Functional age is negatively related to the opportunity to continue working.

Life-Span Age and Sustainable Employability

Life-span age stands for the sequence of positions that a person holds over a period of time (Kanfer et al., 2013), and has been measured in very different ways: for instance, as having a partner or not, having a partner with a paid job or not, or having children (at home or not. Moreover, as already mentioned before, the older people get, the more experience they accumulate, and the more heterogeneous they become (Staudinger and Bowen, 2011). Given the pluriformity in private life situations, it is difficult to translate the findings of these studies into directional hypotheses. In the present study, we decided to include two of the most significant aspects of people's private lives: having a partner or not, and having children (at home) or not. Firstly, marital status and living arrangements, along with changes in these in mid-life and older ages, have implications for an individual's health and mortality. Literature on health and mortality by marital status has consistently identified that unmarried individuals generally report poorer health and have a higher mortality risk than their married counterparts, with men being particularly affected in this respect (Robards et al., 2012). Whereas marriage appears good for everyone's health and well-being, a review of Umberson et al. (2010) concludes that parenthood has significant effects on well-being over the life course, although for some there are positive and for others—such as women, unmarried parents, and individuals with lower social economic status—negative effects. Life-span age also matters as the ability to (not) continue working is related to the financial possibility to retire early (Proper et al., 2009; De Wind et al., 2014). Having to carry the financial burden of paying maintenance for their spouse or paying their children's college tuition may reduce the ability of partners and parents to retire early. On the other hand, the social support from a partner can enhance the perceived ability to continue working

(De Wind et al., 2015). As explained above, we decided to refrain from formulating directional hypotheses for life span age. Based on the outcomes of the above studies, we hypothesize:

Hypothesis 4a: Life-span age is associated with the ability to continue working.

Kooij et al. (2008) concluded that one's partner's wishes and increased value placed on leisure time reduced workers' motivation to continue working and encouraged their decision to retire. Similarly, Van Dam et al. (2009) showed that employees who felt a pressure from their spouse to retire early had a strong intention to leave the work force before the official retirement age. De Wind et al. (2015) found that a positive attitude of the partner with respect to early retirement, and not having a partner, were associated with early retirement. Geuskens et al. (2012) found that employees having a partner without a paid job were more often willing to continue working until the age of 65.

Hypothesis 4b: Life-span age is associated with the motivation to continue working.

The perceived opportunity to continue working is also related to life-span age. McQuaid and Lindsay (2005) reported that individual household circumstances, such has having direct caring responsibilities for children, and financial, emotional, and/or time commitments to family members may affect the employability of people and thus their opportunity to continue working.

Hypothesis 4c: Life-span age is associated with the opportunity to continue working.

METHODOLOGY

Participants and Procedure

Data were collected by means of an e-questionnaire that was distributed among employees of Dutch public service organizations that are responsible for water management in terms of consultation, facilitation, technical execution, and management of water protection. Their jobs are very diverse, ranging from muskrat catcher, inspector of waterworks, receptionist, human resource consultant, crisis coordinator, purification technician, environmental inspector, water level inspector to chairman of the water board. On average, their job demands can be classified as low physical demands, moderate emotional demands and high cognitive demands. Confidentiality and anonymity of responses were guaranteed. Questionnaires were distributed in one public service organization among 140 employees of which 118 employees responded (response rate of 84%). In addition, about one third of the study sample ($n = 62$) replied individually to a call on the website of the labor market and training fund of the Dutch water boards. The final sample was made up of 120 male (67%) and 60 female workers (33%), 41.2% of the participants worked full-time.

Measures

Age Operationalizations

Calendar age (objective age) was measured by asking the person for his/her date of birth, and ranged from 26 to 64 years. The mean calendar age was 48.99 years ($SD = 8.42$).

Organizational age was assessed by means of two separate items: "Since when are you working in your current organization?" and "Since when are you working in your current job?" Respondents' organizational tenure ranged from 1 to 42 years, whereas their job tenure ranged from 1 to 38 years. On average, they were working 16.54 years ($SD = 9.98$) in their current organization, and 11.46 years ($SD = 8.56$) in their current job.

Functional age was operationalized in terms of work ability, which was measured by means of the WAI that has been proven to be a good predictor of one's work ability (in the future) (Tuomi et al., 1994). The WAI is based on a series of questions that takes into consideration both the physical and mental demands of work and the health and resources of the employee (Ilmarinen et al., 2005) and consists of seven items that are scored in the following way: (1) one's current work ability compared with one's life-time best (scored on a 0–10 points' rating scale); (2) work ability in relation to the demands of the job (scored on a 2–10 points' rating scale); (3) number of current diseases diagnosed by a physician (scored on a 1–7 points' rating scale); (4) estimated work impairment due to diseases (scored on a 1–6 points' rating scale); (5) sick leave during the past year (scored on a 1–5 points' rating scale); (6) one's own prognosis of work ability 2 years from now (scored with 1, 4, or 7 points); and (7) mental resources (scored on a 1–4 points' rating scale). The WAI is calculated by summing the points of the seven items (possible score ranging from 7 to 49 points), and can be divided into the following four classes: poor outcome (7–27 points), moderate outcome (28–36 points), good outcome (37–43 points), and excellent outcome (44–49 points) (Tuomi et al., 1994). In earlier research, scholars found a Cronbach's α of 0.70 (Alavinia, 2008), and De Zwart et al. (2002) found that the test-retest reliability of the WAI was acceptable. In the current study, the Cronbach's α was 0.75. The respondents' WAI scores ranged from 26 to 49 with an average WAI of 39.93 ($SD = 5.05$). As the normative age trajectory is decline in health and work ability, we reversed the WAI-scores for further analyses.

Life-span age was measured with one item: "What is your private life situation?" and was scored using the following answering categories: (a) married or cohabiting without children; (b) married or cohabiting with children living at home; (c) married or cohabiting with children living elsewhere; (d) single without children; (e) single parent with children living at home; (f) single parent with children living elsewhere. Based on the respondents' answers, we composed three variables: partner (0 = single; 1 = married or cohabiting), and children (0 = no; 1 = yes) and children at home (0 = no; 1 = yes). Eighty-five percent of the respondents ($N = 153$) were living with a partner, 10.6% ($N = 19$) did not have a partner, and for 4% ($N = 8$) their marital status was unknown. With respect to children, 80% ($N = 144$) of the respondents did have children. In addition, 57% ($N = 103$) had children living at

home. For 4% of respondents ($N = 8$), parental status was unknown.

Sustainable Employability

Ability to continue working was assessed by means of one item (Van den Bossche et al., 2008; Koppes et al., 2011; Geuskens et al., 2012; Ybema et al., 2014): "Until what age do you consider yourself—physically and mentally—able to continue your current work/job?" This question (as well as the one below about the motivation to continue working) has been used for years already in large-scale TNO studies, i.e., NWCS (Netherlands Working Conditions Survey; Koppes et al., 2011), and STREAM (Studies on Transitions in Employability, Ability and Motivation; Ybema et al., 2014). The NWCS is a large-scale periodical investigation into the working conditions of Dutch employees. Ten surveys have been performed to date, in 2003 and 2005–2016. Some 23,000–38,000 employees per year have responded to the surveys (Van den Bossche et al., 2008; Hooftman et al., 2016). Respondents were assigned a report grade based on their response (1 < 60 years and 10 > 66). A 10 was assigned to a response of 66 years and above because the retirement age in the Netherlands is to be increased gradually and will reach 67 years and 3 months in 2022. After 2022, the retirement age will be linked to the average life expectancy.

Motivation to continue working was assessed by means of one item (Van den Bossche et al., 2008; Koppes et al., 2011; Geuskens et al., 2012; Ybema et al., 2014): "Until what age do you want to keep on working?" Respondents were again assigned a report grade based on their response (ranging from 1 = age < 60 years to 10 = 66 years or more).

Opportunity to continue working was assessed by means of a three-item scale on perceived internal and external employability by Verboon et al. (1999) and Veld et al. (2015) that were all scored on a five-point Likert scale ranging from: (1) absolutely not to (5) absolutely. An example item for external employability is: "I am confident that it is easy for me to find an attractive new job in a different organization." Cronbach's α was 0.79.

Analyses

First, we computed bivariate correlations between the different age operationalizations, to explore how they were interrelated. Next, we studied the correlations between the different age conceptualizations and the indicators of sustainable employability. Subsequently, we determined the relative strength of each of these relationships by performing multiple regression analyses, for each of the three indicators of sustainable employability separately, with the different age conceptualizations as predictors.

RESULTS

Correlations

The results for the bivariate correlations between all study variables are presented in **Table 1**. From **Table 1**, it becomes clear that calendar age was significantly positively related to both aspects of organizational age, i.e., organizational tenure ($r = 0.53$; $p < 0.01$) and job tenure ($r = 0.33$; $p < 0.01$), and significantly positively related to functional age, i.e., work ability ($r = 0.19$; $p < 0.05$). Logically, the two aspects of organizational age were positively related to one another ($r = 0.35$; $p < 0.01$). Of the three aspects of life-span age, having children was positively related to calendar age ($r = 0.17$; $p < 0.05$), whereas having children at home was negatively related to calendar age ($r = -0.24$; $p < 0.01$). Having children was significantly positively related to having a partner ($r = 0.17$; $p < 0.05$). Finally, having children and having children at home were significantly positively interrelated ($r = 0.56$; $p < 0.01$). The ability to continue working was significantly positively related to the motivation to continue working ($r = 0.47$; $p < 0.01$), whereas the motivation to continue working and the opportunity to continue working were significantly positively related too ($r = 0.21$; $p < 0.01$).

Calendar age was significantly negatively related to the motivation ($r = -0.19$; $p < 0.05$) as well as to the opportunity to continue working ($r = -0.32$; $p < 0.01$). Regarding the two aspects of *organizational age*, results showed that organizational tenure was significantly negatively related to both the motivation ($r = -0.29$; $p < 0.01$) and the opportunity to continue working ($r = -0.16$; $p < 0.05$). Job tenure, on the other hand, was not significantly related to any of the three indicators of sustainable employability. *Functional age* was significantly negatively related to all three indicators of sustainable employability, i.e., ability to continue working ($r = -0.25$; $p < 0.01$), motivation to continue working ($r = -0.17$; $p < 0.05$), and opportunity to continue working ($r = -0.29$; $p < 0.01$). Finally, as regards *life-span age,* only having children was significantly positively related to the ability to continue working ($r = 0.16$; $p < 0.05$).

Multiple Regression Analyses

In **Table 2**, the outcomes of the regression analyses are presented.

The *ability to continue working* was significantly positively related to having children ($\beta = 0.29$; $p < 0.01$), and significantly negatively to functional age ($\beta = -0.28$; $p < 0.01$) and organizational tenure ($\beta = -0.25$; $p < 0.01$). The *motivation to continue working* was significantly negatively related to organizational tenure ($\beta = -0.35$; $p < 0.01$), and to functional age ($\beta = -0.20$; $p < 0.01$), whereas it was significantly positively related to having children ($\beta = 0.21$; $p < 0.05$). Finally, *the opportunity to continue working* was significantly negatively related to calendar age ($\beta = -0.26$; $p < 0.01$) and to functional age ($\beta = -0.27$; $p < 0.01$), whereas it was significantly positively related to having a partner ($\beta = 0.18$; $p < 0.05$).

DISCUSSION

In most Western countries official retirement ages are rising, therefore protecting and enhancing workers' sustainable employability has become a top priority. However, up till now, only one profound attempt to define sustainable employability conceptually has been made (van der Klink et al., 2016). In the current paper, we propose an approach to sustainable employability that is based on the AMO framework of individual performance, and incorporate three indicators: the ability, the motivation, and the opportunity to continue working, respectively. As the three indicators turned out to be related

TABLE 1 | Correlations between the study variables.

Variables	*Mean*	*SD*	1	2	3	4	5	6	7	8	9	10
1. Calendar age	48.9	8.41	–									
2. Job tenure	11.46	8.56	0.33**	–								
3. Organizational tenure	16.53	9.98	0.53**	0.35**	–							
4. Functional age[4]	39.93	5.05	0.19*	0.09	−0.03	–						
5. Partner[1]	–	–	0.06	−0.06	−0.06	0.09	–					
6. Children [2]	–	–	0.17*	0.00	0.11	0.00	0.17*	–				
7. Children at home[3]	–	–	−0.24*	0.02	−0.11	−0.06	0.13	0.56**	–			
8. Ability cont. working	8.09	2.78	0.01	−0.13	−0.13	−0.25**	0.01	0.17*	0.02	–		
9. Motivation cont. working	8.47	2.59	−0.19*	−0.09	−0.29**	−0.17*	0.12	0.11	0.09	0.47**	–	
10. Opportunity cont. working	3.78	2.04	−0.32**	−0.07	−0.16*	−0.29**	0.07	−0.10	0.12	0.10	0.21**	–

*[1]0 = no partner, 1 = partner; [2]0 = no children, 1 = children; [3]0 = no children at home, 1 = children at home; [4]measured as WAI-reversed; *p < 0.05, **p < 0.01, two-tailed; N = 180.*

TABLE 2 | Multiple regression analysis of the different age conceptualizations on the three indicators of sustainable employability.

	Ability to cont. working		Motivation to cont. working		Opportunity to cont. working	
	R^2	β	R^2	β	R^2	β
	0.17		0.19		0.20	
Calendar age		0.13		−0.04		−0.26*
Organizational tenure		−0.25**		−0.35**		−0.03
Job tenure		−0.07		0.03		0.06
Functional age[4]		−0.28**		−0.20*		−0.27**
Partner[1]		0.00		0.13		0.18*
Children[2]		0.29**		0.21*		−0.09
Children at home[3]		−0.15		−0.09		0.04
Model F	$F_{(7, 151)} = 4.43$**		$F_{(7, 151)} = 5.02$**		$F_{(7, 151)} = 5.51$**	

*[1]0 = no partner, 1 = partner; [2]0 = no children, 1 = children; [3]0 = no children at home, 1 = children at home; [4]measured as WAI-reversed; *p < 0.05, ** p < 0.01; N = 180.*

but not too highly, it supports our argument that these three indicators measure different facets of the overall construct of sustainable employability. As sustainable employability can be considered to be an important aspect of successful aging at work, this study used four different conceptualizations of aging at work to set up convergent and divergent validity of our operationalization of sustainable employability: calendar age, organizational age (job and organizational tenure), functional age (work ability), and life-span age (partner and children). Our results showed that the distinguished age conceptualizations were indeed differently related to the indicators of sustainable employability. Life-span age, in terms of having children, had the strongest negative relationship with the ability to continue working, organizational age (i.e., organizational tenure) had the strongest negative relationship with the motivation to continue working, and functional age had the strongest negative relationship with the opportunity to continue working. Moreover, functional age was significantly negatively related to the other two indicators of sustainable employability too, while life-span age appeared to enhance the ability and motivation to continue working (in terms of having children) and the perceived opportunity to continue working (in terms of having a partner). Calendar age was only significantly related to the opportunity to continue working and appeared to have a negative association with this outcome variable. Thus, our results lend support to our proposed operationalization of sustainable employability and add to the debate on the definition of this concept. Secondly, most scientific research on aging at work has exclusively focused on the impact of calendar or objective age on employee well-being and functioning. By considering several alternative age conceptualizations, we were better able to capture the full complexity of the aging process. In this way, our study expands previous research on different conceptualizations of employee age in an organizational context, and their implications for successful aging on the job. Thirdly, our study helps to understand the construct of sustainable employability better as it provides a theoretical framework (the AMO model) to research it and to empirically test relationships with other constructs in the suggested nomological network of sustainable employability.

With respect to calendar age, only one out of the three hypotheses was confirmed. Calendar age was negatively related to the perceived opportunity to continue working. Whereas we found a negative bivariate correlation between calendar age and the motivation to continue working, interestingly, this relationship turned out to be non-significant after controlling for the three other age conceptualizations in the regression analysis. A possible explanation might be a so-called spurious correlation (Simon, 1954) between objective age and motivation to continue working caused by confounding effects of the subjective operationalizations of age. Earlier research found inconsistent results too. Geuskens et al. (2012) explained the positive relationship between calendar age and the motivation to continue working by means of the so-called healthy worker effect. The findings of Oude Hengel et al. (2012), who found a negative relationship, may be explained by the Socio-emotional Selectivity Theory, indicating that older workers are inclined to focus on different goals, outside working life.

Obviously, longitudinal work is necessary to better understand the underlying mechanisms and possible processes linking calendar age and motivation to work.

Concerning organizational age, only one out of our three hypotheses was confirmed. Contrary to our expectation, organizational age, measured as organizational tenure, was negatively instead of positively related to the ability to continue working. The phenomenon of "experience concentration" (Thijssen, 1996) or skill obsolescence (Schalk et al., 2010) might be an important reason for this. The qualifications that are required for a job have become more and more complex and keeping abreast of new developments is needed in present-day working life. If employees do not succeed in updating their skills and knowledge during their entire career, their ability to continue working will be reduced. In addition, the reduction in early retirement possibilities may also provide less room for the healthy worker effect. Moreover, we found that organizational age was negatively related to the motivation to continue working. This may also be ascribed to the harmful effect of skill obsolescence, which apparently is more impactful on the worker's willingness to go on in comparison with positive effects such as the rise in salary with increasing seniority. In addition, as sustainable employability is a broad construct, involving work motivation, the negative relationship could also be a reflection of less motivated, or achievement oriented employees to not look for new opportunities. Contrary to our hypothesis, organizational age did not explain a significant amount of variance in perceived opportunity to continue working. Several factors might moderate this relationship, for example, aspects of work self-efficacy (Stajkovic and Luthans, 1998), perceived external employment opportunities (Rothwell and Arnold, 2007), and different types of organizational commitment (affective, normative, and continuance, see Meyer and Allen, 1991).

All three hypotheses for functional age were confirmed. In line with earlier research, we found that functional age decreases the ability, motivation and opportunity to continue to work (Sterns and Doverspike, 1989; Kooij et al., 2008; Geuskens et al., 2012). Given the cross-sectional approach of our study, further research using longitudinal designs is needed in order to shed more light on the mechanisms underlying this relationship. As sustainable employability is a rather broad construct, based on this empirical work we cannot exclude possible effects of underlying constructs such a general health, and energy levels, to mention but a few.

Concerning life-span age, we could partly confirm all three hypotheses. Having a partner, goes together with the self-perceived opportunity to continue working (see also McQuaid and Lindsay, 2005). Having children on the other hand, appeared to be positively related to both the ability and to the motivation to continue working. Earlier studies showed mixed results regarding the relationship between life-span age and the ability and motivation to continue working which may be caused by the large variety in operationalizatons of life-span age that have been used in different studies (Proper et al., 2009; De Wind et al., 2014, 2015). As already mentioned in the section on Hypotheses, research on the relationship between life-span age and health and mortality finds mixed results too. Marriage appears to be good for everybody, but parenthood does not have positive effects for all. Another possibility is that, given the fact that, nowadays, traditional life trajectories are less prevalent in comparison with the past, especially when the life-span increases, substantial events, such as marriage and having children might be less reliable markers of life-span with age. Obviously, more in-depth scholarly work taking into account the effect of all kinds of family constellations, incorporating financial, emotional, and time demands, is needed to better understand the impact of life-span age.

The present study has some limitations. Firstly, all data have been collected using a quantitative self-rating approach opening up the possibility of response set consistencies. Notwithstanding this limitation, we believe that using age measures based on the perceptions of employees themselves over and above calendar age has increased our insights on the possible role of age. In addition, by using self-perceived employability, which forms the basis of a mechanism leading to enhanced performance over the life-span (Vanhercke et al., 2014), our approach has high value in the light of a better understanding of sustainable careers (Van der Heijden and De Vos, 2015). Still, future studies might apply qualitative work as well, and include other-ratings of some study variables (e.g., 360° feedback or assessments by others for the measurement of the three indicators of sustainable employability). In addition, as both ability and motivation to continue working have been operationalized by one-item measures (a practice that should not be unequivocally rejected; see Wanous and Reichers, 1996), being a less time-consuming effort which was assumed to have more face validity in this case (see Nagy, 2002), future work using multi-item scales is called for in order to enable us to compare psychometric qualities.

Secondly, research using multi-wave designs can provide more specific information about the stability and change of the variables, and about cross-lagged (i.e., over time) relationships compared with our cross-sectional approach (Spurk and Abele, 2014). Related to this, reciprocal relationships between age conceptualizations and indicators for sustainable employability might be taken into account too. For example, it might be that more employable individuals are also more actively searching for opportunities to protect their functional age and or to adjust their private life situation to their career ambitions, and therefore increase their ability, motivation or opportunity to continue working. As a result, they might even become more employable over time, what would result in positive reciprocal relations between the study variables.

Thirdly, data have been collected among employees holding a variety of jobs but within one specific sector, and therefore future research among different occupational groups should be performed in order to test the generalizability of our results. For instance, public service employees may have a lesser need for employability due to more job security and better unemployment benefits than employees in the private sector. Moreover, the respondents in our sample had relatively high organizational and job tenure, so future research should use samples that are more diverse in this respect.

Finally, more scholarly work is needed to investigate the impact of psychosocial or subjective age. For instance, empirical research could focus on the impact of age stereotypes on

discriminatory cultures in working organizations, and their effects on sustainable employability. Another promising path of scholarly work in this field concerns socially generated age effects, resulting from age norms (see for instance Lawrence, 1988) and relational demography (Shore et al., 2003). Also, we should investigate the extent to which national culture influences psychosocial or subjective age, and age norms. Finally, responding to the complexity of age and generations, more research is needed in order to better understand how, to what extent and under which circumstances age management policies might be effective in the light of managing age diversity and sustainable careers (Pitt-Catsouphes et al., 2011; Segers et al., 2014).

It goes without saying that chronological or objective age is something one cannot change. However, both individuals and organizational stakeholders (direct supervisor, management, and HR representatives) can intervene in the employee's organizational, functional and, to a lesser extent, life-span age to protect and enhance his/her sustainable employability. Sound interventions at the workplace focusing on lifestyle, health and work ability are advised to protect one's ability, motivation and opportunity to work. Also, we suggest measures to enhance the employee's mobility and career development aimed at reducing the possibly negative effects of organizational age, due to experience concentration. Only in case all parties involved do their utmost to promote workers' sustainable employability, their chances to survive in the current-day dynamic working environment are optimized. Hopefully, our attempt to conceptualize sustainable employability, and to substantiate our conceptualization by demonstrating different associations with age conceptualizations, stimulates future research in the field of both (the management of) employability and aging at work.

AUTHOR CONTRIBUTIONS

All three authors (PL, BV, and TV) contributed equally to the drafting of the manuscript (research question, propositions) and to the writing of the manuscript. Data were collected by author TV. Data analysis was performed by author PL.

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Don't Lose Your Brain at Work – The Role of Recurrent Novelty at Work in Cognitive and Brain Aging

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Cognitive and brain aging is strongly influenced by everyday settings such as work demands. Long-term exposure to low job complexity, for instance, has detrimental effects on cognitive functioning and regional gray matter (GM) volume. Brain and cognition, however, are also characterized by plasticity. We postulate that the experience of novelty (at work) is one important trigger of plasticity. We investigated the cumulative effect of recurrent exposure to work-task changes (WTC) at low levels of job complexity on GM volume and cognitive functioning of middle-aged production workers across a time window of 17 years. In a case-control study, we found that amount of WTC was associated with better processing speed and working memory as well as with more GM volume in brain regions that have been associated with learning and that show pronounced age-related decline. Recurrent novelty at work may serve as an '*in vivo*' intervention that helps counteracting debilitating long-term effects of low job complexity.

Keywords: plasticity, lifespan development, cognitive aging, use it or lose it, gray matter volume, work-task changes, job complexity, healthy aging at work

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INTRODUCTION

Occupational health psychology aims to support the creation of "healthy workplaces in which people may produce, serve, grow, and be valued" (Quick et al., 1997, p. 3). It is surprising, however, that "age" or "aging" which have strong associations with physical and cognitive health (see Schaie, 2005; Baltes et al., 2006; Dekkers-Sánchez et al., 2008; Lidwall et al., 2009), have received less attention in organizational health research until now (Oltmanns et al., 2016). More often than not, chronological age has merely been used as a covariate or confound (De Lange et al., 2006; Schalk et al., 2010). Thus far, cognitive and brain health have been neglected as focal points in occupational health research and rarely are they studied across time. That is surprising as (a) the workforce is aging in most Western countries, (b) many cognitive abilities on average decline with increasing age, and (c) working conditions have been shown to impact the development of cognitive and brain health across the lifespan (e.g., Schooler et al., 1999). The present study aims to fill this gap and investigates work settings which foster positive cognitive and neural plasticity across time.

The Lifespan Development of Brain and Cognition

Lifespan investigations of cognitive functioning have differentiated between the *mechanics* and the *pragmatics* of cognition (Baltes, 1987; Baltes et al., 2006). *Mechanic* abilities, such as memory, working memory, and processing speed, represent the mostly biology-based processes of the cognitive system which determine the speed and accuracy of elementary information processing. In contrast, *pragmatic* skills are mainly acquired through cultural influences and typically include knowledge-based abilities, such as vocabulary, verbal ability, or general knowledge (Staudinger et al., 1995). Whereas performance levels in pragmatic abilities typically remain stable across the lifespan (or even increase up to late life), the average lifespan development of mechanic abilities is characterized by maturation first (until early adulthood) which then turns into decline. Ample research has provided evidence for this prototypical pattern of adult cognitive development (e.g., Salthouse, 1996; Schaie, 2005).

On a neurophysiological level, aging is associated with fundamental transformations in the structure and function of the brain. Cognitive aging has been associated with an overall volume loss of 14% in gray matter (GM) across the adult lifespan (Jernigan et al., 2001; Kalpouzos et al., 2012) which has mainly been linked to a combination of cell body shrinkage, dendritic regression, and reduced synapse density (Greenwood, 2007; Grady, 2012). Other studies report 0.2–0.5% volume loss per year (Salthouse, 2011). The extent of decline, however, varies by brain region. Frontal and parietal areas seem to be more strongly affected by age than, for instance, the occipital lobe (Hedden and Gabrieli, 2004; Salthouse, 2011). Some research suggests that the striatum (especially the caudate) is particularly prone to age-related regression (Raz et al., 2005; Walhovd et al., 2011). There is evidence that GM volume begins to decline after young adulthood (Greenwood, 2007). Although the available literature is far from conclusive (Raz and Rodrigue, 2006; Salthouse, 2011), there is ample evidence to indicate that higher levels of executive functioning are linked with larger GM volume in the prefrontal cortex (Raz et al., 1998), hippocampal shrinkage mediates age differences in episodic memory (Head et al., 2008), and speed of processing is positively correlated with GM volume in several frontal, parietal, and occipital regions (Chee et al., 2009; see Salthouse, 2011, for a review).

The Plasticity of Cognitive and Brain Aging

Notwithstanding these age-related changes, the human brain bears potential for *plasticity*, that is, for structural and functional modifications in response to cognitive stimulation (Baltes et al., 2006; Draganski and May, 2008). Lifespan research assumes that such plasticity of brain and cognition is tapped to the extent that an individual is confronted with a mismatch between the functional supply of the cognitive system and challenging environmental demands (Lövdén et al., 2010). The work environment constitutes one kind of environmental demand. The accumulation of such demands across time contributes to the range and limits of the cognitive and brain trajectory (Staudinger et al., 1995). Ample research has provided evidence that stimulating environments are associated with positive *cognitive plasticity* (i.e., the modification of cognitive performance as compared to average levels of cognition at a given age) and *neural plasticity* (i.e., functional or structural changes that occur in the central nervous system as a consequence of mental stimulation). Typical examples include higher levels of cognitive functioning in memory, working memory, and processing speed as well as greater maintenance of GM volume in frontal, parietal, and temporal regions (Valenzuela et al., 2008; Hertzog et al., 2009; Voelcker-Rehage and Niemann, 2013).

It is noteworthy that most of this research has been confined to laboratory settings. '*In vivo*' studies of mental stimulation are few and are often not well controlled (Oltmanns and Staudinger, in preparation). Job complexity is the exception here, and has repeatedly been found to buffer cognitive decline (Schooler et al., 1999). As work takes up a large percentage of full-time employees' waking hours, work demands can be expected to have a strong influence on cognitive and brain aging.

Work as an Important Context of Cognitive and Brain Aging

High job complexity refers to work that requires thought and independent judgment including decision-making under ambiguous or contradictory contingencies (Schooler et al., 1999). In contrast, low job complexity is characterized by constrained decision latitude, repetitive work routines, and high standardization (also see Kohn and Schooler, 1978). Cumulative exposure to high job complexity has been found to be associated with better cognitive performance and a lower risk of dementia later in life (Schooler et al., 1999; Potter et al., 2007). Schooler et al. (1999, 2004) found that although individuals with higher baseline cognitive functioning were more likely to be given high complexity jobs, the reciprocal effect of complexity on general cognitive functioning was still present and even somewhat stronger. A recent study corroborated these results and reported positive effects of job complexity on episodic memory (e.g., Fisher et al., 2014). Other groups extended the research on job complexity and took a closer look at the specific effects of complexity with data, people and things (Finkel et al., 2009). Controlling for educational background and using prospective data over 16 years, it depicted that complexity with people was related to changes in speed and visuospatial ability but not to changes in memory. In addition, complexity with data was found to be associated with changes in spatial ability (but not memory and speed). Complexity with things was not related to any cognitive domain.

In a similar vein, recent neurophysiological work has demonstrated that extended exposure to high job complexity (supervisory experience) in midlife was associated with reduced hippocampal GM loss in old age (Suo et al., 2012). Conversely, low levels of job complexity seem to have detrimental effects on cognitive and brain aging: old assembly line workers showed lower task-switching performance and reduced

electrophysiological brain activity than a matched control group working in more complex settings (Gajewski et al., 2010).

Extracting the Effect of Novelty at Work – The Present Study

High job complexity is protective. Jobs with high complexity, however, require higher levels of education. Further, the studies on job complexity have not yet clarified which specific mental challenges are inducing which changes in the cognitive system and whether such changes in principle could also be observed at lower levels of education. The present study hypothesized that recurrent experience of novelty at work (as opposed to over-routinization) induces such changes, and assumes that novelty can be experienced at all levels of complexity (Bowen et al., 2011; Park et al., 2014; Oltmanns and Staudinger, in preparation). Behavioral experiments as well as neurophysiological laboratory studies have established the positive effect of novelty, learning, and skill acquisition (e.g., juggling or learning to decipher Morse code) on cognitive functioning and regional GM volume (Ackerman, 1988; Doyon and Benali, 2005; Draganski and May, 2008; Seidler, 2010; Thomas and Baker, 2013). In contrast, "routinization" has been found to be negatively associated with cognitive flexibility (Tournier et al., 2012), and linked with more pronounced cognitive decline (Bergua et al., 2006; Gajewski et al., 2010).

In a field study using a case-control design, we investigated whether repeated exposure to novelty at work, at low levels of complexity (i.e., under constrained decision latitude, repetitive work routines, and high standardization) was associated with differences in cognitive performance and brain structure in full-time production workers. We focused on one distinct job characteristic, and that is the degree to which (or the lack thereof) a worker had recurrently been confronted with new work tasks that required mastery (i.e., internalization and automatization). Specifically, we compared full-time production workers who experienced multiple (i.e., two or more) versus 0 or 1 work-task changes (WTC) across the 17 years prior to this study in terms of their cognitive functioning and their brain anatomy.

To clarify, WTC refer to changes in work function, that is, intra-organizational changes of the work task, excluding promotion and demotion. Each change implies that one must learn new skill components or ways of dealing with new materials. WTC un-confound the amount of cumulative cognitive challenge through recurrent novelty at work and the amount of cognitive challenge through upward/downward mobility in the sense of more responsibility and decisional latitude. WTC are different from standard forms of job rotation which refers to (short-term) switching between two or more familiar tasks in a fixed temporal sequence (which amounts to repetition; Campion et al., 1994). Whereas multiple WTC (as opposed to prolonged work-task routine) imply repeated acquisition of skill components and the repeated need to learn how to deal with new materials across longer periods of the work life. Multiple WTC therefore may be considered as an '*in vivo*' intervention to stimulate the cognitive system at work.

Processing Speed and Working Memory Performance as Leading Indicators of WTC and Cognitive Aging

Recurrent acquisition of new skill components requires individuals to understand and reproduce novel tasks and their specific characteristics (Ackerman, 1988). This is associated with the ability to temporarily store and update new information in working memory. In addition, procedures need to be automatized and streamlined in order to improve performance speed and accuracy which has been related with speed of processing. Therefore, we hypothesized that recurrent learning experiences, repeated acquisition of new skill components, and automation of new work procedures under conditions of multiple WTC as opposed to prolonged routine in 0 or only 1 WTC may have a training effect particularly on processing speed (*H1*) and working memory performance (*H2*).

On a neurophysiological level, skill acquisition is mediated by the 'cortico-striatal system,' a network of striatal, frontal, and motor cortical regions (Doyon and Benali, 2005). In line with this, frontal and bilateral striatal activation was, for instance, found in the early stages of motor skill acquisition (Seidler, 2010). Higher demands on the cortico-striatal system in workers with multiple WTC may spark neural scaffolding processes (Reuter-Lorenz and Park, 2014). At the same time, over-routinization and 'disuse' of the cortico-striatal system in workers with 0 or 1 WTC may aggravate age-related cognitive decline through reductions in neural activity and decreases in synapse numbers (Valenzuela et al., 2008; Grady, 2012). Thus, we expected multiple WTC to be associated with more GM volume in frontal (*H3*) and striatal regions (*H4*) as revealed by MR imaging. There is abundant evidence which has shown that experiencing control over events in one's life is a crucial moderator when it comes to determine the outcome of a given event (e.g., Rotter, 1966). We therefore controlled whether such WTC had been reported as voluntary or not. Based on a strong contextual exposure hypothesis, we assumed that the voluntariness would not moderate the effect of novelty processing on cognition and brain structures (*H5*). In addition, we controlled for mental stimulation during leisure time in addition to mental stimulation at work. Even though work occupies a large amount of our waking hours during the week, there is plenty of free time that also exerts influences on cognitive functioning (Andel et al., 2015).

The Present Study

Our study was conducted with workers of *one* production company. We used a case-control study design to investigate the effect of cumulative exposure to multiple as compared to 0 or 1 WTC on cognitive abilities and brain structure of production workers with differing work biographies (also see Oltmanns et al., 2016). The experimental group consisted of production workers who experienced two or more WTC within the 17 years prior to participation in our quasi-longitudinal study. The control consisted of production workers who experienced 0 or 1 WTC. In order to control for selection biases, we applied a diligent matching procedure on a large number of baseline variables likely to affect the outcome measures.

First, to avoid confounding influences of changes in the job hierarchy (Schooler et al., 1999) or influences of the work environment (e.g., company culture, working rules, etc.), all participants were production workers who worked for the same company at the assembly line or similar monotonous work places without interruption at least between 1996 and 2013. The time window of 17 years prior to participation in our study was chosen because (1) in 1996 the company implemented major changes in its work organization, which we did not want to confound the results, and (2) we needed to identify a time window which was long enough to study the cumulative effect of multiple WTC and which at the same time provided a reasonable number of potential participants (since all participants needed to have stayed with the company at least for the time under study). We wanted to use a treatment window that was as long as it could possibly be to test cumulative effects. The lower boundary, however, was defined by 1996 changes in work organization.

Second, we identified the following variables as important matching variables: age, job type (skilled versus unskilled production work), baseline cognitive functioning (see below), leisure-time activities (current and at baseline, see below), and baseline openness to experience (see below). Current/baseline leisure-time activities need to be taken into account in order to control for cognitive stimulation outside of the work setting. Furthermore, seeking out or accepting task changes may be related to personality as indexed by openness to new experiences (hereafter: openness; McCrae, 1996). Openness goes hand in hand with behavioral flexibility and has also been found to be positively related with cognitive functioning (e.g., Gignac, 2005). To control for the influence of these variables, closely matched pairs of participants were identified according to the following procedure.

MATERIALS AND METHODS

Sampling and Design/Matching

With consent of the works council, the Human Resources Department of the German company identified 3,500 production workers that had been continuously full-time employees in jobs at low levels of job complexity (no promotion or demotion) during the time window of 17 years prior to this study. Afterward, the company distributed a screening questionnaire via the internal mail system that was used to assess all relevant matching variables. Ten female and 166 male workers returned the screening questionnaire (response rate = approximately 5%). On the basis of this information, respondents were organized into subgroups of gender (female/ male), job type (skilled/unskilled production work), and age (30–34, 35–39, 40–44, 45–49, 50–54, 55–59 and more than 60 years of age). Subsequently, we called all 176 potential participants and led semi-structured telephone interviews in order to retrieve the specifics of their work biographies and determine the number of WTC between 1996 and 2013. Participants with two or more WTC versus 0 or 1 WTC between 1996 and 2013 were matched on their baseline cognitive functioning as well as engagement in cognitively stimulating leisure activities and openness at baseline. We classified all participants with 0 or 1 work-task changes since 1996 as '0 or 1 WTC' and all with two and more task changes since 1996 as 'multiple' WTC participants.

In order to identify matched pairs, differences of half a standard deviation were used as a range of tolerance around individual scores. Due to a very small number of female workers that satisfied our original selection criteria, our final study sample included only male participants. Out of the remaining 166 male workers, our multi-step matching procedure identified 19 'statistical twins' who were matched in terms of age, educational background, work biographies, indicators of cognitive performance, leisure-time activity as well as openness. **Table 1** indicates that the pairs only differed significantly in the number of WTC ($N = 38$). We purposefully sacrificed a bigger sample size for the sake of minimizing selection biases, and approximating 'randomization' in this quasi-experimental design. The final sample of 38 participants was highly selective. After matching, all 38 participants were invited to take part in the next phase of the study which comprised cognitive testing and MR imaging.

Specific Sample for MR Imaging

For security reasons, not all of the 38 participants were eligible to take part in the MRI anatomical brain scanning. Due to magnetic implants, tattoos or claustrophobic tendencies of one or both members, 9 of the 19 pairs of matched participants had to be excluded from the MRI procedure. Only 20 participants (i.e., 10 matched pairs) went through the full experimental procedure including behavioral as well as MRI testing. Thus, all brain anatomical analyses reported in the following are based on 10 pairs of participants ($N = 20$) who were optimally matched on all covariates. **Table 2** provides a description of the reduced MRI sample.

Selectivity Analyses

It is important to note that neither the study sample of 38 participants nor the reduced MRI sample of 20 participants differed significantly from the initial 166 male workers who responded to the screening questionnaire in a multivariate

TABLE 1 | Characteristics of the matched sample (behavioral study).

Matching variables	Work-task changes	
	0 or 1 ($N = 19$)	Multiple ($N = 19$)
Age	46.95 (4.38)	46.58 (4.62)
Years of education	12.6 (0.82)	12.30 (1.34)
Gender (Number of male participants)	19	19
Job type (% of unskilled work)	74%	74%
Grade point average (high school; obj. record)	2.99 (0.40)	2.98 (0.42)
LEQ (z-scores, young adulthood, reconstructed)	−0.0087 (0.97)	0.0087 (1.06)
Openness (young adulthood, reconstructed)	3.32 (0.49)	3.38 (0.46)
Task changes	*0.74 (0.45)*	*3.63 (1.46)*

Standard deviations are in parentheses. LEQ, Lifetime Experience Questionnaire. Significant group differences at $p < 0.05$ are in italics.

TABLE 2 | Characteristics of the matched MRI sample.

Matching variables	Work-task changes	
	0 or 1 ($N = 10$)	Multiple ($N = 10$)
Age	46.9 (4.22)	46.8 (4.39)
Years of education	13.0 (0.53)	12.0 (1.87)
Gender (Number of male participants)	10	10
Job complexity (% of unskilled work)	70%	70%
Grade point average (high school; obj. record)	3.01 (0.5)	3.01 (0.49)
LEQ (*z*-scores, young adulthood, reconstructed)	0.0349 (0.94)	−0.0645 (1.18)
Openness (young adulthood, reconstructed)	3.27 (0.54)	3.35 (0.51)
Task changes	*0.8 (0.42)*	*3.1 (1.44)*

MRI, magnetic resonance imaging; LEQ, Lifetime Experience Questionnaire. Standard deviations are in parentheses. Significant group differences at $p < 0.05$ are in italics.

ANOVA with age, years of education, academic achievement, health status, work ability, job type, leisure-time activity, and openness in young adulthood as dependent variables. Using Pillai's trace, the multivariate statistics revealed no group differences, neither between the study sample of 38 participants and the 166 workers who returned the screening questionnaire, $F(10,155) = 0.92$, $p = 0.50$, $\eta^2 = 0.05$, nor between the reduced MRI sample of 20 participants and the 166 workers, $F(10,155) = 0.72$, $p = 0.70$, $\eta^2 = 0.04$.

Experimental Procedure

Upon arrival all participants were welcomed and received a short overview of the day before they were asked to read and sign the consent form. The entire experimental procedure comprised two parts: part one consisted of a MRI session in which anatomical images were taken of each participant. Part two aimed at collecting the behavioral data. The behavioral part of the study lasted on average 3 h (including two 15-min breaks). Computerized cognitive tests of processing speed and working memory were administered in a controlled laboratory setting. The order of the tasks was randomized for each participant. Other variables that are not part of this study were assessed after the computerized testing procedure. Due to organizational reasons, MRI sessions always had to be scheduled before the behavioral testing. Therefore, participants completed the MRI session, which took 2 h, before starting to work on the behavioral part of the study (after an extended lunch break of 1 h).

Materials

Screening Questionnaire

The screening questionnaire consisted of four parts. Part one gathered information on demographic variables (age, gender, educational attainment, years of education, family status, and number of children). Afterward, a description of each work place held since 1996 was requested. Participants were asked for job title, content, average working hours per week, team size, and employment status. Part three of the screening questionnaire asked for the reconstruction of their engagement in mentally stimulating activities and openness in young adulthood (see below). The fourth and last part asked for the high school grade point average (GPA) as a proxy of baseline cognitive functioning.

Approximating leisure-time activity in young adulthood

In order to assess leisure-time activity in young adulthood, we used a translated version of the Lifetime of Experiences Questionnaire (LEQ; e.g., Valenzuela and Sachdev, 2007). The LEQ determines a person's cognitive stimulation through education, complex occupations, and cognitively stimulating leisure activities across the lifespan. It comprises 42 items and is subdivided into age-specific and non-specific parts. Since we already had the information about education and occupational history, we excluded these items but used the remaining questions to assess former (in young adulthood) and current participation in a broad range of mentally stimulating leisure-time activities (e.g., reading, writing, giving lectures, playing a music instrument, learning a second language or being engaged in physical activity). The LEQ is a highly reliable instrument (test–retest reliability: $r = 0.98$) which was shown to be a valid predictor of longitudinal cognitive change as well as brain atrophy (Valenzuela et al., 2008).

Approximating Openness in young adulthood

To approximate baseline openness, nine items were created on the basis of the German version of the Big Five Inventory (Rammstedt and John, 2005). In order to minimize recall biases and to avoid 'telescoping effects' (Rubin and Baddeley, 1989), we created items that asked to recall concrete behaviors linked with salient and noteworthy life events. To further improve retrieval, we asked them to recall specific living conditions and significant life events during that period of their life (to set landmarks and create a temporal reference system; Friedenreich, 1994). A 5-point Likert scale (ranging from 1, *completely disagree* to 5, *completely agree)* was used to assess agreement with statements like "*When I was 16 to 25 years old, I attended many different music events*" or "*When I was 16 to 25 years old, I traveled a lot.*" The average of these nine items constituted a scale for (reconstructed) openness in young adulthood ($\alpha = 0.68$). Bivariate correlation of this baseline openness measure with the openness scale of the German BFI version was highly significant and very satisfactory ($r = 0.64$). It also correlated moderately high with a scale of flexible goal adjustment ($r = 0.45$) (Brandtstädter and Renner, 1990) as well as the LEQ scale for mental activity in young adulthood ($r = 0.26$).

Approximating cognitive performance in young adulthood

As we cannot rule out the possibility that cognitively more able individuals are prone to experience more WTC (although there seems to be no relationship between cognitive ability and at least job mobility; see Griffeth et al., 2000), we wanted to control for level of cognitive performance at baseline. We used the high-school GPA as proxy variable. It is widely accepted that cognitive ability is associated with academic achievement. Ample research has established correlations of about 0.4 to 0.7 between IQ scores and school performance (Deary et al., 2007). In addition, a recent meta-analysis found that out of 112 studies that assessed the relationship between personality traits and intellect, 86 utilized academic achievement as proxy

variable of intellect. Next to intelligence tests, it was the most often employed indicator of cognitive functioning (von Stumm and Ackerman, 2013). Therefore, we used the high school GPA as a proxy for baseline cognitive functioning. It was calculated as a mean of six grades retrieved from the graduation certificates of each participant: German, English, mathematics, physics (if not available: chemistry), history (if not available: geography) and arts. Bivariate correlations of these averages with the cognitive performance measures used below were satisfactory ($r = 0.30$–0.43) and comparable to long-term correlations between grades and cognitive performance reported in the literature (Deary et al., 2007).

Reconstruction of work-task biographies

Individual work-task biographies were assessed via telephone. Four trained interviewers led semi-structured biographical interviews. Each interview started with the question "*Which tasks and duties does your current position include? Please give a detailed description.*" Afterward, participants were asked "*Were there ever any changes in your tasks and duties since 1996? If yes, when?*" Subsequently, the interviewer went through the work-task biography in reverse. Starting with the present job tasks, each position within the last 17 years was discussed step-by-step and comprehensively documented by the interviewer. Every interviewee was required to give a detailed description of all tasks since 1996 (e.g., engine assembly or interior fittings). This diligent step-by-step procedure served to reduce recall biases and helped to draw a complete picture of the work biographies of our participants. Also, note that for the present design the absolute number of WTC was of less relevance than the basic distinction between '0 or 1' or 'multiple.' In addition, since the company implemented an extensive change in work organization in 1996, the recollection of task allocation in this 'anchor' year allowed reducing recall biases. Afterward, 'multiple' and '0 or 1' WTC were determined for each participant in consensus meetings that involved all four interviewers as well as the project members. To further test the reliability of our WTC measurement, we assessed the number of WTC twice: first, in the telephone interview prior to the lab study and second during the lab study itself. There was not one participant reporting conflicting information on both occasions.

Cognitive Tests

As processing speed and working memory capacity have been linked with skill acquisition and learning, we included both cognitive measures.

Processing Speed

Processing speed was measured via two tasks: the visual search task (Hommel et al., 2004) and the identical pictures test (Ghisletta et al., 2006). It was important to us to select processing speed tasks with high external validity. We expected the visual search task and the identical pictures test to be more closely linked with the day to day tasks of the participating production workers than other speed measures. The *visual search task* is often used as a standard test for processing speed and has been shown to be sensitive to age effects (Foster et al., 1995; Hommel et al., 2004). The version we employed in our study was similar to that used by Voelcker-Rehage et al. (2011), apart from the fact that we exclusively used conjunction searches with a set size of 14 stimuli. Participants had to search a target (filled white circle) among 14 unfilled circles and filled white squares and were instructed to press a left button with their left index finger if they found the target and press a right button with their right index finger in case they did not find it. It was emphasized to respond as quickly and as accurately as possible. In total, participants had to work on five blocks with 80 trials each (50% target present trials). They were not given any practice run but received standardized instructions and illustrated examples. *Z*-scores of the median reaction times of correct trials and the response accuracy were used to create a composite score of the visual search task as outcome variable.

In the *identical pictures test* a target figure was presented in the upper half and five response alternatives were presented in the lower half of a computer screen. Participants were instructed to identify as fast and as accurately as possible the one figure among the five response alternatives that equals the target figure and click on it (Ghisletta et al., 2006). Each trial ended at first response and was then followed by the next. In total, 46 trials were available. However, the test ended automatically after 80 s. According to the literature (see Ghisletta et al., 2006), the identical pictures test uses the number of correctly solved trials within this time frame as a measure of processing speed. Therefore, *z*-scores of the number of correctly solved trials within 80 s were used in the statistical analyses. Reliability of the identical pictures test was very satisfactory (Cronbach's alpha = 0.80–0.96).

We used both of these rather dissimilar measures because they target different levels of difficulty. Whereas in the visual search task participants had to compare simple geometric shapes, the identical pictures test used more complex figures. The identical pictures test forced participants much more than the visual search task to pay attention to details. In line with this rationale, visual search theory suggests that higher difficulty is more sensitive in carving out existing dissimilarities in cognitive functioning (Wolfe, 2007). That is, lower levels of difficulty in the visual search task may mitigate existing differences in cognitive functioning between participants with multiple versus 0 or 1 WTC whereas higher levels of intricacy in the identical pictures test may aggravate such dissimilarities. See **Table 3** for the 0-order correlations between the matching variables and the cognitive variables.

Working Memory

Working memory performance was assessed with the N-back task (Jaeggi et al., 2010). Participants had to remember a span of individually presented letters and compare the current item with the one before. The task was administered at two levels of difficulty, as visual 1-back and 2-back task. The visual 1-back and 2-back tasks are reliable measures to asses working memory capacity (split-half reliability: $r = 0.94$) with satisfactory psychometric validity (Jaeggi et al., 2010). In the 1-back task, participants were told to press a left button with their left index finger whenever the current letter equaled the one presented immediately before. If the current letter was different, they were instructed to press a right button with their right index finger

TABLE 3 | Zero-order correlations of the matching variables with the cognitive variables.

	Matching variables						Cognitive variables		
	Age	**Years of education**	**Job complexity**	**GPA**	**LEQ (rec.)**	**Openness (rec.)**	**Visual search**	**Id. Pic.**	**N-back**
Age	1								
Years of education	−0.40*	1							
Job complexity	0.07	0.05	1						
GPA	0.26	0.19	0.04	1					
LEQ (rec.)	−0.16	0.25	−0.07	−0.30†	1				
Openness (recon.)	0.03	0.08	0.37*	−0.26	0.35*	1			
Visual search	−0.33*	0.00	0.23	−0.42*	0.40*	0.25	1		
Identical pictures	−0.27†	−0.07	0.19	−0.29†	0.15	0.17	0.52*	1	
N-back	0.00	0.00	0.31†	0.00	0.11	0.04	0.23	0.32*	1

*GPA, grade point average; LEQ (rec.), Lifetime of Experience Questionnaire (reconstructed from young adulthood); Openness (recon.), openness to experience (reconstructed from young adulthood); Id. Pic., identical pictures; *$p < 0.05$; †$p < 0.1$.*

(Voelcker-Rehage et al., 2011). Similarly, in the 2-back task, they had to press the left button if the current letter was equal to the one presented two items earlier, and press the right button if this was not the case. All subjects started with the 1-back task and were shown a randomized sequence of 80 letters at both levels of difficulty (37.5% match trials). Each letter was presented for approximately 1500 ms and was then followed by a fixation cross (exposure time = 300 ms). As in the visual search task, participants were not given practice trials. They received a standardized instruction and digitally illustrated examples in which it was emphasized to respond as accurately as possible. *Z*-scores of the response accuracies of the 1-back and 2-back tasks were used to create a composite N-back score as outcome variable.

Control Variables

Leisure-Time Activity

As stated above we used a translated version of the LEQ (Valenzuela and Sachdev, 2007) to assess former (in young adulthood) as well as current participation in a broad range of mentally stimulating leisure-time activities. *Z*-Scores of the sum of current participation in stimulating leisure-time activities (as indicated by LEQ items) were used as control variable.

Voluntariness of WTC

In order to control for the potential influence of voluntariness of WTC, we additionally assessed voluntariness of each WTC over the 17-year period. Using a 5-point Likert scale (ranging from 1, *absolutely voluntary* to 5, *absolutely not voluntary)*, participants were asked "*Was this a voluntary work-task change?*" for each WTC. The mean voluntariness across all WTC over the 17-year period was used to indicate voluntariness in WTC.

MR Data Acquisition and Analysis

Acquisition

Voxel-based morphometry (VBM) was applied to T1-weighted anatomical brain scans acquired on a 3-Tesla Siemens Allegra whole-body magnetic resonance tomograph (MPRAGE sequence, TR of 2300 ms, 176 slices with 1 mm × 1 mm × 1 mm isotropic resolution). The anatomical brain scans were part of a larger MRI protocol. The entire MRI protocol lasted about 90 min.

Preprocessing and analysis of T1-weighted images were performed using the VBM 8 toolbox[1] (Structural Brain Mapping Group, University of Jena, Germany) in SPM8[2] (Wellcome Trust Centre for Neuroimaging, University College London, London, UK) running on MATLAB version R2011b (The MathWorks, Sherborn, MA, USA). We applied the standard VBM8 routines and default parameters. The preprocessing procedure implemented in VBM8 consists of (1) a correction for bias-field in homogeneity, (2) a high-dimensional spatial DARTEL (Diffeomorphic Anatomical Registration Through Exponentiated Lie Algebra) normalization into MNI (Montreal Neurological Institute) space, (3) tissue segmentation into GM, white matter (WM), and cerebrospinal fluid (CSF), and (4) a modulation step in which GM images were multiplied by the local value derived from the deformation field (in order to account for individual brain size differences and restore within-voxel volumes that may have been altered during normalization). The modulated GM volumes were smoothed with an 8 mm FWHM (full width half maximum) Gaussian kernel. The normalized, modulated, and smoothed GM images were used for statistical analyses.

Statistical Analysis

Comparisons of regional GM volumes between participants with multiple versus 0 or 1 WTC in 17 years were performed using both voxel- and cluster-level inference within the framework of the general linear model. Full-factorial ANCOVA was used to investigate regional GM volume differences across the whole brain between the two groups. Prior to analysis, GM volumes with less than 0.2 tissue class probability were excluded. Due to the small sample size, only current participation in cognitively stimulating leisure-time activities (but not voluntariness in WTC) was added to the model as covariate. Statistical parametric GM maps were thresholded with $p < 0.001$ (uncorrected). We used the empirically determined extent threshold of $k = 56$

[1]http://dbm.neuro.uni-jena.de/vbm/

[2]http://www.fil.ion.ucl.ac.uk/spm/

voxels per cluster to correct for multiple comparisons. That is, only voxel clusters exceeding a size of more than 56 voxels will be reported. A recent study provided evidence that reporting uncorrected results from parametric statistical approaches tends to inflate false-positive error rates (Eklund et al., 2016). However, the same study also reported that cluster-defining thresholds of $p < 0.001$ combined with a smoothing kernel of 8 mm yields expected levels of false-positive error rates in SPM. In addition to that, we are optimistic that our extent threshold of $k = 56$ voxels helps to minimize potential errors.

Correlating Individual Brain Volume with Cognitive Performance

We extracted individual GM volumes from significant VBM clusters with the help of the MarsBar toolbox for SPM[3], and related the average GM volume in each cluster with performance in the significant cognitive tests (in a partial correlation analysis, controlling for current leisure time activity).

RESULTS

Are Work-Task Changes Associated with Higher Levels of Cognitive Performance?

Due to the rather small sample size, the behavioral hypotheses were tested via one Multivariate Analysis of Covariance (MANCOVA) - rather than using multilevel modeling – with (a) a composite score for the visual search task built from averaged *z*-scores of the median reaction time per correct trial and from *z*-scores of the accuracy in the visual search task, (b) *z*-scores of the number of correct trials within 80 s in the identical pictures test, and (c) a composite *z*-score of the accuracies in the 1- and 2-back task as dependent variables. WTC ('multiple' versus '0 or 1') were included as independent variable. A composite LEQ score and its interaction with WTC as well as an average *z*-score of voluntariness in WTC served as covariates. The results for the main effects of WTC after controlling for leisure-time activity and voluntariness in WTC can be found in **Table 4**.

Using Pillai's trace, the multivariate statistics revealed a main effect of WTC on cognitive functioning, $F(3,31) = 3.32$, $p = 0.03$, $\eta^2 = 0.24$, as well as a marginally significant interaction between WTC and leisure time activity, $F(3,31) = 2.79$, $p = 0.06$, $\eta^2 = 0.21$, but no main effect of leisure-time activity, $F(3,31) = 1.48$, $p = 0.24$, $\eta^2 = 0.13$, and voluntariness in WTC, $F(3,31) = 2.03$, $p = 0.13$, $\eta^2 = 0.16$. Given the significant omnibus effect, we decided to accept this pattern of results as indication of a potential main effect of WTC and inspected the univariate statistics for processing speed and working memory performance.

[3]http://marsbar.sourceforge.net

TABLE 4 | Differences in cognitive performance as a function of work-task changes (adjusted for leisure-time activity and voluntariness; *n* = 38).

Indicators of cognitive performance	Work-task changes			
	0 or 1 (*N* = 19)	Multiple (*N* = 19)	*F*	*P*
Visual search	−0.89 (0.19)	0.13 (0.19)	1.16	0.29
Identical pictures	−0.12 (0.21)	0.12 (0.21)	6.81	0.01
N-back	−0.18 (0.16)	0.25 (0.16)	5.63	0.02

Indicators of cognitive performance are presented in composite z-scores. Standard errors are given in parentheses.

Processing Speed

The univariate statistics showed a significant effect of WTC on the identical pictures test, $F(1,33) = 6.81$, $p = 0.01$, $\eta_p^2 = 0.17$. Participants with multiple WTC reached higher *z*-scores in the identical pictures test ($M_{\text{multiple}} = 0.12$, $SE = 0.21$) than participants with 0 or 1 WTC ($M_{0\text{or}1} = -0.12$, $SE = 0.21$). See **Table 4** and **Figures 1** and **2** for further information.

The univariate statistics revealed no main effect of WTC on performance in the visual search task, $F(1,33) = 1.16$, $p = 0.29$, $\eta_p^2 = 0.03$. See **Table 4**. We interpreted this finding as a potential ceiling effect as a consequence of lower cognitive load as compared to the identical pictures test. The average reaction time across all participants and conditions of the visual search task ($M_{\text{all}} = 675.6$ ms) was more than 200 ms lower than in a comparable subsample of the lifespan study by Hommel et al. (2004; $M_{\text{Hommel},45-55\text{ years}} = 876$ ms). In addition, the standard deviation was only a fourth of that presented in Hommel's work ($SD_{\text{all}} = 65.1$ ms versus $SD_{\text{Hommel},45-55\text{ years}} = 253$ ms).

Working Memory

Table 4 summarizes the significant univariate effect of WTC on the N-back task, $F(1,33) = 5.63$, $p = 0.02$, $\eta_p^2 = 0.15$. As shown in **Figures 1** and **2,** multiple WTC led to higher composite *z*-scores in the N-back task than 0 or 1 WTC ($M_{\text{multiple}} = 0.25$, $SE = 0.16$ vs. $M_{0\text{or}1} = -0.18$, $SE = 0.16$).

Are Work-Task Changes Associated with Differences in Brain Structure?

The VBM analysis revealed five regions with significant differences in GM volume between participants with multiple versus 0 or 1 WTC (see **Figure 3** and **Table 5**). We found four voxel clusters in which participants with multiple WTC indicated more GM volume than participants with 0 or 1 WTC: two clusters located in the left and right caudate, one of them extending into the right rostral anterior cingulate cortex (ACC). In addition, there were another two clusters in the right medial frontal gyrus and in the left insula. Vice versa, participants with 0 or 1 WTC depicted more GM volume in the left inferior temporal gyrus.

In a follow-up analysis and in order to validate the factual importance of the regions detected in our VBM analysis, we correlated the individual average GM volume in each of these regions with performance in the identical pictures and N-back tests. Results suggest moderately high correlations between performance in the identical pictures test (but not the N-back task) and the four clusters that were positively associated with WTC: particularly the two clusters comprising the left and right caudate and rostral ACC but also the two clusters in the left insula and the right medial frontal gyrus depicted moderately

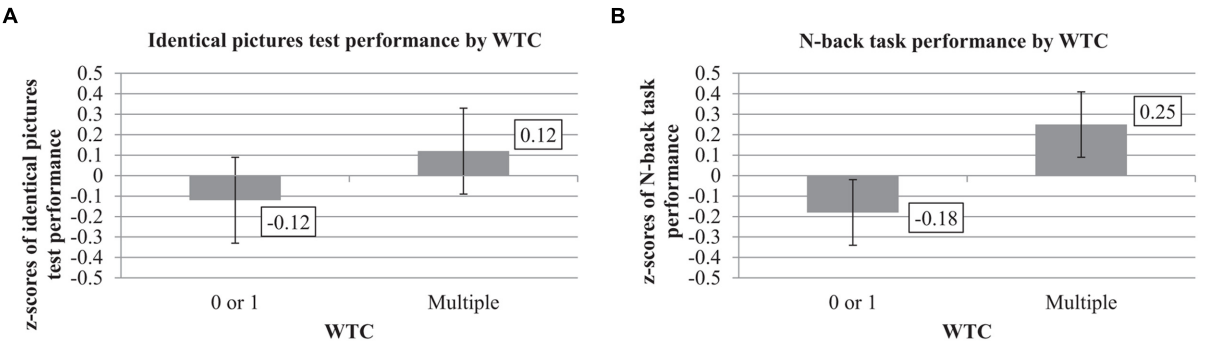

FIGURE 1 | Identical pictures test and N-back performance by work-task changes (WTC) (adjusted for leisure-time activity and voluntariness in WTC; *n* = 38). *z*-scores of performance in the identical pictures test **(A)**, and N-back task **(B)** by multiple versus 0 or 1 WTC during 17 years. Error bars indicate standard errors.

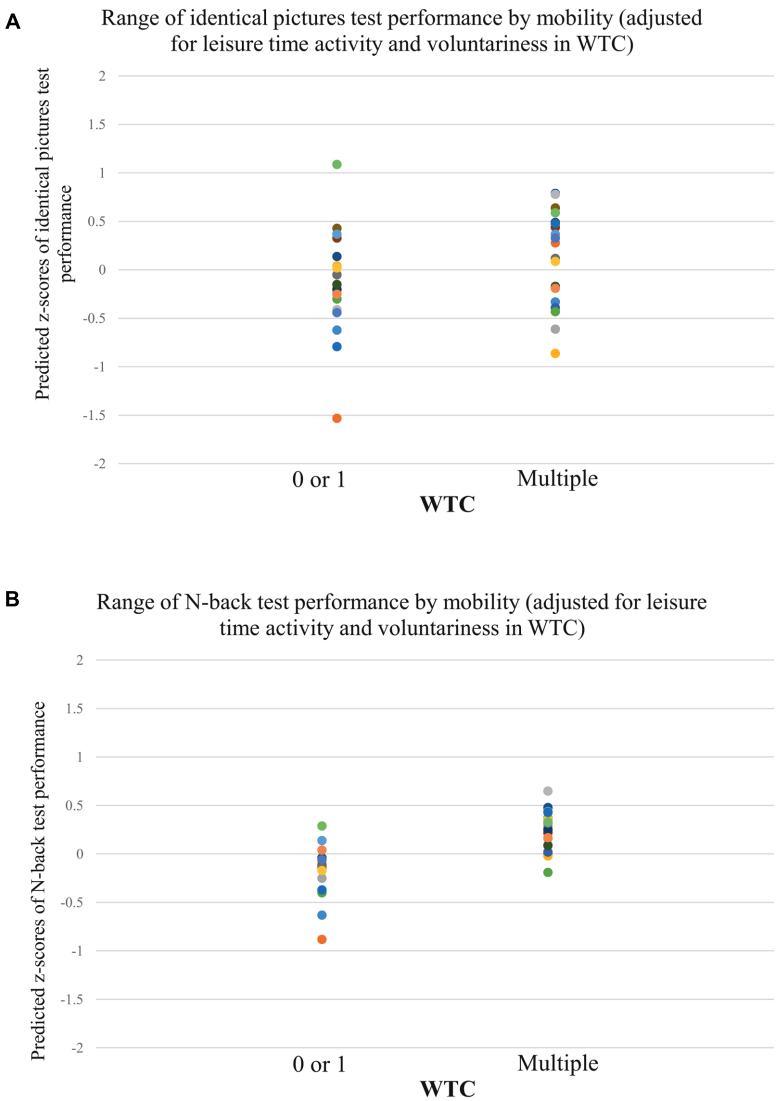

FIGURE 2 | Individual test performance in identical pictures test and N-back task by WTC (adjusted for leisure-time activity and voluntariness in WTC; *n* = 38). Individual *z*-scores of performance in the identical pictures test **(A)**, and N-back task **(B)** by multiple versus 0 or 1 WTC during 17 years.

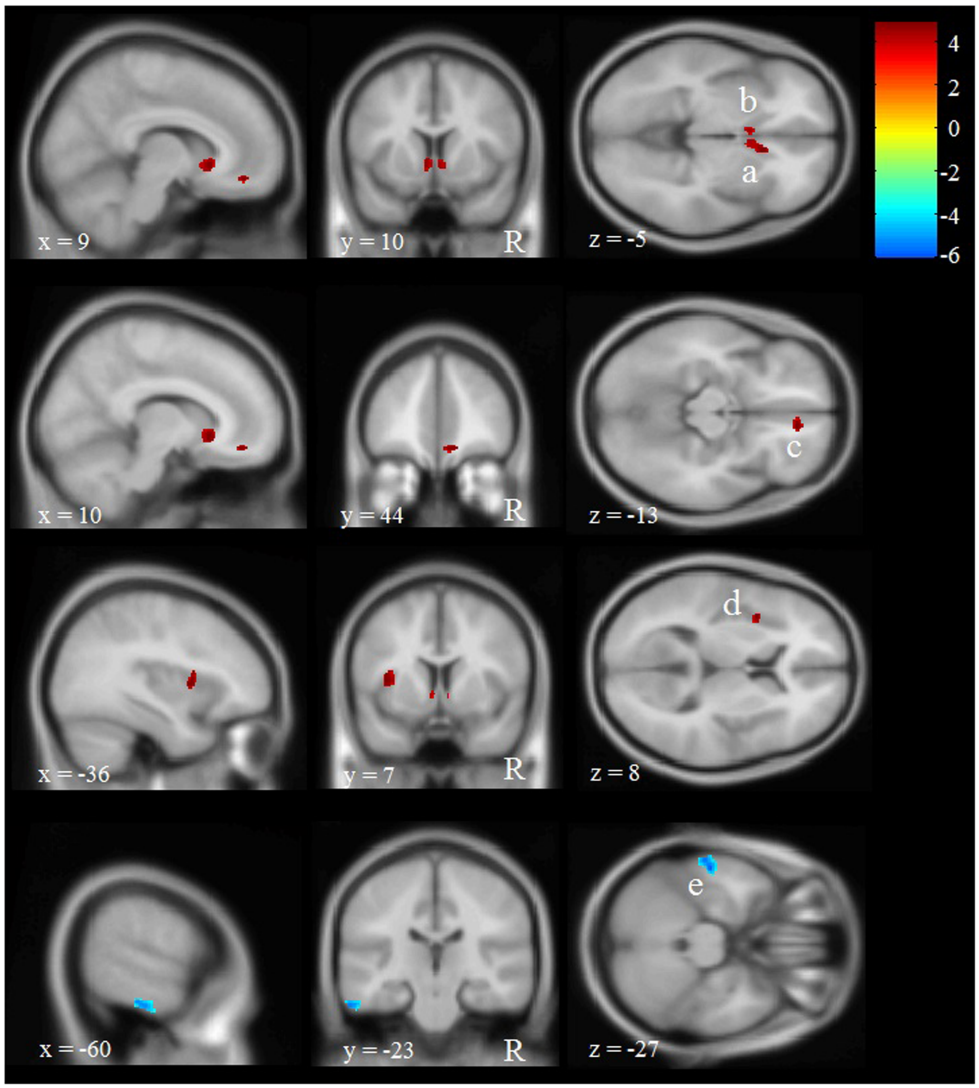

FIGURE 3 | Effects of WTC on regional gray matter (GM) volume in long-term production workers ($n = 20$). Shown are clusters with significantly more (red, a–d) or less (blue, e) GM volume in participants with multiple WTC as opposed to participants with 0 or 1 WTC. Multiple WTC were associated with more GM volume in the left (a) and right caudate (b), as well as in the medial frontal gyrus (c) and the insular cortex (d). 0 or 1 WTC were associated with more GM volume in the inferior temporal gyrus (e). The letter 'R' indicates the right hemisphere. Letters a, b, c, d, e refer to the voxel clusters depicted in **Table 1**. x, y, and z specify the MNI coordinates.

high correlations between $r = 0.22$ and $r = 0.46$ with performance in the identical pictures test. That is, the more GM volume individuals depict particularly in the left and right caudate the more correct trials they reached in the identical pictures test. In contrast, the one cluster in the left inferior temporal gyrus that was negatively related to WTC did not show a significant correlation with processing speed or working memory (see **Table 6**).

DISCUSSION

All in all, our results supported and extended our hypotheses. We provided first cautious evidence that recurrent experience of novelty at work (as indicated by multiple WTC in 17 years) is associated with (a) higher levels of processing speed and working memory performance and (b) greater GM volume in striatal, frontal, and insular regions. This is first evidence that novelty seems to play a role in counteracting the debilitating effects of low complexity at work. However, replication is needed to corroborate these results.

Mental Stimulation through Novelty

Cognitive Performance

Our findings are consistent with the interpretation that a work environment which is characterized by multiple (as opposed to 0 or only 1) WTC implies repeated confrontation with new tasks

TABLE 5 | Differences in regional gray matter (GM) volume between production workers with multiple versus 0 or 1 WTC ($n = 20$).

Contrast: multiple WTC > 0 or 1 WTC							
Region	**Hemis-phere**	**Letter Figure 2**	**MNI coordinates**			**Cluster size**	***t*-value (df = 15)**
			x	***y***	***z***		
Caudate/ACC	R	A	11	21	−6	195	4.91
Caudate	L	B	−5	11	−3	62	4.47
Medial frontal gyrus	R	C	11	44	−14	67	4.84
Insula	L	D	−36	6	4	109	4.86
Contrast: 0 or 1 WTC > Multiple WTC							
Inferior temporal gyrus	L	E	−56	−21	−29	267	5.95

WTC, work-task changes; Fig., Figure; MNI, Montreal Neurological Institute; R, right; L, left. t-values at $p < 0.001$ (uncorrected). Extent threshold (k) = 15 voxels.

and recurrent skill acquisition. Building on such findings one might argue that cumulative long-term negative effects of low complexity work could be avoided by systematically introducing work-task changes. Our results suggest that recurrent novelty of the work tasks seem to trigger plasticity (even on low levels of complexity and independent of leisure-time behavior and voluntariness in WTC). Thus, it may be considered one crucial component of job complexity, however, it is one that can occur at all levels of complexity. Recurrent novelty (at work or in general) may be one critical contextual feature for cognitive plasticity to unfold. It may be the mismatch that has been postulated in earlier influential work (Lövdén et al., 2010). This is in line with recent evidence suggesting that cognitive and brain plasticity may particularly benefit from active learning and novel information processing (Park et al., 2014).

TABLE 6 | Correlations of average GM volumes with cognitive performance ($n = 20$).

Brain areas	**Hemis-phere**	**Letter Figure 2**	**Indicator of cognitive performance**	
			Identical pictures	**N-back**
Caudate/ACC	R	a	0.403†	−0.034
Caudate	L	b	0.466*	−0.032
Medial frontal gyrus	R	c	0.227	0.113
Insula	L	d	0.346	−0.144
Inferior temporal gyrus	L	e	−0.126	−0.233

*Average GM volumes were partially correlated with composite z-scores of performance in the identical pictures test and N-back task. VBM, voxel-based morphometry; R, right; L, left; *$p < 0.05$, †$p < 0.1$.*

Brain Structure

The behavioral results were replicated in the analyses of potential difference in brain structure. We found that multiple WTC in 17 years were associated with more GM volume in striatal, frontal, and insular regions. In the context of long-term exposure to the detrimental effects of repetitive production work, more as compared to less WTC may have placed higher demands on the cortico-striatal system (Doyon and Benali, 2005; Seidler, 2010) which in turn affected GM volume in parts of the medial frontal gyrus as well as in the left and right caudate. The affected brain regions are also part of the dopamine system (Li et al., 2010). The dopamine system is assumed to play an essential role in rewarded learning processes (Bäckman et al., 2010) and also declines with age, mainly in the caudate but also in frontal regions and the anterior cingulate (see the 'correlative triad' between age, dopamine receptor loss and cognitive functioning; Bäckman et al., 2010). It will be interesting to see in future research whether recurrent novelty and learning experience due to multiple WTC as opposed to prolonged routine due to less WTC have the potential to diminish age-related receptor loss in these regions.

The mechanisms that underlie the effect of WTC on GM volume in the rostral ACC and the insular cortex may be more difficult to understand. However, both regions depict age-related GM volume loss (Mann et al., 2011; Taki et al., 2013) and both regions seem to be related to learning processes and cognitive functioning. To start with, the ACC is commonly involved in error detection and conflict monitoring (Bush et al., 2000; Elmer et al., 2014). Experimental research has provided evidence for the monitoring role of the ACC in executive functioning (Abutalebi et al., 2012; Elmer et al., 2014). The insular cortex, on the other hand, is involved in a multitude of processes. Next to visceral and autonomic activities such as heart rate, bladder and bowel distension, there is evidence that it plays an important role in cognitive functioning (e.g., Nelson et al., 2010). For instance, the insular cortex was related to working memory performance, processing speed, and executive functioning (Zakzanis et al., 2005; Ruscheweyh et al., 2013; Müller et al., 2014). Indeed, it has been stated that a functional network involving the insular cortex and parts of the ACC and the medial frontal cortex are among the most frequently activated brain regions in any cognitive task (Ebisch et al., 2013). The connectivity strength of this network has been linked to higher levels of performance in tests of executive functioning and logical reasoning (Ebisch et al., 2013; Müller et al., 2014). Interestingly, a recent review postulated the striatum as well as the insular cortex and the medial frontal cortex to be part of a more complex loop to facilitate decision making (cf. the 'affect-integration-motivation framework'; Samanez-Larkin and Knutson, 2015).

Limitations and Future Research

Why and how WTC affect cognitive performance is an open question. We suggest that our findings are consistent with the

interpretation that multiple as opposed to 0 or 1 WTC during 17 years represent a work context that is characterized by repeated confrontation with new, yet unknown situations and cognitive challenges. And it is especially these characteristics that are essential to maintain (or spark positive changes in) adult cognitive functioning. In this vein, our results may support the notion that instead of the complexity of a given environment it may rather be the novelty that is critical for cognitive plasticity to manifest (Lövdén et al., 2010; Bowen et al., 2011; Park et al., 2014).

Although this study uncovered some interesting results, it does have limitations. With 38 (20) participants in total and 19 (10) participants in each of the two experimental groups, the statistical power of our analyses was low, particularly in the reduced fMRI sample. Therefore, some effects may have failed to reach conventional levels of significance. However, samples of 20 subjects have been shown to yield acceptable levels of false-positive error rates (e.g., Eklund et al., 2016). It is important to note that this study was exploratory field research, conducted, however, under rather controlled conditions. We aimed to minimize selection biases via a complex matching procedure.

'*In vivo*' research is time consuming as it is complex to enter real-life environments and establish a quasi-experimental design. It took the project team almost 2 years to develop the trust with the company leadership and its work council in order to finally gain access to human resource information and to workers. Of course, traditional randomization of individuals to work biographies with more or less WTC is not conceivable. Thus, quasi-experimental design with its limitations was the design of choice. A case-control study design represented the most rigorous approach. Therefore, without doubt replication studies are needed to rule out that effects are due to either chance or selection. We would like to present these study results as a first cautious hint as to which components of cumulative work settings might be levers to promote cognitively health aging.

As research within a company across a period of almost 20 years is unheard of, we had no option but to reconstruct most of the baseline level variables. In terms of the brain variables we had no baseline assessment available. As a consequence, we cannot entirely rule out the possibility of selection biases. Our hope, however, is that we minimized this problem with a diligent multi-step matching procedure including all relevant covariates. Furthermore, we took great care to develop retrospective measures that were constructed to approximate the baseline covariates with the best possible validity (e.g., test–retest reliability of the LEQ was $r = 0.98$; internal consistency of our scale for reconstructed Openness $\alpha = 0.68$). However, we have to acknowledge that these scales remain being reconstructions and we cannot say to what extent our participants were able to accurately recall and report their engagement in mentally stimulating activities and openness in young adulthood.

In a similar vein, the number of WTC was assessed retrospectively in biographical interviews. All work biographies were discussed in reverse, starting with the present job tasks. We are convinced this step-by-step procedure served to reduce recall biases and helped to draw a complete picture of the work biographies of our participants (see **Figure 4** for the distribution of WTC across all participants). However, we cannot guarantee the accuracy of our measurement. It is possible that there is a causal relationship between the ability of our participants to accurately remember their work biographies and the dependent variables in this study (namely, working memory, processing speed, and GM volume).

Similarly, we used the GPA as proxy variable for baseline cognitive functioning. Next to intelligence tests, GPA was the most often employed indicator of cognitive functioning (von Stumm and Ackerman, 2013). And correlations of about 0.4–0.7 between IQ scores and school performance (Deary et al., 2007) provide further support for its validity to proxy cognitive functioning. But GPA is likely to be determined by factors

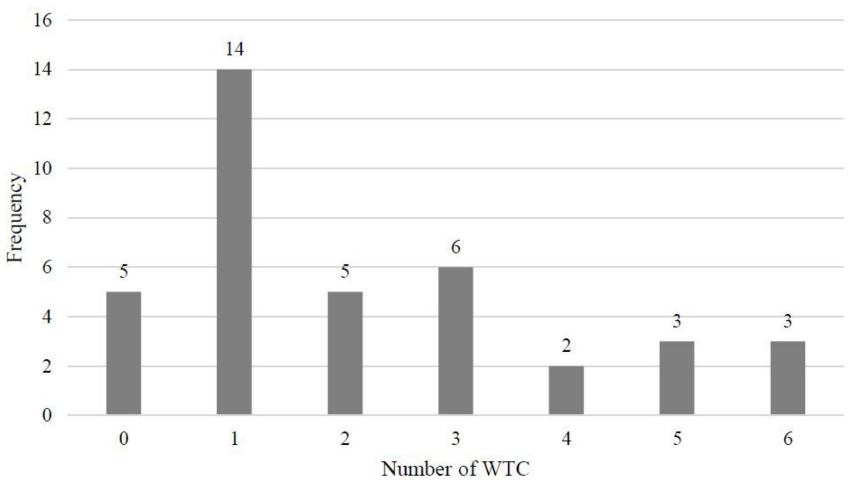

FIGURE 4 | Distribution of WTC across all participants ($N = 38$).

other than cognitive functioning as well, such as, motivation, environmental support, social background, or teacher ability. It is possible that we were not able to fully control for selection biases with GPA as measurement for baseline cognitive functioning. We cannot avert the possibility of reverse causality, that is, that participants with higher baseline cognitive functioning were more likely to be given new or other work responsibilities because of their capability. However, to additionally control for this, we added voluntariness in WTC to our analysis model. We did not find any moderator effect voluntariness. Obviously, future studies should aim for prospective longitudinal designs with greater sample sizes and pre- and post-assessment of all relevant covariates and measures of GM volume.

Whether the group differences in cognitive performance and regional GM volume are the positive consequence of more mental stimulation in participants with multiple WTC or the negative consequence of over-routinization in participants with 0 or 1 WTC or both, we cannot determine. On the basis of our data, we cannot disentangle the mechanisms that underlie the promising effect of WTC. For instance, whether the GM volume differences between participants with multiple versus only one or less WTC in 17 years are a consequence of increments in GM or a consequence of reduced loss under multiple WTC, we cannot say. As we interpret our results, repeated confrontation with novel experience, skill acquisition and automatization of new routines placed higher demands on the cortico-striatal (and perhaps the dopaminergic) system. These characteristics may have sparked neural scaffolding processes (e.g., augmented synaptogenesis; see Markham and Greenough, 2004; also see Petersen et al., 1998; Reuter-Lorenz and Park, 2014). At the same time, over-routinization and 'disuse' of the cortico-striatal system in workers with less WTC may have aggravated age-related cognitive decline through reductions in neural activity and decreases in synapse numbers (Valenzuela et al., 2008; Grady, 2012). As noted above, it is likely the strong effect size of the differences in cognitive performance and GM volume in participants with more versus less WTC are linked with the increased sensitivity that was built into our design by confining ourselves to one company and by the rigorous matching procedure that we applied. Thus, the variance in outcome variables may be reduced and therefore favor stronger effect sizes. The observed differences between participants with more versus less WTC may therefore be amplified. Apart from this magnifying effect, it is also possible that recurrent experience of novelty (i.e., recurrent WTC) may have triggered new behaviors at work or in private life (over and above the controlled leisure-time activities) which lead to a cascading effect and augmented the group differences. In other words, the positive effects of recurrent novelty at work (e.g., recurrent skill acquisition, better cognitive performance, increase of GM volume in cortico-striatal networks) spilled over to private life and paved the way to more cognitively favorable behavior or environments outside of work which then accumulated over the years and supposedly affected the exposure of novelty at work in turn (in the sense of an upward spiral of mental stimulation at work and in leisure time). This speculation also deserves further investigation in future research.

Another interesting avenue for the studies to come is the long-term effect of WTC. In the present work, we studied middle-aged workers (M_{age} = 47 years). It is an open question whether the small effects we found with this comparatively young sample would be more pronounced in an older population. There is reason, however, to assume that a career of multiple versus 0 or 1 WTC could unfold greater influence later in life. For instance, job complexity showed greater effects in older than in younger workers (Schooler et al., 1999). Whether the same holds true for WTC is an interesting question that should be dealt with in future work.

Finally, and regardless of the rather theoretical considerations above, our findings may have important practical implications. Low complexity occupations such as industrial production work have detrimental effects on brain and cognition. However, an average of three to four WTC in 17 years yields considerable differences in both cognitive performance levels and brain anatomy. In other words, one WTC in 4–5 years could already help to preserve cognitive health and facilitate work ability, well-being, and productivity across the working lifespan at low levels of job complexity. Managing directors, company owners, as well as personnel and health executives may therefore want to consider aging as an important variable in organizational health psychology and understand WTC as strategic health management instrument.

CONCLUSION

Taken together, the present study demonstrated optimistic evidence that recurrent experience of novelty (as indicated by multiple WTC in 17 years) can serve as a powerful '*in vivo*' cognitive intervention in the work setting to diminish negative long-term effects of low job complexity on the cognitive system (Gajewski et al., 2010). Moreover, our findings may extend extant knowledge on critical contextual features that foster cognitive plasticity: it is possible that recurrent experience of novelty at work is a crucial component underlying the observed effects of job complexity. Future research, however, needs to corroborate our first cautious evidence.

ETHICS STATEMENT

This study was approved by Ethik-Kommission der Deutschen Gesellschaft für Psychologie (DGPs).

AUTHOR CONTRIBUTIONS

BG, KS, and US (in alphabetical order) developed the study concept. JO, US, BG, AW, GR, KS, and CV-R contributed to the study design. Testing and data collection were performed by JO, AW, and GR. JO, AW, and CN performed the data analysis and interpretation under the supervision of BG and US. JO, US, and BG drafted the manuscript, and all other authors provided critical revisions.

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SOC Strategies and Organizational Citizenship Behaviors toward the Benefits of Co-workers: A Multi-Source Study

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Background: Individuals' behavioral strategies like selection, optimization, and compensation (SOC) contribute to efficient use of available resources. In the work context, previous studies revealed positive associations between employees' SOC use and favorable individual outcomes, like engagement and job performance. However, the social implications of self-directed behaviors like SOC that are favorable for the employee but may imply consequences for coworkers have not been investigated yet in an interpersonal work context.

Objective: This study aimed to assess associations between employees' use of SOC behaviors at work and their organizational citizenship behaviors (OCB) toward the benefits of co-workers rated by their peers at work. We further sought to identify age-specific associations between SOC use and OCB.

Design and Method: A cross-sectional design combining multi-source data was applied in primary school teachers (age range: 23–58 years) who frequently teach in dyads. $N = 114$ dyads were finally included. Teachers reported on their SOC strategies at work. Their peer colleagues evaluated teachers' OCB. Control variables were gender, workload, working hours, and perceived proximity of relationship between the dyads.

Results: We observed a positive effect of loss-based selection behaviors on peer-rated OCB. Moreover, there was a significant two-way interaction effect between the use of compensation strategies and age on OCB, such that there was a positive association for older employees and a negative association for younger employees. There were no significant main and age-related interaction effects of elective selection, optimization, and of overall SOC strategies on OCB.

Conclusion: Our study suggests that high use of loss-based selection and high use of compensation strategies in older employees is positively related with OCB as perceived by their colleagues. However, high use of compensation strategies in younger employees is perceived negatively related with OCB. Our findings contribute to a better understanding of the age-differentiated interpersonal effects of successful aging strategies in terms of SOC in organizations.

Keywords: performance, older workers, social support, SOC, successful aging, teamwork

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INTRODUCTION

Due to the aging of the workforce in many countries, organizations seek ways to promote functioning and well-being of their employees throughout the whole work-life span. Research shows that individuals' behavioral strategies of selection, optimization, and compensation (SOC, Baltes and Baltes, 1990) are key contributors, particularly in older individuals to cope effectively with dwindling individual resources (Riediger et al., 2006). Accordingly, previous studies in the work context revealed positive associations between employees' SOC use and favorable individual outcomes, like engagement and job performance (for an overview, see Müller and Weigl, 2015; Moghimi et al., 2017). Moreover, first interventional approaches to train and apply SOC behaviors on the job were introduced, indicating that the SOC model is a promising approach for the development of occupational health and stress prevention measures drawing upon a life-span approach (Müller et al., 2016; Becker et al., 2017).

However, previous research exclusively considered individual effects of SOC, i.e., cognitive-behavioral, performance, or health outcomes. Implications on the inter-individual or organizational level are largely neglected (Moghimi et al., 2017). In modern work environments, collaboration and teamwork are essential. Both, individual gains and organizational benefits through application of individual behavioral strategies at work need to be in balance. This study therefore aimed to assess for the first time the associations between employees' use of SOC behaviors at work and their organizational citizenship behavior (OCB) specifically toward the benefits of co-workers rated by their immediate peers at work.

We deem that this study contributes to the current knowledge base on effects of behavioral strategies of successful aging at work in three ways: first, since inter-individual effects of SOC are under-investigated, our study expands previous approaches on the use of SOC behaviors at work through its social perspective. To the best of our knowledge, no studies have yet surveyed the benefits or harms of individuals' SOC use through the eyes of their immediate co-workers. In this vein, our findings help to understand the social implications of SOC. Second, our study seeks to further elucidate the differential and shared effects of the individual SOC strategies with age. Originally, it has been proposed that SOC use is most efficient in the concerted and concurrent application of all SOC strategies (Freund and Baltes, 2000). However, previous research suggested that single SOC strategies are more efficient in response to personal age-related changes and environmental demands (e.g., Demerouti et al., 2014; Riedel et al., 2015). Lastly, the majority of available research on the effects of SOC use relied on self-reports that are prone to bias (Moghimi et al., 2017). We therefore aimed to test the single as well as overall effects of SOC using different sources of data, i.e., self and peer ratings.

SOC Behaviors

In the field of age and occupational functioning, concepts that consider aging in terms of a dynamic development of gains, losses, and the reorganization of resources serve as a base for explaining successful aging at work (Riediger et al., 2006; Zacher, 2015). One of the key concepts in this area is the model of SOC. It suggests that individuals aim to maintain an optimal allocation of individual resources, functioning in the face of challenges, and adaptation to declined resources (Baltes and Baltes, 1990; Riediger et al., 2006).

The core propositions of the SOC model state that individuals manage age-related changes and losses of capabilities and resources more efficiently by virtue of three interrelated action strategies (Freund and Baltes, 2002b): *Selection* behaviors aim to focus resources on specific goals in contrast to allocating resources among multiple goals. Thus, selection determines the direction of personal development and resource investment. Selection can be differentiated into either elective, that is, directed toward desired future states (e.g., an employee decides to exclusively pursue one important goal at work, e.g., attaining a specific position within the organization) or loss-based, that is, directed at the reorganization of goals in response to perceived problems or experienced challenges (e.g., an employee decides to change job tasks because the current job demands can no longer be accomplished). *Optimization* behaviors aim to facilitate individuals in obtaining and continuously improving the means to successfully pursue a desired goal (e.g., an employee acquires the necessary competencies to successfully perform important job tasks). Thus, optimization refers to the quality as well as to the persistence of resource allocation in service of goal pursuit. As third SOC behavior, *compensation* includes the acquisition and application of alternative means to achieve a desired goal in the case of obstacles or resource losses (e.g., an employee with chronic diseases seeks opportunities of extra support and additional assistance at work). As such, compensation specifically refers to the flexibility of resource allocation in the pursuit of goals. In summary, the SOC model proposes that the use of SOC behaviors is particularly effective when individuals focus on fewer, but more important goals, pursue these goals in an optimized manner, and, in doing so flexibly apply adequate compensatory means to address goal-relevant barriers (Baltes, 1997).

Main aspects of the SOC model are in accordance with the tenets of motivational theory on life-span development (Heckhausen et al., 2010): both approaches assume that the agency of individuals is the driver of human development and functional adaptation. Moreover, the SOC model and the motivational theory on life-span development agree that adaptive life course development involves the selection and disengagement from goals.

SOC and Successful Aging at Work

During the past decade, SOC-based research has been established as a powerful approach for explaining organizational behavior related to coping with age-related changes in individual resources across the work lifespan (cf., Müller and Weigl, 2015). Previously, Moghimi et al. (2017) synthesized all available research on SOC use at work. They concluded that SOC behaviors are important for various employee outcomes, particularly for job performance, job satisfaction, and engagement. However, in their comprehensive review, Moghimi et al. (2017) also identify remaining gaps in the current evidence base on SOC use in

the workplace. One particular shortcoming refers to contextual outcomes of SOC on the organizational level. For example, it has been suggested, that employees' SOC use has consequences for teams, and organizations (Baltes and Dickson, 2001). However, the empirical investigation of this assumption has not been undertaken yet and deserves in-depth exploration in work settings (Moghimi et al., 2017).

Organizational Citizenship Behaviors

A second focal construct in our study is employees' OCB. It can be defined as discretionary employee behaviors or extra-role behaviors that support coworkers, contribute to team functioning and to the organization (Borman and Motowidlo, 1997). OCB has been considered as employee activities that support the social and organizational environment beyond the actual core task or job role (Podsakoff et al., 2009). Hence, OCB includes extra-role activities or behaviors that are not just about carrying out one's prescribed job requirements, i.e., in-role job performance. The construct of OCB has received broad attention throughout the past decade and it has been shown that it is a key variable in employees' organizational behavior and a meaningful measure of organizational effectiveness. The literature on OCB and potential consequences showed that employees' OCB may be associated with important individual- and organizational-level outcomes (Podsakoff et al., 2009).

Although several conceptualizations of OCB have been introduced, Williams and Anderson's (1991) distinction of extra-role behaviors into two major categories is one of the most accepted and established (Podsakoff et al., 2009). Williams and Anderson (1991) differentiated between OCBs directed toward the benefits of the employing organization (e.g., taking extra shifts) and OCBs directed toward the benefits of other individuals (e.g., supporting colleagues). The latter dimension captures behaviors of interpersonal helping or facilitation. In our study, we focused on this interpersonal dimension of OCB, specifically the OCB toward the benefits of co-workers and the team.

The Association between SOC and OCB Directed toward the Benefits of Co-workers

Meta-analytic evidence shows that SOC is positively correlated with both self-reported and externally rated job performance (Moghimi et al., 2017). However, available studies mainly focused on indicators of in-role job performance, like productivity and efficiency (Abraham and Hansson, 1995; Yeung and Fung, 2009), performance quality in nursing (Baethge et al., 2016), supervisor rated overall job performance (Bajor and Baltes, 2003), or fulfillment of formal requirements of the job (Demerouti et al., 2014). To the best of our knowledge, empirical investigations on the associations between SOC and extra-role job performance in terms of OCBs that are directed toward the benefits of other co-workers are missing.

Previous research indicates that exchange relationships play an important role as OCB antecedents (Cardona et al., 2004). From the perspective of social exchange theory, persons follow certain explicit or implicit rules of exchange, which evolve over time into perceptions of trust, justice, and mutual commitment (e.g., Cropanzano and Mitchell, 2005). One of the most important universal rules of social exchange is reciprocity, which means that people should return favors, e.g., support or contributions that they received from others (Eisenberger et al., 2001). We assume that the use of SOC has an impact on the social exchange between co-workers and is consequently associated with OCB. For example, it can be assumed that the selection of a specific work task by a team member will have an impact on the perception of reciprocity within the team. Specifically, selection can be evaluated positively and supportive through the eyes of a team member, when an employee selects and carries out an unpleasant task. In contrast, selection might be perceived negatively in case selection means to disregard such a task, which has then to be taken over by a team-member.

Hypotheses about the direction of the association between SOC and OCB can be drawn from the perspective of resource allocation and conservation of resources (e.g., Hobfoll, 2002). From this perspective, efficient use of resources through SOC saves or establishes "spare" resources to apply extra-role behaviors like OCB toward the benefits of co-workers. For example, SOC at work involves behaviors like setting priorities to carry out the most important tasks first (selection), or informing oneself about the current state of the professional knowledge (optimization; see Müller et al., 2013). The application of these behaviors enables employees to efficiently achieve core task objectives. Through saving efforts in goal-directed behaviors, saved individual resources can be used to help co-workers. As example, if a teacher focuses on specific subjects, this may enable her/him to save time and efforts in preparation and teaching, what eventually allows her/him to invest additional time in communication and exchange with pupils, parents, and colleagues. This can eventually help to foster a collaborative and supportive learning climate which is beneficial for the team.

From the perspective of motivational theory on life-span development (Heckhausen et al., 2010), the association between SOC behaviors and OCB may differ depending on whether the selected goal is to maintain a good relationship to co-workers or to promote one's personal career. Although the SOC model is unspecific about goal contents, previous findings provide first support that the use of SOC behaviors at work is positively related with socially desirable behaviors. For example, Freund and Baltes (2002b) reported that the use of SOC behaviors is positively related with important social aspects of successful life management like establishing a positive relationship with others. Moreover, the same study reported that the use of SOC behaviors also correlated with personal characteristics like conscientiousness, emotional stability, and openness. There is meta-analytic evidence showing that these personal characteristics in turn are important preconditions for OCB toward the benefits of co-workers (Chiaburu et al., 2011). We therefore assume that the use of SOC at work is positively related with OCB toward the benefits of co-workers.

Hypothesis 1: The use of SOC at work is positively related with OCB toward the benefits of co-workers.

Age Effects on the Association between SOC and OCB

We furthermore assume that the above hypothesized relationship between SOC use and OCB is moderated through employees' age. Drawing on socioemotional selectivity theory (SST, Carstensen et al., 1999) we suggest that older employees' SOC use might be more beneficial in establishing effective social relationships at work, what, eventually, results in increased OCB-related outcomes. SST postulates that the individual perception of future time perspectives (i.e., the expectation of how much time is left in our life) is related to the choice of goals (Carstensen et al., 1999). This includes particularly a reorganization of motivational focus toward establishing emotionally satisfying social relations in older persons, whereas in younger persons the instrumental function of social relations, for example, in terms of promoting future opportunities, plays a greater role (Luong et al., 2011). Accordingly, Freund and Blanchard-Fields (2014) observed consistently across four studies, that older persons exhibited stronger altruistic values and exhibited more helping behaviors compared to younger persons. Moreover, research on age and social experience indicates that older persons often attained a greater sensitivity to interpret the needs of other persons and to foresee the social implications of their own behaviors (Hess, 2006).

With regard to work environments, previous research suggested that the employees' age is negatively related to their occupational future time perspective, i.e., employees' perceptions of their remaining time at work and their career opportunities (for an overview, see Henry et al., 2017). Moreover, a study of Treadway et al. (2010) observed that socially competent employees with more shallow occupational future time perspectives engage in more altruistic and other-centered networking behaviors than employees with longer occupational future time perspective. In line with this research, we assume that older employees *are more motivated* to select SOC behaviors at work that are geared toward benefits of their co-workers. Moreover, due to accumulated social experience, older employees might *be better able* to choose the best means for attaining goals in a socially acceptable way (see also Sonnentag, 2000; Kanfer and Ackerman, 2004). In the case of school teachers, experienced teachers may have a larger skill set to master difficult and challenging relationships with pupils what eventually helps to maintain professional and supportive relationships in the school. We therefore hypothesize that the positive association between the use of SOC and OCB toward the benefits of co-workers is stronger with higher age.

Hypothesis 2: The positive association between SOC at work and OCB toward the benefits of co-workers is moderated by age, such that this relationship is stronger for older employees.

Exploration of Differential Effects of Individual SOC Strategies on OCB

Originally, it has been proposed that SOC is most effective when individuals use all SOC strategies in a joint and coordinated way (e.g., Freund and Baltes, 2000). However, previous research indicates that the SOC strategies are also representing distinct action processes with independent and differentiated effects on outcomes such as performance and work ability (e.g., Abraham and Hansson, 1995; Freund and Baltes, 2002b; Wiese et al., 2002; Bajor and Baltes, 2003; Yeung and Fung, 2009; Demerouti et al., 2014; Riedel et al., 2015; Zacher et al., 2015). From the perspective of action theory, both selection strategies are related to the choice of goals, whereas optimization and compensation are directed to establish the adequate means to achieve goals (Freund and Baltes, 2000). Taking the perspective of cognitive theories of control (e.g., Hockey, 1997), Demerouti et al. (2014) it can be assumed that the use of selection strategies has a negative impact on extra-role behaviors in terms of adaptivity to change because employees strive to execute high priority in-role tasks first, particularly when resources are low. Demerouti et al. (2014) further suggest in accordance with conservation of resources theory (Hobfoll, 2002) that optimization and compensation are positively related to in-role performance as well as to extra-role performance. Since both refer to means to attain task goals, they potentially enhance the use of available resources (Demerouti et al., 2014).

Moreover, previous literature emphasized that loss-based selection and compensation are both "responses" to external or internal circumstances (e.g., hindrances) which require flexible goal adjustment or adaptive adjustment of means (e.g., Freund and Baltes, 1998, 2002a). From the viewpoint of research on social support, particularly this responsive nature of both strategies needs to be considered (Maisel and Gable, 2009). Findings suggest that responsiveness, in terms of adapting one's own behaviors to meet the needs of a partner, is an important indicator for perceived social support (e.g., Neff and Karney, 2005; Maisel and Gable, 2009). Translating these findings to the social context of SOC at work, it can be argued that particularly employees with high use of loss-based selection or compensation are more responsive in their behaviors, i.e., being capable to flexibly adjust to their co-workers' needs. With regard to our study questions, this line of research suggests that loss-based selection and compensation might be positively associated with to OCB toward the benefits of co-workers.

Exploration of Age Effects on the Association between Individual SOC Strategies and OCB

Concerning the role of age, the following considerations led us to explore the social effects of the four individual SOC strategies and among different age groups. Previous research shows that not all SOC strategies are equally beneficial at all stages of adulthood (e.g., Riediger et al., 2006). Due to losses and shrinking time perspectives, the number of unattainable personal goals potentially increases in older age (e.g., Carstensen et al., 1999). In the same vein, in older employees the likelihood increases that important means for goal achievement are no longer available. From the perspective of conservation of resources (Hobfoll, 2002), the use of the two loss-related SOC strategies, loss-based selection and compensation, should be more beneficial for older employees than for their younger colleagues to allocate remaining resources in an adaptive way. Accordingly, a study of Wrosch

et al. (2003) showed that, disengagement from unattainable goals and reengagement in new and meaningful goals is associated with high well-being, particularly in older individuals. With respect to our study, we therefore assume that the use of loss-based selection and compensation helps particularly older employees to allocate their resources more efficiently in order to exert extra-role behaviors like OCB toward the benefits of co-workers.

Overall, the knowledge base on the sequelae of the individual SOC strategies on OCB is inconsistent and remains inconclusive. We therefore refrained from formulating specific hypotheses about the effect of individual SOC strategies. This exploratory approach generates preliminary empirical findings that provide the base for future studies on social effects of SOC strategy use.

MATERIALS AND METHODS

Study Design, Setting, and Participants

The data was derived from a cross-sectional study combining multi-source data from primary school teachers, who frequently teach in dyads, i.e., class approach of team teaching. Hereby, two teachers concurrently and collaboratively teach the class. Additionally on a weekly level, teachers are requested to commonly plan and prepare teaching with their peer teacher, discuss didactic approaches with their peer, as well as jointly reflect problems or potential challenges with pupils or parents. The data was collected between May and June 2012 in eight primary schools in South Tyrol (Italy). The data collection was approved by the directorates of each school and all participants were informed about aims and procedures of the study.

Procedure

Each teacher of the participating schools received an envelope with a main (for her-/himself) and a second, short questionnaire (for their team teaching colleague). Overall, 180 pairs of questionnaires were distributed. All teachers were asked to fill out their main, first questionnaire to report the use of SOC behaviors and to provide further sociodemographic characteristics. Furthermore, all teachers were asked to hand the second, separate questionnaire on to their team colleague. In the instruction, it was stated that they hand out the second questionnaire to their immediate colleague with whom they frequently perform team teaching. Within the instruction of the second survey sheet, the team colleague was asked to fill in the short questionnaire to evaluate the first teacher's OCB. Both teachers were required to fill in and return their questionnaires independently. To maintain confidentiality, with each questionnaire a sealed return envelope was attached. Each pair of questionnaires was prior marked with an identical code to ensure the matching of the pairs.

Measures

SOC Behaviors

To measure the use of SOC strategies, a short German version of the original SOC questionnaire (Baltes et al., 1999; Freund and Baltes, 2002b) was used. In the present study, we used the revised response scale developed by Zacher and Frese (2011). It comprises the four sub-scales that respectively characterize specific SOC behaviors: elective selection, loss-based selection, optimization, and compensation. Each sub-scale consists of three items, which were rated on a 5-point Likert scale from 1 = "does not apply at all" to 5 = "applies completely." A sample item for selective election behaviors is "I concentrate all my energy at work on few things"; for loss-based selection "If I can't do something important at work the way I did before, I look for a new goal"; for optimization behaviors "If something at work matters to me, I devote myself fully and completely to it"; and for compensation "When things at work don't go as well as they used to, I keep trying other ways until I can achieve the same result I used to." We assessed the reliability with McDonald's (1999) Omega using a bias-corrected and accelerated bootstrap approach (Kelley and Cheng, 2012). Omega is based upon the sum of squared loadings on one common factor. We used McDonald's coefficient Omega because it is compared to Cronbach's alpha less biased when assumptions of essentially tau equivalency are not met, which is usually the case for most measures (Dunn et al., 2014). McDonald's Omega for the total SOC scale is 0.77, 95% CI 0.69–0.82. For the individual scales: elective selection = 0.65, 95% CI 0.48–0.76, loss-based selection = 0.73, 95% CI 0.60–0.81, optimization = 0.52, 95% CI 0.34–0.63, and compensation = 0.63, 95% CI 0.45–0.73.

Organizational Citizenship Behaviors (Peer Rating)

To evaluate first the teacher's extra role and team behaviors, a short version of the validated role-based performance scale of Welbourne et al. (1998) was applied. We used an adapted German 4-item version that refers to employees' contributions to team functioning. Example items are: "Doing things that help others when it's not part of his/her job," "Helping so that the team is a good place to be," and "Making sure his/her work group succeeds." All items were answered on a 5-point Likert scale from 1 = "Needs much improvement" to 5 = "Excellent." Cronbach's alpha for the total OCB scale was excellent with $\alpha = 0.92$.

Age

Information on teachers' age was based on a single question in the survey: "How old are you (in years)?" Answers were provided in free text.

Control Variables

To control for potential influences of individual and task-related characteristics, several control variables were included in the questionnaire. All teachers were asked for gender (1 = female, 2 = male), their working hours (in hours per week), and job tenure (in years; "How long are you working in your current profession?"). Additionally, all teachers were asked to rate their job demands since high or overtaxing requirements on the job may force employees to develop and apply respective behavioral strategies on the job to cope with excessive loads or time pressure. We used an abbreviated two-item scale of a validated scale from a German instrument on Work Analysis that assesses work overload (TAA) (Glaser et al., 2015). An example is "Frequently, there is too much work at once." Internal consistency was good ($\alpha = 0.70$). To assess the perceived proximity of the relationship

between the teacher and his/her peer, the second teacher was asked the following question: "How well do you know the colleague?" We included this measure since we assumed that in close or familiar working dyads, potential bias for overly positive OCB ratings may occur. Responses were provided on a 5-point Likert scale from 1 = "not well at all" to 5 = "very well."

Statistical Analyses

In the first step, descriptive and inferential statistical analyses were conducted. Hypotheses were tested with hierarchical moderated multiple regression analysis (Cohen et al., 2003). SOC, age, and OCB were used as continuous variables in the analyses. In step 1, we included the control variables gender, workload, working hours, and perceived familiarity with the colleague. In step 2, we determined the main effects of SOC and of chronological age on peer-rated OCB. In step 3, we additionally included the interaction terms of SOC use and chronological age. Finally, this procedure was repeated with the four individual SOC strategies. As recommended, all continuous variables were mean-centered before calculating interaction terms. Tests and graphical displays for slope differences used group differences with ±1 SD from the mean. Statistical significance was set at $p < 0.05$. All analyses were performed using SPSS 24.0 (IBM Inc., Chicago).

RESULTS

One hundred and fifteen questionnaires were returned to the study team. The majority of the sample were female ($n = 109$, 94.8%) what fairly represents the overall gender distribution among primary school teachers in South Tyrol. Additionally, 120 peer ratings were sent back. Finally, $N = 114$ dyads, i.e., matched pairs of questionnaires and peer ratings, were included into the further analyses. This equates to a response rate of 63.3%.

Descriptive Statistics

Table 1 reports the descriptive results for sample characteristics and study variables. Teachers' mean age was $M = 41.75$ (SD = 9.39) with a range between 23 and 58 years. 13.3% of the teachers were below 30 years old ($n = 15$) and 15.9% ($n = 26$) were older than 50 years. Mean job tenure was $M = 20.58$ years (SD = 10.80) with a range between 1 and 39 years. Since age and job tenure were highly correlated ($r = 0.90$, $p < 0.001$), we excluded job tenure from further analyses.

Next, intercorrelations of the sociodemographic and study variables were computed (cf., **Table 1**). With increased familiarity or proximity of the team teaching relationship, peers rated OCB behaviors more favorably ($r = 0.25$, $p = 0.008$); but there was no significant association with the use of overall SOC behaviors at work ($r = 0.18$, $p = 0.061$). Reported compensation behaviors were positively related to perceived proximity ($r = 0.22$, $p = 0.021$). Job demands were positively correlated with weekly working hours ($r = 0.21$, $p = 0.039$) but neither with the use of overall SOC behaviors at work nor with any of the individual SOC strategies; although the strength of the relationship between loss based selection and job demands was close to our significance criterion ($r = -0.18$, $p = 0.055$).

Hypotheses Testing

For testing our two proposed hypotheses, we conducted regression analyses and controlled for gender, weekly work time, proximity of the relationship, and job demands. Our first hypothesis assumed a main effect of the use of SOC behaviors at work on OCB such that increased SOC behaviors are associated with increased peer-rated OCB (hypothesis 1). We tested for overall SOC behaviors as well as for each individual SOC strategy respectively. We obtained no significant association between the use of overall SOC behaviors at work and peer-rated OCB ($\beta = 0.13$, $p = 0.227$). Concerning the relationships between individual SOC strategies and OCB, we observed one significant association: increased loss-based selection behaviors were positively related to peer-rated OCB ($\beta = 0.24$, $p = 0.021$). The three other dimensions of SOC were not significantly related to OCB (elective selection: $\beta = -0.07$, $p = 0.532$; optimization: $\beta = 0.03$, $p = 0.760$; compensation: $\beta = 0.11$, $p = 0.310$). The significant effect of loss-based selected remained significant after removal of all control variables ($\beta = 0.20$, $p = 0.040$). The non-significant associations for the other three SOC strategies remained unaffected as well without adjusting for controls.

For the next step, we tested if teachers' age had direct effects on SOC behaviors and peer-rated OCB. After controlling for the above listed confounders, age was not associated with OCB ($\beta = -0.06$, $p = 0.569$). However, age was significantly associated with overall SOC behaviors such that teachers with higher age reported more overall SOC behaviors ($\beta = 0.29$, $p = 0.007$). With regard to individual SOC strategies, age was significantly related to selection behaviors (elective selection: $\beta = 0.30$, $p = 0.007$; loss-based selection: $\beta = 0.23$, $p = 0.040$) but not to the two other strategies (optimization: $\beta = 0.20$, $p = 0.069$; compensation: $\beta = 0.10$, $p = 0.345$).

Our second hypothesis proposed a moderating influence of age for the relationship between SOC and peer-rated OCB (hypothesis 2). As depicted in **Table 2**, the association of overall SOC and OCB was not affected by teachers' age ($\beta_{age \times SOC} = 0.15$, $p = 0.147$).

However, there was a significant two-way interaction effect between the use of compensation strategies and age on OCB ($\beta_{age \times SOC\ compensation} = 0.25$, $p = 0.043$). This interaction effect is displayed in **Figure 1**. It shows that the positive association between SOC compensation and OCB was affected by teachers' age: in older teachers, this relationship was positive ($\beta = 0.18$, $t = 2.81$, $p = 0.006$), whereas in younger teachers the association was negative ($\beta = -0.23$, $t = -3.69$, $p < 0.001$).

There was no age-related moderation effect between the other SOC strategies and peer-rated OCB ($\beta_{age \times SOC\ elective\ selection} = 0.15$, $p = 0.301$; $\beta_{age \times SOC\ loss\ based\ selection} = -0.01$, $p = 0.950$; $\beta_{age \times SOC\ optimization} = -0.16$, $p = 0.276$). All results of the final step of the regression analyses for the individual and shared effects of the SOC strategies, age, and OCB are depicted in **Table 3**.

To test the robustness of this observation we repeated this analysis and tested if the observed interaction terms

TABLE 1 | Means (*M*), standard deviations (*SD*), and intercorrelations of study variables.

	M	*SD*	1	2	3	4	5	6	7	8	9	10
1 OCB (peer rating)	4.16	0.77										
2 Gender	1.05	0.22	0.00									
3 Weekly working hours	32.52	8.71	0.05	−0.34**								
4 Proximity of relationship (peer rating)	4.13	0.66	0.25**	−0.11	0.02							
5 Job demands	3.34	0.81	0.03	0.07	0.21*	0.03						
6 Age	41.75	9.39	0.04	−0.07	0.21*	0.31**	0.06					
7 SOC (overall scale)	3.71	0.46	0.14	0.02	−0.09	0.18	−0.04	0.22*				
8 SOC: elective selection	3.53	0.70	−0.04	0.03	−0.12	0.14	−0.01	0.23*	0.54**			
9 SOC: loss-based selection	3.68	0.79	0.20*	−0.04	−0.07	0.11	−0.18	0.23*	0.80**	0.29**		
10 SOC: optimization	3.78	0.57	0.08	0.09	−0.01	0.09	0.15	0.10	0.65**	0.17	0.33**	
11 SOC: compensation	3.85	0.69	0.15	0.00	−0.06	0.22*	0.02	0.14	0.71**	0.05	0.46**	0.36**

*N = 114. For gender, 1 = female, 2 = male. SOC, selection, optimization, and compensation. **$p \leq 0.01$; *$p \leq 0.05$, two-tailed.*

TABLE 2 | Effects of overall SOC and age on peer-rated organizational citizenship behavior (OCB).

		Outcome: OCB			
		B	**95% CI *B***	**β**	***P***
Control variables	Gender	0.38	−0.40 to 1.16	0.11	0.330
	Weekly working hours	0.07	−0.12 to 0.25	0.09	0.461
	Familiarity with colleague	0.16	−0.03 to 0.35	0.18	0.103
	Job demands	0.01	−0.15 to 0.18	0.02	0.868
Age	Age	−0.08	−0.26 to 0.11	0.16	0.420
SOC use	SOC (overall)	0.13	−0.04 to 0.31	−0.09	0.139
Age × SOC	Age × SOC (overall)	0.12	−0.04 to 0.29	0.15	0.147

N = 114. All continuous variables were centered at their means. SOC, selection, optimization, and compensation. B, unstandardized regression coefficient; β, standardized regression coefficient; displayed are all results of step 3 (Model 3).

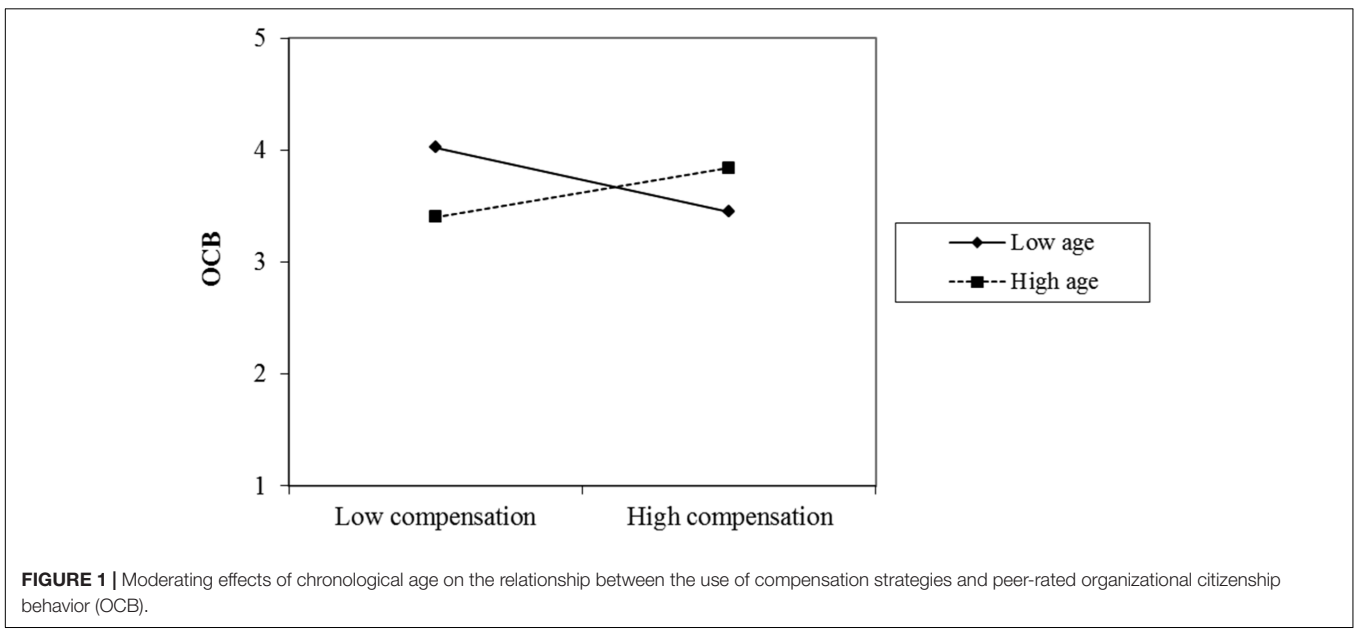

FIGURE 1 | Moderating effects of chronological age on the relationship between the use of compensation strategies and peer-rated organizational citizenship behavior (OCB).

remained significant after removal of the control variables. The crude estimate of the interaction effect of age and SOC compensation behaviors for OCB remained significant ($\beta_{\text{age} \times \text{SOC compensation}} = 0.21, p = 0.026$).

DISCUSSION

Drawing on a sample of dyads of school teachers, this study sought to determine the individual and shared associations

TABLE 3 | Effects of individual SOC strategies and age on peer-rated organizational citizenship behavior (OCB).

		Outcome: OCB			
		B	**95% CI *B***	**β**	***p***
Control variables	Gender	0.44	−0.35 to 1.22	0.12	0.269
	Weekly working hours	0.04	−0.15 to 0.23	0.05	0.663
	Familiarity with colleague	0.12	−0.08 to 0.32	0.14	0.232
	Job demands	0.08	−0.09 to 0.25	0.10	0.345
Age	Age	−0.05	−0.24 to 0.15	−0.06	0.632
SOC strategies	SOC: elective selection	−0.16	−0.37 to 0.05	−0.19	0.134
	SOC: loss-based selection	0.27	0.05 to 0.49	0.33	0.017
	SOC: optimization	−0.06	−0.27 to 0.15	−0.07	0.571
	SOC: compensation	−0.03	−0.23 to 0.18	−0.03	0.796
Age × SOC strategies	Age × elective selection	0.12	−0.11 to 0.35	0.15	0.301
	Age × loss-based selection	−0.01	−0.24 to 0.23	−0.01	0.950
	Age × optimization	−0.11	−0.31 to 0.09	−0.16	0.276
	Age × compensation	0.21	0.01 to 0.40	0.25	0.043

N = 114. All continuous variables were centered at their means. SOC, selection, optimization, and compensation. B, unstandardized regression coefficient; β, standardized regression coefficient; displayed are all results of step 3 (Model 3).

between behavioral strategies of successful aging at work in terms of SOC and OCB toward the benefits of co-workers. Our results show that the use of overall SOC behaviors was unrelated to OCB. However, the use of loss-based selection behavior is positively related with co-workers evaluations of OCB. Moreover, we observed that age moderates the association between the use of compensation strategies and OCB, such that there is a positive association between SOC compensation and OCB for older employees and a negative association for younger employees. No moderating effects of age were observed in respect to overall SOC behaviors and the remaining SOC sub-strategies. Although we found no confirmation for our two hypotheses and only two out of ten potential associations between overall SOC and OCB were statistically significant, our study contributes to the current knowledge base on SOC behaviors at work in various ways:

First, our study provides empirical evidence that the use of single SOC behaviors at work, specifically, loss-based selection and compensation behaviors in older employees, are positively associated with desirable social behaviors at the work place. So far, research neglected potential social consequences of SOC at work (Moghimi et al., 2017). Since self-directed SOC behaviors may impose a burden on co-workers, e.g., by neglecting assigned tasks that need to be completed, this might negatively affect perceived OCB that is directed toward the benefits of co-workers. This assumption has been empirically confirmed in recent research on the negative relationship between individual work behaviors and colleagues well-being (Tims et al., 2015). With the exception of compensation in younger employees, our findings provide no indication that individualized work behaviors in terms of SOC have an adverse effect on the social level or social relations at work.

Second, our study further elucidates the shared and differential influences of employee age for social consequences of employees' SOC behaviors. Our results suggest that only responsive, loss-related SOC strategies, i.e., loss-based selection as well as compensation behaviors, have potentially positive effects on OCB toward the benefits of co-workers. The surveyed elective and growth-related strategies, i.e., elective selection and optimization, represent more persistent behaviors and were shown not to be associated with peer-rated extra-role behaviors. So far, loss-based selection and compensation have been mainly interpreted as responses to perceived decline of resources that force the individual either to adjust its goal system or to develop alternative means to maintain a desired level of functioning (Freund and Baltes, 2000). Our findings complement this perspective by suggesting the additional interpretation, that the use of both action strategies can also be interpreted as a response to social requirements or role expectations (see Neff and Karney, 2005; Maisel and Gable, 2009). Thus, employees with high use of loss-based selection might be better able or more willing to detach from personal goals when it is demanded from peers or the social context. Taken together, this hypothesis generated from our findings is worthwhile to be investigated in future studies.

Third, our findings contribute to a better understanding of the psychological processes of extra role performance in aging employees. Meta-analytic evidence revealed a positive association between age and OCB (Ng and Feldman, 2008). Drawing on the propositions of SST (Carstensen et al., 1999) and research on age and social experience (Hess, 2006), our results suggest that older employees with high use of compensation strategies might be more motivated or able to flexibly adapt their actions to the needs of others. In contrast, high use of compensation strategies in younger employees was associated with lower OCB toward the benefits of co-workers. *Post hoc*, we assume that younger teachers were either less willing or able to adjust their actions to social requirements or role expectations. Alternatively, compensation behaviors among younger teachers were yet not well adapted or implemented to their collaborative work routines

what eventually resulted in inferior peer ratings. No age-related effects were observed for overall SOC behaviors or any of the over individual SOC strategies. Further research is therefore necessary to elucidate the determinant role of age in the interplay of behavioral strategies of aging in workplace and activities toward the benefits of co-workers and the team.

Fourth, our inclusion of peer ratings further contributes to more methodologically rigorous research in the field of SOC behaviors at work. So far, only a few investigations used multiple data sources to avoid common source bias: Bajor and Baltes (2003) showed that the use of SOC behaviors at work correlated with supervisor-rated job performance. Weigl et al. (2013) found a three-way interaction effect of age, job control, and use of SOC behaviors on supervisor-rated work ability of nurses. Yeung and Fung (2009) reported that the use of the SOC behaviors at work in older employees was positively associated with sales increases when tasks were not difficult or moderately difficult. Our findings provide additional evidence that the positive effects of SOC behaviors at work cannot be attributed to single source bias and spurious estimates. Moreover, and to the best of our knowledge, our approach to draw upon dyadic working relationships is the first study that directly assesses the social consequences of SOC behaviors through the eyes of co-workers.

Limitations

First, our findings cannot be generalized to other professions without further consideration, because we focused on a convenience sample of teachers of different primary schools. The specific job conditions of our surveyed sample and the extent of team work and collaboration as well as task interdependencies may limit the external validity of our results. Future studies are necessary to replicate our findings in the same as well as in other professions and work contexts.

Second, we cannot draw conclusions about the effects of motivational states among older and younger teachers. The SOC model and its measures are unspecific about various aspects of motivation like goal content, and congruence of goals, because it assumes that goal selection and compensation are per se adaptive. SOC theory has been criticized for that (Heckhausen et al., 2010). Future research on SOC in occupational settings might therefore incorporate information on goal content and adequacy of goals (e.g., Stamov-Roßnagel and Biermann, 2012).

Third, the cross-sectional design does not allow inferences about underlying causal effects. For example, compensation strategies also include seeking social support from co-workers. Thus, from the perspective of social-exchange theory it might be that OCB toward the benefits of co-workers is a precondition to apply compensation behaviors. Moreover, the validity of age effects may be limited due to differences between birth cohorts (Smola and Sutton, 2002). Consequently, future studies should apply longitudinal or cohort-sequential designs.

Fourth, peer ratings may be prone to selection bias as well as to the likelihood to avoid negative ratings. Moreover, we did not attempt to establish a full data structure such that both teachers identically provide full information concerning their SOC use, OCB, and age. We thus cannot exclude bias arising from instances where the same teachers provided SOC information as well as evaluations concerning the OCB of their team teaching partner. Future investigations should therefore seek to establish complete dyadic data structures that allow for analyses of actor-partner interdependence models (Kenny et al., 2006).

Fifth, we acknowledge that our measure of extra role behaviors is not identical with conventional measures of OCB. We, however, assumed that in the context of teachers, our measure may reflect well the team-related behaviors and beneficial actions toward the newly introduced teaching teams in this occupational context. We strongly recommend that future studies incorporate measures that assess the key characteristics of OCB (Podsakoff et al., 2009).

Sixth, the rather low internal consistencies of the SOC subscales (and particularly that for optimization behaviors) limit the statistical power of our study. This suboptimal reliability of the SOC scale is consistent with previous studies (e.g., Wiese et al., 2000; Riedel et al., 2015). We tested the deletion of one problematic item of the optimization subscale (i.e., second question) but achieved no substantial improvement (i.e., McDonald's Omega = 0.63, 95% CI 0.48–0.74). Notwithstanding, we reran all hypotheses tests with a revised, two-item optimization scale. Above-reported results did not change meaningfully; the association between the revised optimization scale and OCB remained insignificant ($\beta = -0.06$, $p = 0.542$), whereas age was significantly related to optimization behaviors ($\beta = 0.29$, $p = 0.009$). The interaction term of age and the revised optimization measure was insignificant again ($\beta = -0.14$, $p = 0.340$). The significant interaction of age and compensation was confirmed ($\beta = 0.25$, $p = 0.047$). Finally and for the sake of comparability between studies, we decided to report all results with the original 3-item optimization measure, but acknowledge that future investigations should aim to apply improved and reliable measures for all SOC components.

Finally, previous research discussed the dark side of OCB behaviors (for a review, see Bolino et al., 2013). For instance engaging in OCB might also involve behaviors like working at the weekend which in turn might contribute to work-family conflicts (Halbesleben et al., 2009) or inferior in-role performance (e.g., Bergeron, 2007). Yet, OCB behaviors toward the benefits of co-workers, the specific focus of our study, might stem from rather-self-serving motives like impression management (Snell and Wong, 2007). These potential drawbacks of OCB have to be considered when interpreting our results.

Practical Implications

We deem that the use of SOC behaviors in the work environment holds benefits for employees, with particular respect to their social functioning in team work environments. Previously, applied trainings that facilitate active development and implementation of SOC behaviors among employees have been introduced and evaluated (Müller et al., 2016; Becker et al., 2017). The overall intention of these SOC-based interventions is to enable employees to apply self-directed behaviors in the workplace, to maintain work ability, and to promote functioning on the job despite age-related changes. In SOC-based trainings, employees choose a specific goal to successfully cope with

a critical job demand (selection), identify actions to achieve this goal in an optimal way (optimization), and consider alternative strategies in cases of external or internal hindrances during goal accomplishment (compensation). Our study results complement this line of thought in several ways: First, our findings inform practitioners that seek to advance SOC-based or similar interventions in occupational settings. Our findings corroborate, that SOC-based trainings should address social and organizational implications of self-directed behaviors at the work place. The development of self-directed behaviors should not be exclusively focused on individual needs but also be sensitive and responsive to the needs of co-workers. Consequently, the idiosyncratic development of SOC strategies should be complemented by reflections that expand the perspective of the trainees to the social and organizational consequences of their self-directed behaviors, e.g., through moderated discussions with co-workers or team supervision. Second, our study dispels potential concerns of managers against training approaches that focus on the promotion of individualized action strategies at the work place. Our findings indicate that individual benefits of the SOC use are not necessarily at the costs of their co-workers. Therewith our study corroborates the further implementation of occupational health interventions that build upon life-span perspectives in organizational practice.

CONCLUSION

Our study shows that employees who report high use of loss-based selection are perceived positively by their colleagues in terms of OCB toward the benefits of the team and co-workers. We additionally showed that among senior teachers, the use of compensation strategies was positively related to OCB, whereas in younger teachers compensation was negatively related to OCB. Therewith, our findings contribute to a better understanding of the age-differentiated social effects of successful aging strategies in terms of SOC at work.

ETHICS STATEMENT

The study was carried out in accordance with the recommendations to safeguard good scientific practice of the German Research Association (DFG).

AUTHOR CONTRIBUTIONS

AM drafted the manuscript. He contributed to the analysis, and interpretation of the data. MW developed the design and contributed to the data acquisition. He revised the manuscript critically for important intellectual content. He also contributed to the analysis, and interpretation of the data.

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Job Crafting: Older Workers' Mechanism for Maintaining Person-Job Fit

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Aging at work is a dynamic process. As individuals age, their motives, abilities and values change as suggested by life-span development theories (Lang and Carstensen, 2002; Kanfer and Ackerman, 2004). Their growth and extrinsic motives weaken while intrinsic motives increase (Kooij et al., 2011), which may result in workers investing their resources in different areas accordingly. However, there is significant individual variability in aging trajectories (Hedge et al., 2006). In addition, the changing nature of work, the evolving job demands, as well as the available opportunities at work may no longer be suitable for older workers, increasing the likelihood of person-job misfit. The potential misfit may, in turn, impact how older workers perceive themselves on the job, which leads to conflicting work identities. With the traditional job redesign approach being a top-down process, it is often difficult for organizations to take individual needs and skills into consideration and tailor jobs for every employee (Berg et al., 2010). Therefore, job crafting, being an individualized process initiated by employees themselves, can be a particularly valuable mechanism for older workers to realign and enhance their demands-abilities and needs-supplies fit. Through job crafting, employees can exert personal agency and make changes to the task, social and cognitive aspects of their jobs with the goal of improving their work experience (Wrzesniewski and Dutton, 2001). Building on the Life Span Theory of Control (Heckhausen and Schulz, 1995), we posit that job crafting, particularly cognitive crafting, will be of increasing value as employees age. Through reframing how they think of their job and choosing to emphasize job features that are personally meaningful, older workers can optimize their resources to proactively redesign their jobs and maintain congruent, positive work identities.

Keywords: job crafting, older workers, person-job fit, proactivity, successful aging

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INTRODUCTION

The concept of fit has always been a topic that receives attention from both researchers and practitioners in the field of organizational psychology, as person-environment fit has significant implications for employees' attitudes and behaviors, as well as organizational outcomes (Edwards, 1991; Kristof, 1996). Person-environment fit can be broadly defined as the compatibility resulting from the characteristics of an employee and his/her work environment being well aligned (Kristof-Brown et al., 2005). As there are various unique components of the work environment, breaking down the construct of environment helps elucidate how congruence with each distinct part could impact employees' attitudes and behaviors. Specifically, this paper focuses on person-job fit, which refers to the degree of alignment between the individual and the job he/she holds

(Edwards, 1991). Person-job fit can be achieved in two ways: when employees' skills match the specific job requirements (abilities-demands fit), and when their needs are congruent with the opportunities available at work (needs-supplies fit). Similar to other levels of fit, person-job fit is related to positive attitudes, job performance and personal well-being (Park et al., 2011; Afsar et al., 2015). Furthermore, early research focused on static fit, examining aspects of the person and the environment that are stable over time. However, it is currently recognized that achieving fit is a dynamic process, with features of both employees and jobs changing over time (Tinsley, 2000). Changes in the work environment can result in changes in employees (e.g., restructuring production process corresponds to new training for factory workers), and changes in employees can also lead to changes in the work environment (e.g., advancement of employees' technological knowledge can further transform the production process). This notion of dynamic fit is useful in considering the effects of aging in the organizational context. Given that there are increasing proportions of older workers in the active workforce, it is important to examine the within-individual age-related changes as well as changes in jobs on employees (Feldman and Vogel, 2009).

This article aims to answer the question of how job crafting would be a useful strategy for workers to achieve greater fit as they move forward with their careers. In the first section, we explore the aging-related changes that employees may face. The aging process contributes to major changes of different forms, including gains, maintenance and decline, in almost all aspects of individuals' capabilities and interest, such as cognitive skills, physical abilities, emotions and motives. As people age, growth and extrinsic motives weaken while intrinsic motives increase (Kooij et al., 2011), which may result in employees prioritizing different crafting strategies (i.e., task crafting, relational crafting, and cognitive crafting). Despite common misconceptions about aging, these changes vary considerably across individuals. General statements that describe the average trends of aging in workers may not adequately describe how changes would impact individuals and how they perform on their jobs. However, without proper modifications to job requirements, these within-person age-related changes can substantially alter both abilities-demands fit and needs-supplies fit, improving or worsening the overall person-job fit. In the second section, we discuss how changes on the job itself may also contribute to potential misfit. As the nature of the job evolves over time, altered job expectations placed upon employees may create challenges for workers and require them to reorient how they perform their job. The potential misfit may impact how older workers perceive themselves on the job, which leads to conflicting individual work identities. Building on the Life Span Theory of Control (Heckhausen and Schulz, 1995), we posit that job crafting, particularly cognitive crafting, will be of increasing value as workers age. Although cognitive crafting has received little research attention thus far, it can help individuals to cope with age-related changes and maintain favorable work identities. It also aids the development and maintenance of task and relational crafting by directing their resources to areas that are personally meaningful. The increasingly limited resources due to aging make the selection of suitable job crafting practices to be of greater importance for older workers. Unlike the standardized initiatives implemented by organizations, the individualized, bottom-up approach of job crafting would be able to accommodate the substantial individual differences among older employees. Thus, a combination of different forms of job crafting allows them to realign their abilities and needs with their job to develop and maintain congruent work identities.

WHO ARE OLDER WORKERS?

Depending on the purpose and field of study, older workers have been defined using a cut-off age varying from 40 to 75 years old (Stein and Rocco, 2001). While the age of 40 is frequently used based on the United States Age Discrimination in Employment Act of 1967 (ADEA), organization decision markers identify older workers as those who reached the age of 52 years (McCarthy et al., 2014). Some researchers also have treated age as a continuous variable and not adopted a specific age distinguishing older workers from younger workers (e.g., Ng and Feldman, 2010). Clearly, there is no consensus in the literature regarding the definition of older workers.

While we understand the argument of using a specific age to denote older workers can be significant in workplace practices, multiple perspectives need to be taken into account to understand this unique population. Because aging is a continuous process, its effects on workers do not begin or stop at a particular point. Using a specific cut-off does not capture a complete picture of how the multidimensional, age-related changes may affect employees' crafting activities. In addition, there is considerable variability in the lifespan trajectories, depending on individual and contextual characteristics as well as their interaction (Baltes, 1987). Even among employees at the end of the age distribution, there can still be multiple subgroups such as "early retirees," the "young-old," and the "old-old" (Pinquart, 2001). Using a single age to divide the workforce into groups is overly simplistic. Moreover, the definition is constantly shifting in response to contextual factors. The increased average life expectancies allow more older adults to participate in the workforce, exemplified by the fact that the largest segment of the world's working population is 45–49 years old (Ng and Feldman, 2010). The demographics of particular industries can also influence who are considered to be older workers. Therefore, this paper employs the lifespan developmental perspective to examine workers' job crafting in response to the physiological, psychological and social changes resulting from aging as well as the time-related changes in the job.

AGE-RELATED CHANGES IN PERSON

Physical Changes

Normal aging involves a multitude of physiological changes, primarily in sensory function, muscle function, cardiovascular function and immune response (Maertens et al., 2012). Individuals may experience reduced visual acuity and hearing sensitivity, decline in aerobic capacities (which leads to decrease

in heart rates and increase in blood pressure), as well as reduced psychomotor speed and abilities with the increase in age (Forteza and Prieto, 1994). There is also a robust literature that documents the loss of physical strength associated with aging, which occurs due to bone loss, as well as the decline in both muscle tone and muscle mass (Warr, 1994). However, it is important to note that these changes are gradual, and that vast individual differences impact older workers' job experience in various ways, especially since white-collar jobs now constitute an increasingly large proportion of the labor force. For example, the age-related decline in physical strength, endurance and speed may hinder performance of those whose jobs rely heavily on physical abilities. As a result, an older grocery clerk may no longer be able to stock shelves due to the heavy lifting involved. Instead, he/she may job craft to assume only the responsibilities of a cashier or incorporate the usage of transport dollies to complete the stocking tasks. However, the potential impairments in performance due to aging would not be consistent among all individuals, even if they hold the same job position.

Aging is also related to decline in homeostasis, the reduced ability for the body to maintain and return to normal operations across different situations (Hedge et al., 2006). Older workers may have less tolerance for extreme physical job conditions such as heat and cold due to their reduced abilities to withstand temperature changes. It is also more difficult for older workers to adjust to non-standard shift work, as it would take them longer to recover from altered sleep patterns (Blok and de Looze, 2011). This can be a particular challenge for older employees with jobs that require constant adjustment to different work conditions. For instance, construction work which requires shift schedules and high physical demands can become increasingly difficult as workers age.

Surveys have found a higher percentage of adults between the age of 45 to 64 reporting their health as good or excellent compared to that from 25 years ago, and rates of functional limitations have also decreased (James et al., 2013). In some sense, older workers have become healthier. However, despite no increase in subjective physical health problems, meta-analytic evidence suggests that employees still experience modest decline in physical health such as elevated blood pressure, cholesterol and insomnia as they get older (Ng and Feldman, 2013). The reduced efficiency of the immune system also makes older workers more prone to illnesses, and require longer recovery time. Studies have proposed that the length of sick leave is positively correlated with age (Thomson et al., 2000). Older workers also recover more slowly from injuries (Sterns et al., 1985). Therefore, although the incidence of injuries is lower for older workers (Ng and Feldman, 2008), jobs with high risk for injuries may become increasingly unsuitable as workers get older.

In response to these changes in physical abilities, employees may be prompted to employ different forms of job crafting, such as using cognitive crafting to make sense of these changes, and alter how they perceive and perform their job tasks accordingly.

Cognitive Changes

Cognitive abilities are another functional area that shows age-related changes, which include both gains and losses. There is a negative relationship between age and fluid intelligence (Gf), such as processing speed, working memory, and selective attention (Truxillo et al., 2015). It is exemplified by the Seattle Longitudinal Study (Schaie and Hertzog, 1983; Schaie, 1994), which followed several cohorts from diverse backgrounds over their life courses. Results suggested that all abilities (with the exception of perceptual speed which starts to decrease in the early 1930s) begin to decline in the mid 1940s. However, crystallized intelligence (Gc), which is the accumulated knowledge, skills, and wisdom, continues to grow until late life. The gains in crystallized intelligence can allow older workers to compensate for losses in fluid intelligence (Warr, 2001). This may help explain the lack of a significant negative relationship between age and job performance in the literature (Ng and Feldman, 2013), since most jobs nowadays require a combination of both types of intelligence. Older workers may also counteract declining cognitive abilities by performing their jobs more conscientiously (Farr and Ringseis, 2002) and increasing their effort at work (Bunce and Sisa, 2002). Age-related cognitive changes may lead to person-job misfit for those without the ability to redesign their jobs through job crafting.

Skills

According to Fossum et al. (1986), deterioration in present skills or the failure to acquire new ones as job requirements change result in obsolescence of employees' skills. Older workers' skills may deteriorate over their work histories. In addition, they are often stereotyped as less adaptable, having lower ability to learn and being more difficult to train (Ng and Feldman, 2008; Posthuma and Campion, 2008). Companies, therefore, are reluctant to invest in their training, under the assumption of lower return on investment due to the perceived lack of potential for development associated with age. Organizational practices often discourage older employees from engaging in training (Maurer, 2001; Farr and Ringseis, 2002). In addition, when older workers have access to training, it is often of shorter duration and lower quality (Felstead et al., 2010). In reality, older workers value opportunities to maintain their capabilities for a better sense of job security (Herrbach et al., 2009). It is also a driving factor for individuals to return to work post-retirement (Armstrong-Stassen, 2008), suggesting that developmental options need to accommodate the needs of older workers in order to be motivating. The lack of access to suitable opportunities may harm their self-efficacy and impact how they perceive themselves at work (Maurer and Tarulli, 1996). They may face a higher risk of their skills becoming obsolete, which interferes with their abilities to perform effectively on the job and thus contributes to poorer person-job fit. Older workers may, for example, job craft by attending training workshops on their own initiative to update their skills in response.

Emotions

Emotional regulation is a functional area in which individual gains are observed as the aging process unfolds (Scheibe and Zacher, 2013). Older individuals have learned to effectively regulate their emotions and developed emotional resiliency in stressful situations through their work histories and other

life experiences (Carstensen and Mikels, 2005). The change in future time perspective from Socioemotional Selectivity theory (which will be discussed below), in which older adults tend to perceive time as a more limited resource, also helps explain the age-related differences in affective responses. Instead of attending to the negative aspects of the environment, individuals tend to shift their focus to the positive cues which provide immediate emotional gratification (Mather and Carstensen, 2005), in part due to their sense of limited time remaining. Therefore, older workers are more likely to utilize positive emotions in the face of work-related problems (Folkman et al., 1987), which could lead them to job craft differently compared to their younger colleagues. When vertical career advancement is no longer feasible, older workers may shift their focus to broadening their job tasks and utilizing other strategies to make their job more enjoyable. Or, they may cognitively reframe to perceive an increase in job demands as a challenge, which may prompt them to engage in other crafting behaviors such as seeking support from colleagues.

MOTIVES

The major lifespan development theories and empirical literature support that individuals' motives change over time. Therefore, the value of certain activities and outcomes, such as close colleagues, promotion opportunities, and pay, change accordingly. These theories inform our understanding of the dynamic nature of work motives and how these changes can contribute to person-job misfit and the job crafting strategies for older workers.

Intrinsic Work Motives

The stereotype that older workers are less motivated has been shown to be inconsistent with the cumulated research evidence (Ng and Feldman, 2012), but it is important to differentiate what exactly motivates older workers. Intrinsic work motives refer to integral parts of the work that satisfy individuals' psychological needs. Some examples of intrinsic work motives include needs for autonomy, achievement and social connection with others. There is a common notion that general growth motives weaken during aging. In other words, older workers are less concerned with general learning compared to their younger counterparts, which aligns with what is suggested in developmental theories (Baltes, 1997; Kanfer and Ackerman, 2004). A meta-analysis of 15 empirical studies including a total sample size of over 6,000 employees found a weak, negative relationship between age and learning motivation (Ng and Feldman, 2012). The Selection, Optimization and Compensation (SOC) theory indicates that limited personal resources (such as time and cognitive capacity) become more strained as individuals become older (Baltes, 1997). The allocation of resources then shifts from growth to maintaining the resources already possessed, keeping losses to a minimum. As a result, SOC theory predicts a negative relationship between age and growth-related motives. However, it is important to distinguish how different types of growth motives change with age. Although there is ample evidence corroborating that knowledge acquisition motives decline with age, meta-analytic evidence indicates a positive relationship between age, need for autonomy and achievement (Kooij et al., 2011). As general life expectancy has increased, it is not uncommon for individuals to live into their 1980s and 1990s. Yet, the age range for individuals remaining in the active workforce is narrower. It is likely that the significant decline in intrinsic growth motives proposed would not be realized until after retirement. Given the significant individual differences in aging, it is likely that some older employees still value training opportunities in order to maintain their competencies and satisfy their need for achievement.

As individuals grow older, their values regarding social interactions may undergo changes. Socioemotional Selectivity theory (SST; Carstensen, 1995; Carstensen et al., 1999) introduced future time perspective (FTP) – when individuals view time as expansive, they prioritize goals that aim at optimizing the future. Thus, younger workers, who tend to have expansive FTP, are inclined to pursue opportunities that are useful in the more distant future, such as acquiring additional work-related knowledge (Kooij and Van De Voorde, 2011). When people perceive time is running out with increasing age, they may gravitate toward goals that are emotionally fulfilling. The constrained FTP steers the focus to the utilization of skills and social interactions that affirm positive self-concept and promote instant emotional satisfaction. In the context of work, older workers are thought to prefer deepening existing core relationships, such as those with close colleagues who share similar interests, over broadening peripheral relationships. Kanfer and Ackerman (2004) similarly proposed that generativity motives and the importance of protecting one's work self-concept increase with age. Compared to advancing their careers, older workers are more likely to focus on passing knowledge onto their younger colleagues (Mor-Barak, 1995; Kooij and Van De Voorde, 2011). However, empirical data provides equivocal results on this link. Several studies have found a negative relationship between age and need for affiliation with others (Fagenson, 1992; Mudrack and Naughton, 2001); however, meta-analytic evidence based on 35 empirical studies including over 29,000 employees suggests that age is unrelated to social motives at work (Kooij et al., 2011). One possible explanation for the variability is that the need for social affiliation is met in domains outside of work, which may alter how older workers craft their work relationships.

Extrinsic Work Motives

Extrinsic work motives are job features and outcomes that occur as a consequence of work, such as compensation, social recognition and benefits. Extrinsic growth motives generally refer to the valence placed on promotions and advancement at work. As suggested by Kanfer and Ackerman (2004), the salience of these extrinsic outcomes decrease with age. The shift in temporal perspective proposed by SST and meta-analytic data (Kooij et al., 2011) provide evidence supporting this change. Older workers may not believe that they can realize their future-oriented opportunities. The idea of limited time remaining in their careers drives older workers to focus on fewer but specific outcomes that would provide immediate gratification, such as a

sense of achievement from accomplishing challenging job tasks. In addition, most studies have found no relationship between age and need for recognition (Churchill et al., 1979; Inceoglu et al., 2009), which also aligns with the SOC theory. As individuals grow older, they also gain better understanding about their strengths and have clearer professional identities (Helson et al., 1995). In fact, most individuals become more confident and emotionally stable over the life span (Roberts et al., 2006). As a result, praise and need for recognition from others may not have much of an impact on how older workers' perceive themselves. These age-related changes do suggest that as employees age they will be motivated to engage in job crafting to align the outcomes of work with their personal motives.

TIME-RELATED CHANGES IN JOBS

Other than changes within individuals, elements of work change over time as well. While changes in job responsibilities and within occupations may alter workers' job demands, older workers may also achieve more job autonomy as they advance their careers. In addition, adoption of technology and Human Resources Management (HRM) policies at work have the potential to improve or impair their person-job fit.

Job Demands

As employees get older and advance through the various career stages, their jobs may become more demanding due to the increased level of responsibility associated with longer tenure (Hurrell and Lindström, 1992). For example, mid-career employees face higher job demands compared to those earlier in their careers, as they assume more supervisory duties but have yet to achieve full job autonomy (Ng and Feldman, 2010). Other research has suggested that job demands decrease as employees move toward retirement, because they either get assigned less challenging responsibilities or have voluntarily modified their employment terms to part-time (Feldman and Ng, 2007). Prior studies proposed that jobs can be stereotyped into young-typed and old-typed, based on the age of prototypical job incumbents (Perry and Finkelstein, 1999). While young-typed jobs have been associated with tasks that rely on technology and ability to adapt quickly, old-typed jobs are those that require extensive organization-specific knowledge or experience (Kaufman and Spilerman, 1982; Perry, 1994). Similarly, prototype matching can be extended to the assignment of job tasks: older workers may not be considered to be a good fit for tasks that are commonly associated with younger workers. For example, despite being technologically literate and having the same qualifications, an older worker may be less likely to be considered for a challenging project working with a technology company. In addition, older workers face more negative perceptions of their job performance from their supervisors (Hassell and Perrewe, 1995). Based on these age stereotypes, older workers may receive narrower sets of tasks, which could shape their work experience. Older workers, who are often in the maintenance career stage, are concerned with preserving interest in their jobs and getting involved in areas that appeal to them (Conway, 2004). The lack of challenges at work may result in older workers perceiving themselves as less competent compared to their younger colleagues and finding their jobs not as intrinsically motivating. This may influence how older workers engage in job crafting.

Changes within Occupations

Changes in the routines and activities within an occupation occur over time, which would also lead to cascading effects on job demands and, in turn, influencing person-job fit (Feldman and Vogel, 2009). For example, billing and insurance processes have become progressively more complicated in healthcare, while the amount of litigation for the industry has also increased. As a result, jobs of healthcare professionals have evolved to reflect these changes, as they face additional demands working with insurance carriers and malpractice lawyers (Feldman, 2013). Apart from the healthcare industry, multiple waves of a nationally representative surveys of teachers indicate an increase in work hours since the implementation of No Child Left Behind (Grissom et al., 2014). The performance-based legislation also alters teachers' professional practices, resulting in modification of curriculum to reflect state standards and incorporate test-taking skills (Barrett, 2009). Both are examples of how changes within occupations over time would ultimately reshape job duties and potentially increase job demands. As older workers tend to have longer tenure and reduced career mobility, they are more likely to stay within the same occupations and jobs. Without suitable support in terms of resources, higher job demands and altered responsibilities may contribute to person-job misfit over time, which may prompt different forms of job crafting.

Technology

Adoption of new technology can be a double-edge sword for older workers' person-job fit. Technology facilitates the automation of work tasks, which in turn increases knowledge job demands (Drucker, 2000). This creates opportunities for older workers to shift away from physically arduous duties and diversify their job tasks, such as taking on new responsibilities that rely on their extensive domain knowledge. For instance, wearable safety glasses equipped with communication functions allow veteran building maintenance workers to offer their expertise in real-time to their younger colleagues, without having to climb to significant heights (Griffith, 2014). Telecommuting and blended work allow for time-independent and location-independent work, removing potential barriers that prevent older employees from continuing to work beyond retirement age (Dropkin et al., 2016). Older workers also show comparable performance on multiple telecommuting tasks to their younger colleagues (Sharit et al., 2004). They may proactively incorporate technology in their jobs accordingly to improve their overall work experience.

On the other hand, technology can also place higher demands upon older workers. When software is designed without accounting for age-related perceptual and cognitive changes, it may create additional challenges for older employees. Decline in color perception and visual acuity may make it particularly difficult for older workers to read obscure information on computer screens (Charness and Boot, 2009). As technological

devices continue to shrink in size (Thompson and Atkins, 2010), more precise motor control is needed for proper usage. Reduced button size has been shown to result in increased time on tasks and higher mental workload for older users (Fezzani et al., 2010). In addition, given their age-related changes, effective technology-based training for older workers should be self-paced, highly structured, and incorporate a user-friendly and consistent interface to enhance learning outcomes (Williams van Rooij, 2012; Wolfson et al., 2014). These design issues in emerging workplace innovations create potential systematic barriers for older workers' performance, and may hamper their confidence and motivation to fully utilize technology. In addition, information and communication technology has become an integral part of work, which can lead to unexpected strain. Interruptions from instant messaging and email alerts increase mental load, and such disturbances have been suggested to create more stress and lead to lower performance in older workers (Tams and Hill, 2017). While robots and other programs can perform an increasing variety of tasks to augment workers' capabilities, workers also find them to be threatening to their job security (Cascio and Montealegre, 2016). As the impact may be particularly severe for older employees due to their lower job mobility, altering their perceptions through cognitive crafting can be one way to counteract such impact on their work experience.

The rapid pace of evolution in technology makes it difficult for workers, regardless of age, to stay abreast, which may result in gaps in their skills needed to perform well on the job. However, to the best of our knowledge, few studies have directly examined technology usage and its impact specifically for older workers. As attitude toward technology was strongly related to work motivation among older employees (Elias et al., 2012), individuals who struggle with incorporating technology in their work may have chosen to retire early since they cannot cope with such job demands. Therefore, those who are still active participants in the workforce may not face as many functional limitations in this area as previously theorized. In addition, because of the considerable differences in aging trajectories, more empirical data is needed to examine how technology in the workplace shapes older workers' job crafting strategies, and in turn, their job experience.

Human Resources Management (HRM)

The experience of HRM policies differs across employees due to both uneven implementation of practices and individual differences (Clinton and Guest, 2013). Organizations can be reluctant to invest in older workers since their younger counterparts would have more years remaining in their careers for companies to benefit from their investment (Schultz, 1961). Along with the stereotypes of lower potential for development, older workers have less access to training (Farr and Ringseis, 2002). As the perceived availability of training resources positively relates to employees' self-efficacy (Maurer and Tarulli, 1996), older workers may attribute the lack of equal access to developmental opportunities as a sign of deficits in their own abilities, threatening their work identities. It is also common for stereotypes to influence important human resource decisions, such as training and performance evaluations. During subjective performance appraisal, age stereotypes may be invoked despite no conscious intent from the supervisors. Prior research has shown that older workers often receive lower performance scores even when they have the same qualifications as their younger counterparts (Posthuma et al., 2012). They may view themselves negatively because of the different evaluation criteria, which may prompt specific crafting practices in order to protect their identities and maintain self-esteem. As organizational practices can be seen as signals from employers to employees, adopting specific HR policies can be indicative to employees to cultivate a positive sense of self. For instance, distinct bundles of High-Performance Working Systems (HPWS), which are designed to enhance employees' skills and empowerment, convey the idea that organizations value their employees. Research has found that the relationships between maintenance HR practices (e.g., performance appraisal) and well-being, as well as developmental HRM practices (e.g., training) and performance, strengthen with age (Kooij et al., 2013). In addition, HRM practices designed for older workers (such as formally recognizing their achievements and explicitly investing in their training) can counteract negative environmental cues of stereotype threat of ageism and reaffirm older workers' social identity (Kulik et al., 2016). Older workers shifting their attention to cues set by companies through HRM policy implementation may help them sustain a positive sense of self.

JOB CRAFTING

Despite changes in abilities, needs and work motives being similar among older workers, there is still substantial between-individual variability in their aging trajectories. For instance, although future time perspective tends to become more limited, with a shorter time frame as people age (Carstensen et al., 1999), some older individuals may have more open-ended future time perspectives in regards to their careers. Since job redesign traditionally is a top-down process implemented by organizations, standardized policies are rarely able to take individual needs and abilities into consideration (Hackman and Oldham, 1976). Therefore, although one way to reduce the discrepancy between person and job fit would be job redesign, it is often difficult for organizations to update jobs for every single employee (Berg et al., 2010). This makes managing such a heterogeneous group of employees particularly challenging. In addition, older workers often face age stereotyping at work, which threatens their self-identity. Identity theory proposes that given a mismatch between identities and actions, people would proactively align their actions with expectations, as well as prioritize and integrate identities to cope with the discrepancy (Stryker and Burke, 2000). In fact, researchers have provided increasing evidence suggesting older workers exercise agency and adopt an active role in altering their perceptions, behaviors and environments at work to achieve fit (Freund and Baltes, 1998; Wahl et al., 2012). We propose that job crafting, being an individualized, bottom-up approach, provides a valuable avenue for older workers to adapt to their individual age-related changes,

as well as the dynamic nature of work, to stay motivated in their job. Cognitive crafting, in particular, enables them to reframe their perceptions of the job and focus on job features that are personally meaningful, which further aids other forms of job crafting.

Forms of Job Crafting

Job crafting is defined as changing the boundaries and conditions of job tasks, work relationships and the meaning of the job (Wrzesniewski and Dutton, 2001). While job design assumes employees are passive recipients of changes imposed by organizations, job crafting considers them to be active participants who restructure their own job boundaries as needed. It is a self-initiated behavior by employees with the goal to improve their own work experience. Unlike other proactive behaviors such as personal initiative and role innovation, job crafting does not necessarily lead to positive organizational outcomes, as the focus is on the employees themselves. Through engaging in job crafting, employees are able to exert personal control over their jobs, to establish positive self image, and to satisfy their need for fulfilling interpersonal relationships (Wrzesniewski and Dutton, 2001).

According to Wrzesniewski and Dutton's (2001) original theoretical framework, job crafting can take three different forms: task, relational and cognitive crafting. Specifically, task crafting comprises altering the number, type and scope of tasks that employees need to fulfill at work. For instance, employees decide for themselves to take on or reduce the number of tasks, and introduce new means to complete those tasks to make their jobs easier or more interesting. Relational crafting involves exercising discretion to alter the quality and/or number of interactions with others encountered on the job. Examples include workers focusing on developing relationships with those who share similar interests, or distancing themselves from unpleasant colleagues. Cognitive crafting refers to the reframing of individuals' perceptions and cognitive representations of their jobs. By changing the task, relational, and cognitive boundaries of their jobs, employees can shape the meaning of the job and, as a result, influence their work identities accordingly.

Alternatively, Tims and Bakker's (2010) conceptualization of job crafting is based on the job demands-resources (JD-R) model. Although job crafting is initiated by the employees, it occurs within the context of their prescribed jobs, which are bounded by the specified tasks, expectations and structure imposed by the organizations. This definition emphasizes job characteristics that can be crafted across all occupations, namely job demands and resources. Job demands job characteristics that involve sustained physical or mental effort and are therefore associated with physiological and psychological costs. Although job demands could potentially evoke strain if they exceed employees' adaptive capabilities (Bakker et al., 2007), they can also lead to positive outcomes if employees have enough resources to manage them. A challenging work demand may induce increased effort and satisfaction from the employee for achieving such a difficult task. Job resources are job characteristics that facilitate the achievement of work goals and promote personal growth (Bakker and Demerouti, 2007). By altering job demands and resources, employees can shape their jobs to match their individual abilities and desired goals. Tims et al. (2012) differentiated four dimensions of job crafting: (1) increasing structural job resources, such as task variety, opportunities for professional development, and job autonomy; (2) increasing social job resources, such as social support, supervisory coaching, and feedback; (3) increasing challenging job demands, which refer to taking on tasks that stimulate skills development or sense of accomplishment, such as new projects and higher levels of responsibility that are rewarding; and (4) decreasing the level of hindering emotional and cognitive job demands that interfere with the ability to achieve important work goals, such as role conflict and stressful interactions (Cavanaugh et al., 2000). Therefore, employees can craft their jobs to achieve better fit, helping them to maintain motivation and promote well-being.

Older Workers and Job Crafting

Much of the empirical literature on job crafting thus far employs the conceptualization rooted in the JD-R model, proposing that employees focus on altering their job demands and resources in desirable directions (Bakker et al., 2012; Nielsen and Abildgaard, 2012; Kooij et al., 2016). Researchers have also suggested specific job crafting activities that are likely to be most relevant for older workers. Promotion-focused job crafting such as increasing structural and social resources motivates them to continue working beyond retirement age through the mediating mechanism of managing burnout (Lichtenthaler and Fischbach, 2016). Kooij et al. (2015), using the Selection, Optimization and Compensation (SOC) framework, identified three forms of job crafting for older workers: Accommodative crafting, which focuses on regulating losses, include delegating lower priority tasks, hiring an assistant, and reducing workload. Developmental crafting refers to strategies that focuses on growth, such as participating in workshops, using professional network for learning and partaking in professional organizations. Utilization crafting emphasizes employing workers' existing skills, such as taking on tasks to activate previously unused skills and prioritizing attainable goals that are personally meaningful.

Job crafting was originally conceptualized as strategies that can be adopted across occupations and job ranks, yet behavioral changes to the tasks and relationships can be limited by job autonomy, task nature and organization structure (Tims and Bakker, 2010; van Wingerden and Niks, 2017). Cognitive crafting, which has received little research attention, can be a significant facet that would be especially valuable for older workers. We expand the definition of cognitive crafting beyond employees altering their view of the job, but also changing how they perceive their own role as workers. Instead of treating it as a mere coping mechanism, it can be another way for employees to proactively improve their work experience through aligning their actions and identities. Identity generally refers to "who the individual thinks he or she is and who is announced to the world in word and action" (Charon, 1992, p. 85). Specifically, work identity refers to how people perceive and define themselves at work (Wrzesniewski and Dutton, 2001), which affects the roles people take on and influences their subsequent behaviors

and cognitions when performing the job. Work identities are important because they provide information about features that influence how people act, think and feel at work (Ashforth and Kreiner, 1999). As the formation of work identities is an active process, workers proactively create situations that confirm their favorable self-concepts (Schlenker, 1985). When there is a mismatch between workers' sense of self and roles, workers may change their actions or modify their identities to fit work demands (Pratt et al., 2006). Cognitive crafting permits employees to ascribe additional meanings to the tasks that they do and cultivate their work identities, which in turn may motivate them to engage in specific crafting behaviors based on these meanings. Workers, thus, can reconcile the person-job misfit and maintain a positive sense of self. While it was not discussed in the conception by Wrzesniewski and Dutton, it is also possible for workers to cognitively disengage from their jobs in response to individual and environmental changes. Using the stereotype threat framework, utilizing cognitive crafting may help older workers to buffer age-related stereotype threat and protect their self-identity. Building on the life span theory of control, we propose that job crafting, particularly cognitive crafting, will be of increasing value as employees age.

Value of Cognitive Crafting for Older Workers

The Life Span Theory of Control proposes that individuals throughout the life course need to balance their primary and secondary control strategies in order to maintain functional equilibrium (Heckhausen and Schulz, 1995). Primary control comprises actions directed at changing the \environment to fit individuals' wants and needs, and secondary control aims at changing the individual self to be congruent with the environment. Researchers have argued for the functional primacy of primary over secondary control when it is attainable (Heckhausen and Schulz, 1995). Extending the Life Span Theory of Control to the context of job crafting, task and relational crafting are primary control strategies aimed at changing the job itself by changing what individuals do and who they interact with at work. On the other hand, cognitive crafting is a secondary control strategy, enabling employees to achieve changes in their own perceptions of the job. Yet, primary control strategies may not always be feasible. Although the motivation to strive for primary control remains stable, people's capabilities to do so may decline with age due to both within-person and environmental constraints. When this occurs, secondary control plays an increasingly important role. For instance, older workers are likely to face a certain extent of decline in physical capabilities which they have little control. While they may be able to apply primary control strategies in other aspects such as seeking out tasks that rely on cognitive abilities, the focus of resources may shift to regulate their thinking and emotions as this is an uncontrollable situation. Secondary control not only helps people to cope with losses of primary control, but it facilitates primary control through contributing to the selection of goals pursued (Heckhausen and Schulz, 1995). By altering how one thinks of primary control failures, secondary control buffers the impact on self-concept and preserve motivational resources for utilizing the primary control approach again in the future. Similarly, when certain forms of task and relational crafting are not attainable, cognitive crafting can be one particularly valuable way for older workers to cope and redirect resources to other areas that are personally important.

While there are few empirical studies on cognitive crafting, research on highly stigmatized occupations sheds light on techniques that workers might use to create more meaning in their jobs (Ashforth and Kreiner, 1999). For example, reframing involves reconstructing the job in a way that differs from its apparent meaning, tying in more abstract value with greater purposes. As older workers tend to have longer tenure, they may perceive that their work not only contributes to the everyday operation of the organization, but as being instrumental to the organization's growth over the years. This, in turn, would allow them to maintain and further develop positive worker identities. Since ageism is one of the most prevalent discrimination at workplaces, older employees are constantly faced with negative age stereotyping cues (Lamont et al., 2015). Individuals may shift to alternative means to meet their overarching needs for a positive sense of self in response, exemplified by findings on employing self-affirmation to combat stereotype threat (Martens et al., 2006; Sherman et al., 2013). Instead of tending to the negative stereotypes, older workers, due to their predisposition to focus on the positive, may be better able to redirect their limited resources toward cognitive crafting and recognize age as a badge of honor that symbolizes their accumulated experience and wisdom. This allows them to preserve a positive sense of self as workers, which is vital for their self-esteem and job performance. It has been theorized that older individuals are threatened the most by self-concept based stereotype – the possibility that negative age-related stereotypes are personally true of themselves (Barber, 2017). Cognitive crafting may allow older workers to refine how they perceive themselves and to view age in a more positive light. This might offset the negative effect of stereotype threats on self-concept and performance, and maintain positive overall work identities.

Cognitive crafting may be particularly essential in situations where person-job fit is the result of situations that older workers have little control. When changing tasks and relationships at the job are not possible, older workers may engage in identity patching, that is changing their sense of self to make sense of workplace situations (Pratt et al., 2006). Through cognitive crafting, older workers may choose to place less value on certain aspects or their jobs as a whole and move toward the career disengagement stage as suggested by Super's Career Stages theory (Super, 1980). For instance, if their needs for emotional involvement have been satisfied outside of work, such as being caregivers for their families or pursuing hobbies, older workers may place less value in cultivating positive relationships at work. Or, when employees are chronically faced with age stereotyping at the workplace, cognitively disengaging from work itself allows them to persist without doing further damage to their self-identity (Woodcock et al., 2012). Although it can be costly to the organizations, cognitive crafting through disengaging

and devaluing aspects of work can potentially improve older employees' work experience.

As employees age, cognitive crafting may become increasingly important as a means for both maintenance and development of task and relational crafting. Life Span Theory of Control proposes that secondary control optimizes the selectivity of primary control targets. This may be accomplished by promoting the value of selected goals while disengaging from those that are no longer attainable, and enhancing individual's self-confidence (Heckhausen and Schulz, 1995). Due to decreases in job mobility, it is difficult for older workers to change jobs. However, they can shift their attention to job features that are extrinsically or intrinsically rewarding for them personally (Ashforth and Kreiner, 1999). Because of their longer time in the workforce, older workers tend to have a better understanding about their preference in tasks, as well as their strengths and weaknesses (Helson et al., 1995). Therefore, they are more capable of optimizing their resources and directing them to suitable crafting practices. For instance, older workers may choose to learn how to navigate new computer systems based on their interest in technology, focusing their attention on achieving a sense of mastery despite common stereotypes. Or, they may place the value of their jobs on building meaningful social relationships with colleagues as their purpose, instead of putting in extra effort for a promotion. It also has been suggested that older workers tend to engage in job crafting using their personal strengths placing more value on serving their organizations than job crafting based on their own personal interests (Kooij et al., 2017). Through refocusing, older workers can appreciate job features that make the job worthy of their time and energy. These job features then serve as targets for them to employ in further primary crafting, that is, task and relational crafting, so that their behaviors are more consistent with their identities.

Value of Task and Relational Crafting for Older Workers

Through employing task and relational crafting, older workers can directly manipulate their daily job duties and interactions with other employees as suggested by previous researchers (Kooij et al., 2015). As older employees often have held the same job for a long time, tasks that once were challenging and meaningful can become routine and lackluster (Robson and Hansson, 2007; Hornung et al., 2010). They are often given more routinized job assignments due to stereotypes rooted in ageism (Salthouse and Maurer, 1996). Thus, older workers may no longer find their jobs to be satisfying their needs for mastery and achievement. Task crafting allows older workers to proactively seek out opportunities that interest them and change how they perform their jobs to fit their values. For example, older individuals who have a passion for learning may actively look for training and volunteer to join challenging projects, even if their organizations may not consider them to be the best candidates for these openings. Furthermore, they can alter, refine or minimize interactions with others at work through relational crafting to match their needs and wants. For instance, generativity motives, which is the tendency to focus on helping others, the society as a whole and future generations instead of self, increase with age (McAdams et al., 1993). Kanfer and Ackerman (2004) argued that employees who are motivated by such motives would pay attention to the collaborative process of goal accomplishments, rather than outcomes, on the job. As a result, the desire to pass on knowledge to their younger colleagues may become the primary driving force for some older workers, thus changing how they approach their work. Instead of aspiring to advance their own careers, older workers may prefer to take on mentoring roles to train others on areas of their strengths. At the same time, due to the increasingly more limited future time perspective with age, older workers may become more selective about who they invest their time in. They may distance themselves from colleagues and supervisors who do not share similar core values, which helps improve the alignment between their actions at work and who they perceive themselves to be as workers. These crafting strategies are also consistent with the SOC theory. Primary control crafting behavior provides an avenue for older workers to direct their limited resources to job responsibilities and relationships that are personally motivating and essential features to their identities, which consequently improve the alignment between their jobs and themselves.

CONCLUSION

Aging at work is a dynamic process. Changes in employees' motives and competencies, along with job changes occurring over their work histories, increase the likelihood that older workers will experience person-job misfit. Through using various strategies of job crafting, older employees can realign their person-job fit and maintain congruent work identities. As job crafting is initiated by employees themselves, it would be able to accommodate the substantial individual differences existing among older workers. While most of the empirical literature, thus far, focuses on job crafting through balancing job demands and resources, we believe that it will be of theoretical value to revisit the conceptualization proposed by Wrzesniewski and Dutton (2001) to examine cognitive crafting. As a secondary control strategy, it serves as an additional means for workers to cultivate meaningful work identities and give priority to job features that are personally important for additional primary job crafting. More research will further demonstrate the potential value of job crafting for this unique population.

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CW played a primary role in the conception and drafting of the manuscript. LT played a major role in drafting of the manuscript and providing critical revision to the manuscript.

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Implicit Age Cues in Resumes: Subtle Effects on Hiring Discrimination

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Anonymous resume screening, as assumed, does not dissuade age discriminatory effects. Building on job market signaling theory, this study investigated whether older applicants may benefit from concealing explicitly mentioned age signals on their resumes (date of birth) or whether more implicit/subtle age cues on resumes (older-sounding names/old-fashioned extracurricular activities) may lower older applicants' hirability ratings. An experimental study among 610 HR professionals using a mixed factorial design showed hiring discrimination of older applicants based on implicit age cues in resumes. This effect was more pronounced for older raters. Concealing one's date of birth led to overall lower ratings. Study findings add to the limited knowledge on the effects of implicit age cues on hiring discrimination in resume screening and the usefulness of anonymous resume screening in the context of age. Implications for research and practice are discussed.

Keywords: age, anonymous resume screening, hiring discrimination, job market signaling theory, recruitment

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INTRODUCTION

In Western society people need to work long enough to maintain welfare levels (Administration on Aging, 2015). Many people also prefer to stay active in the labor market until an older age (Wöhrmann et al., 2016). However, and despite anti-discrimination legislation, chronologically older compared to younger job applicants still have lower chances to hold and obtain jobs, even when their competencies are alike (Neumark et al., 2016; Wanberg et al., 2016).

The present paper focuses on age discrimination in hiring, and more in particular on resume screening, (Bal et al., 2011; Truxillo et al., 2015). Worldwide, resumes are one of the most frequently used screening tools that encompass the first selection hurdle. Moreover, due to the way impressions are formed, this hurdle seems vulnerable for hiring discrimination (Fiske et al., 2002). Although chronological age has no validity for predicting future job performance (Schmidt et al., 2016), correspondence audit studies[1] consistently show that explicitly presenting one's chronological age in a resume may decline older applicants' job chances (Riach and Rich, 2006, 2010; Richardson et al., 2013; Neumark et al., 2016). Moreover, such ageism effects seem substantial. Ahmed et al. (2012), for instance, found that younger (31 years) compared to equally

Abbreviation: AAP, anonymous application procedures.

[1]The correspondence audit technique is an experimental research technique that allows to compare labor market outcomes of applicants who are equally qualified for a job (i.e., identical in all productive characteristics) but who differ in non-job related or non-productive characteristics like -most typically- demographic characteristics (e.g., gender, ethnicity, and age). In correspondence audit studies matched pairs of equivalent resumes are sent to the same employer and callback is registered as the outcome variable in order to investigate whether differential treatment of applicants can be attributed to hiring discrimination.

qualified older (46 years) applicants received over three times more responses from employers looking to hire restaurant workers and over four times more responses from employers looking for sales assistants.

Anti-discrimination regulations have not prevented bias in resume screening; therefore AAP are offered to combat illegal discriminatory hiring practices (Åslund and Skans, 2012). AAP like blind auditions (Goldin and Rouse, 2000), blind interviewing (Buijsrogge et al., 2016), and anonymous resume screening (Åslund and Skans, 2012), aim to blot non-job-related, personal identifiers (like socio-demographic information) to increase protected job applicants' chances of advancing to the next assessment stage, and hence, to increase their hiring chances. Intriguingly, however, results of AAP are mixed. Anonymous resume screening also *dilutes* hiring chances of job applicants from protected social groups (Krause et al., 2012; Behaghel et al., 2015), which suggests that resumes in which demographic information is blotted still reveal information about job applicants' group membership, albeit in subtle ways. To the best of our knowledge, the role of implicit markers of applicants' social group membership on their hiring chances has not been investigated much in recruitment (i.e., resume screening), especially not regarding applicants' older age, and will be considered here.

According to the signaling theory (like the job market signaling theory; see Spence, 1973, 1974; Rynes, 1991) senders (like applicants) exchange information with receivers (like recruiters) through signals/cues (like resume information), which correlate with unobservable characteristics of the sender (Connelly et al., 2011; Bangerter et al., 2012). Hence building on assumptions from both job market signaling theory and impression formation theory, we first investigate whether older job applicants benefit from concealing explicitly mentioned age cues in their resumes (like date of birth) or whether more implicit/subtle age cues in resumes – i.e., other than one's date of birth- may lower older job applicants' hirability ratings. Second, surprisingly and with a few exceptions (see Fasbender and Wang, 2017), few studies investigated recruiter characteristics on hiring discrimination, and ageism in particular. Yet, recruiters might differ in their susceptibility to hiring bias and recruiters' chronological age has been suggested as one potential boundary condition. As a second aim, we therefore explore the potential moderating role of recruiters' chronological age on implicit/subtle age-related information in resumes on the one hand and applicants' hirability ratings on the other hand. Some studies showed evidence for in-group favoritism with chronologically older recruiters favoring older applicants (Krings et al., 2011), whereas others have shown the opposite (Finkelstein and Burke, 1998; Axt et al., 2014). Since hiring literature is inconclusive and mainly considered explicit age cues, we further explore whether older recruiters may (dis)favor resumes based on implicit old-age cues (Axt et al., 2014; Marcus and Sabuncu, 2016).

In the next paragraphs, we first discuss why resume screening is vulnerable to age discrimination, what is known about ageism effects in this stage of the hiring procedure, and why anonymous resume screening may fail to avert age discrimination. Next, we turn our attention to job market signaling theory and discuss 'implicit' age cues in resumes (i.e., applicants' name and affiliations). Finally, we explore the potential moderating role of recruiters' chronological age on implicit age cues and hiring discrimination.

THEORETICAL BACKGROUND

Age Discrimination in Resume Screening

Resumes are one of the first and most important sources of information when HR managers and recruiters initially screen applicants for jobs, but they also appear very vulnerable to bias (Derous et al., 2015). Job applicants are typically judged on the basis of a one- or two-page resume. This resume screening provides limited individuating information and is vulnerable to categorization effects. That is, cognitive models of impression formation (like the continuum model; see Fiske et al., 1999) suggest that category-based information processing will be particularly strong when limited individualized information is available, such as on resumes (Abrams et al., 2016). Models of impression formation further suggest that categorization will occur automatically and once people have categorized someone as belonging to a particular out-group, associated group stereotypes may be activated, which can influence how people judge others (Fiske et al., 1999).

In many Western European societies, it is common to indicate date of birth on resumes, which explicitly signals applicants' chronological age. Such an explicit signal might provide recruiters with information about one's life/work experiences but at the same time might come with a cost and lower older applicants' hiring chances. When explicit age markers are present in resumes, recruiters seem to prefer younger applicants over older ones as evidenced by many recently conducted (field) experiments (Lahey, 2008; Albert et al., 2011; Krings et al., 2011; Ahmed et al., 2012; Richardson et al., 2013). For instance, Lahey (2008) showed in a field experiment (i.e., correspondence audit study) that chronologically older women received fewer positive reactions to their applications than comparable younger women. In another correspondence audit study, Albert et al. (2011) sent out resumes of equally qualified 24-, 28-, and 38-years old applicants in response to existing job ads. Resumes from 38-years old applicants received a significant lower callback than those from the former two age groups. Similarly, Ahmed et al. (2012) found 46-years old applicants to get lower callback than applicants aged 31, whereas Richardson et al. (2013) showed resumes of applicants aged 54 to less likely be hired than those of equally qualified applicants aged 42 or 48.

These correspondence audit studies show age discrimination to be one of the reasons why older workers have a higher chance of dropping out of the labor force (Neumark et al., 2016). A survey of the AARP Public Policy Institute also revealed that 51% of older unemployed workers (aged 47–70) reported to be discriminated against because of their older age (Koenig et al., 2015). In support of this, Wanberg et al. (2016) showed negative relationships between job seekers' chronological age, reemployment status, and reemployment speed. Moreover, these

negative relations became stronger over age 50 (see also Perry et al., 2016). Comparable findings have been reported in several other Western countries outside the United States, showing less positive callbacks for older job seekers when compared to their equally qualified younger counterparts (e.g., Krings et al., 2011; Åslund and Skans, 2012), indicating age discrimination in resume screening to be a widespread, substantial, and pressing issue.

Anonymous Resume Screening

To avert age discrimination in the first phase of the screening procedure, policy makers as well as researchers recommended AAP (see Edin and Lagerström, 2006; Furtmueller et al., 2010; Åslund and Skans, 2012). Furtmueller et al. (2010, p. 10), for instance, concluded that "since employers are prohibited to select employees based on gender, birth date, nationality and marital status, resume forms should not ask for this personal information." Anonymous resume screening omits explicit demographic cues from resumes that are non-job-related, like date of birth, ethnic-sounding name, or gender (Edin and Lagerström, 2006; Åslund and Skans, 2012; Krause et al., 2012; Hiemstra et al., 2013).

Intriguingly, however, studies have shown that anonymous resume screening may not be as effective as typically assumed as ethnic minority or otherwise stigmatized applicants (e.g., like female or older applicants) are still more rejected when they apply anonymous compared to equally qualified ethnic majority or their non-stigmatized counterparts (Behaghel et al., 2015; Maurer, 2016). For instance, in a field experiment in Germany (Krause et al., 2012), female applicants were less likely to receive a job interview invitation for a *post doc* position in economics compared to equally qualified male applicants when they applied with an AAP. In France, organizations were less likely to invite minority applicants when they received anonymous resumes (Behaghel et al., 2015). The French government, therefore, abandoned the idea of making anonymous resume screening mandatory in public employment service offices. Recently, the Behavioral Economics Team of the Australian Government (BETA) also showed that de-identifying applications for senior positions decreased the number of female and ethnic minority applicants shortlisted for senior positions in the Australian Public Service (Hiscox et al., 2017). Corroborating these findings, a recent scenario study in which both American and European participants had to screen resumes of chronologically older/younger applicants (Kaufmann et al., 2016) revealed that hiring intentions of the chronologically older applicants (i.e., who applied with resumes that included age cues) did not differ significantly from those of the 'anonymous' candidates (i.e., who applied with resumes without age cues).

In a Dutch study, Hiemstra et al. (2013) showed that in the absence of demographic information (as in anonymous resume screening), real recruiters still gave lower job suitability ratings to resumes of ethnic minority applicants compared to those of their majority counterparts. Whereas human capital factors could explain these findings to some extent, Hiemstra et al. (2013) could not exclude hiring discrimination, either. Specifically, other resume information (like applicants' affiliations) than explicit signals of one's demographic background (like applicants' chronological age or ethnic background) might operate as 'implicit' or subtle markers of applicants' protected group status and affect hirability ratings (Dovidio and Gaertner, 2000; Cole et al., 2007; Derous et al., 2012).

Indeed, over the past decades, workplace discrimination has become more subtle (Dovidio and Gaertner, 2000; Rosette et al., 2016). In line with this, one could expect recruiters to also turn their attention to more subtle cues in resumes to gain information. Specifically, recruiters may infer applicants' protected group membership from subtle cues (like one's affiliations, Dovidio and Gaertner, 2000; Hiemstra et al., 2013), which contrasts with the often discussed view that anonymity prevents recruiters from favoring majority over minority applicants when credentials are equal, at least in the initial stage of the hiring process. The above-mentioned findings raise the question: Is there more into a resume than one's date of birth (i.e., or any other explicit age cue, like years of work experience) that might disclose one's chronological age and might instigate age discrimination in hiring, albeit in more subtle ways?

Implicit Cues in Resumes

Job Market Signaling Theory

Recruitment researchers rely on *job market signaling theory* (Spence, 1973, 1974) to explain how actors determine what information is reliable for making job market choices. In its more general and original sense, signaling theory refers to how individuals (i.e., job applicants and recruiters/organizations) with -partly- conflicting interests will communicate and interpret signals/cues of unknown characteristics (i.e., of the organization/job seeker) to obtain the biggest gains, like getting hired or getting the best employees on board. Hence, signaling systems are characterized by information asymmetry between senders and receivers but are at the same time shaped by mutual interests between signalers and receivers (Connelly et al., 2011).

Typically, signaling theory in recruitment research (i.e., job market signaling theory; see Rynes, 1991) is used to explain the cues *job applicants* use to make inferences about the prospective employer/organization (Carter and Highhouse, 2014). Put differently, the recruitment literature considers how observable recruitment characteristics (like recruiter behavior) serve as signals or cues of the unknown (to job seekers) organizational quality or organizational characteristics. A warm recruiter, for instance, may signal to applicants an organization that looks after its employees (Slaughter et al., 2004). However, *recruiters* also look for 'cues'[2] about applicants' overall and unknown qualities in their resumes (Popken, 1993; Cable and Gilovich, 1998; Cole et al., 2003, 2009; Aguinis et al., 2005; Burns et al., 2014). According to the normative-predictive model of

[2]In layman's terms 'cues' and 'signals' are used intertwined (as synonyms). In signaling theory, the notions 'signal' and 'cue' may differ conceptually from each other in that 'signals' refer to traits or characteristics of the sender that might change the behavior of the receiver to the benefit of the sender whereas 'cues' refer to traits or characteristics of the sender that might benefit the receiver (Connelly et al., 2011). Given the overall lower labor market outcomes of chronologically older compared to younger persons (Wanberg et al., 2016), in the present paper, implicit resume information referring to an applicant's older age might be captured more by the notion 'cue' than 'signal.'

resume screening (Vieira Campos Proença and Valente Dias de Oliveira, 2009; Guion, 2011), resume screening should be based on objective and job-related information like applicants' work experiences and educational background as mentioned in resumes (Cole et al., 2007). Objective and job-related information (like qualifications) might function as 'explicit cues' about applicants' competencies (Bangerter et al., 2012). Yet, Popken (1993) indicated that recruiters also reply upon inference and indirect speech acts when they read resumes. Cole et al. (2003, 2009) indeed showed recruiters to infer applicants' personality (like agreeableness) from work experiences as mentioned on resumes (see also Burns et al., 2014). Recently, Kaufmann et al. (2016) even showed trait-related inferences from resume pictures to lower applicants' hiring chances (i.e., with pictures of applicants with old-appearing faces triggering impressions of low health and fitness). Hence, recruiters also tend to infer subjective attributes and even personality characteristics from resume content in an indirect way (from educational credentials, work experiences, and so on), albeit often not in very accurate ways (see Apers and Derous, 2017; Cole et al., 2007). Put differently, some objective and job-related information in resumes might also function as 'implicit cues' about other applicant characteristics (like attributes and traits) than this information is originally intended to be used for.

Interestingly, most studies consider qualification-based inferences (e.g., cues to applicants' personality) but do not consider *social group status inferences* (i.e., cues to applicants' protected group status, like age), which may also affect recruiters' impressions of applicants' overall job qualification (i.e., given age-based inferences) and even impact recruiters' hiring judgments. For instance, applicant skills as mentioned in resumes might signal applicants' overall qualification in a very explicit way but at the same time might communicate something else being useful to recruiters, namely applicants' chronological age (Abrams et al., 2016). Whereas job market signaling theory mainly focuses on actions taken by senders to communicate positive, imperceptible qualities of the signaler to the receiver (like acquired skills), other information could also be conveyed (i.e., co-vary with positive qualities) that might turn-out to be less beneficial or even harmful to senders (like their older age). Implicit cues to one's social group status, therefore, can be considered as an unintended consequence of actions taken by senders to communicate positive qualities through resume information (Connelly et al., 2011). As shown by Abrams et al. (2016), applicants' skills' set (i.e., observable signal of one's qualifications) might co-vary with receivers' perceptions of applicants' chronological age (i.e., indirectly cause chronological age is not explicitly mentioned in the applicants' skills or any other section). Hence, when job applicants provide explicit information in their resumes about their skills (like 'being a rapid decision-maker'; 'understanding others' views well'), they might *indirectly* signal their age too (when 'being a rapid decision-maker' is associated with chronologically younger age and 'understanding others' is associated with chronologically older age) which might affect recruiters' stereotypical impressions of the applicant's potential productivity. In doing so, recruiters may subtly factor-in job-irrelevant information, like one's social group status, that they infer from implicit age cues in applicant resumes (Hiemstra et al., 2013; Abrams et al., 2016).

Implicit cues (e.g., regarding one's chronological age) differ further from explicit cues in that they may be much more 'hard-to-fake' by applicants and 'hard-to-resist' by recruiters (Bangerter et al., 2012; Abrams et al., 2016). First, cues are considered 'hard-to-fake' (or 'honest') if signaling happens beyond one's conscious control regarding one's unobserved qualities (Connelly et al., 2011; Bangerter et al., 2012). Information about one's social group status (e.g., age) is implicitly conveyed through 'honest' cues, meaning that these cues convey truly useful information to the receiver about the sender's social group status in an indirect, non-manipulable way (i.e., beyond the sender's awareness; see Bangerter et al., 2012). Second, implicit cues are 'hard-to-resist' by recruiters. Recruiters might look for such implicit, hard-to-fake cues in resumes because applicants are less likely to consciously cheat on these implicit age cues as applicants might not be aware of the age-related associations they indirectly send to recruiters through this information (e.g., skills as 'proxy' of applicants' chronological age; Abrams et al., 2016). Given that applications are characterized by information asymmetry between applicants and recruiters, such information might be of specific interest to recruiters. Moreover, when implicit cues refer to one's social group status, they may increase category salience and lessen recruiters' ability to inhibit categorization (Fiske et al., 1999), which may make them even much 'harder-to-resist.' Hence, implicit age cues may fuel recruiters' categorization processes and ageist hiring preferences in rather subtle ways, as discussed next.

Implicit Age Cues

The present study integrates predictions from theories that explain hiring discrimination (i.e., cognitive models of impression formation) with job market signaling theory by considering recruiters' use of age-related cues in resumes. First, according to impression formation theories (Fiske et al., 2002), resumes may trigger social categorization processes and instigate hiring discrimination because of the limited amount of individuating information (i.e., a one or two-page resume). Second, given the limited amount of individuating information on resumes and given that resume-screening is characterized by information asymmetry (Bangerter et al., 2012), recruiters may particularly look for both explicit and implicit cues about applicant characteristics to base their hiring decisions upon. Certain of these cues may signal applicants' age and may trigger age-related associations (like applicants' physical and psychological 'fitness') to recruiters. Whereas effects of explicit age cues on recruiters' hiring decisions have already been demonstrated (e.g., using correspondence audit tests; see Neumark et al., 2016), effects of implicit age cues remain largely understudied and are considered here. Specifically, given that implicit cues are 'hard-to-fake' and 'hard-to-resist,' one could expect strong categorization effects from implicit age cues, thereby affecting job suitability ratings of applicants with old vs. young-age cues in a different way.

Two implicit age cues of interest to this study are applicants' *first names* and *extracurricular activities*. First, as the popularity

of *first names* changes over time (Christopher, 1998; Sigurd et al., 2005), names might indicate in a subtle, indirect way a person's chronological age and applicants might not be aware of such a subtle and honest signal (i.e., age-related association) in their resumes. Furthermore, because first names are tied with one's social and personal identity, they may activate social categorization processes and ageism (Young et al., 1993; Bennington and Wein, 2002; King et al., 2006; Derous et al., 2009). Therefore, first names might be both hard-to-fake (applicant perspective) and hard-to-resist (recruiter perspective). For instance, Young et al. (1993) and Christopher (1998) both showed that recruiters infer age from applicants' first names. Moreover, age associations seemed hard to resist as equally qualified applicants with young-sounding names were perceived more positively and received higher job suitability ratings than those with old-fashioned names, showing there is more into a resume than one's date of birth (or any other explicit age cue) that might disclose one's chronological age and instigate age discrimination (Perdue et al., 1990; Rudman et al., 1999).

Second, recruiters also evaluate applicants based on their *extracurricular activities/affiliations with socio-cultural groups* (Dovidio and Gaertner, 2000; Cole et al., 2007; Derous et al., 2009). Cole et al. (2007) showed that if asked directly, recruiters considered extracurricular activities as the least important resume characteristic in judging applicants' employability. Actual employability ratings, however, showed exactly the opposite, hence indicating that extracurricular activities were factored in (hard-to-resist) when recruiters evaluated applicants. This is buttressed by studies showing ethnic affiliations to lower ethnic minorities' job suitability ratings (Dovidio and Gaertner, 2000; Derous et al., 2009): Affiliations with certain socio-cultural groups seem to affect recruiters' information processing and decision-making in subtle ways. Berger (2009) also suggests that extracurricular activities in resumes can be beneficial to older applicants when such activities counter stereotypical inferences about the (older) applicant. Hence, as with names, extracurricular activities might serve as hard-to-fake cues about applicants' chronological age, particularly when applicants are unaware of the age-related associations and such cues seem hard-to-resist from a recruiter's perspective (Cole et al., 2007; Abrams et al., 2016).

Building further on both impression formation (Fiske et al., 2002), and job market signaling theory (Bangerter et al., 2012) to explain age discrimination in resume-screening, we expected effects of implicit age cues in such a way that:

> **Hypothesis 1.** Applicant resumes with old-sounding names (Hypothesis 1a) and old-fashioned activities (Hypothesis 1b) will receive lower job suitability ratings than those from equally qualified applicants with young implicit age cues.

The traditional view of bias considers membership in a particular social group (e.g., with a protected status) as having the same effect on employment outcomes for all members of that group; typically studies do not consider multiple cues in conjunction and within-category differences (i.e., differences between members from the same social category; see Kaiser and Pratt-Hyatt, 2009; Marcus and Fritzsche, 2014). That is, compared to a single cue on a resume (e.g., name only) one would expect multiple cues (like old-sounding name and old-fashioned extracurricular activities) to increase category salience and lessen the ability of even a motivated decision maker to inhibit the activation of a social category (Kulik et al., 2007; Derous et al., 2017). Similarly, research has suggested that minority group members may be rejected in proportion to their 'outgroupness' (Crisp and Hewstone, 1999). Several studies offer evidence that multiple cues to minority membership may lead to greater hiring discrimination (Uhlmann et al., 2002; Segrest Purkiss et al., 2006; Derous et al., 2009, 2015). Segrest Purkiss et al. (2006), for instance, found that two ethnic cues (name; accent) led to more negative interviewer reactions than one cue only. Derous et al. (2009) also showed that the strength of applicants' ethnic in-group identification (or social category salience) as appearing on resumes affected their job suitability ratings with highly Arab-identified minority applicants receiving lower job suitability ratings compared to equally qualified but less highly Arab-identified applicants. Similarly, because category salience will affect attention to that category (Kulik et al., 2007) and because protected group members (like older workers) may be rejected in proportion to their degree of identification with the protected social group of interest (Kaiser and Pratt-Hyatt, 2009), we expected for implicit age cues that:

> **Hypothesis 2.** Applicant resumes with more implicit cues referring to older age will receive lower job suitability ratings than those with less implicit cues referring to older age.

Recruiter Age

Recruiters may differ in their susceptibility to bias. Given the limited number of studies that considered effects of recruiter characteristics on ageism in hiring (Kulik et al., 2000) and in resume-screening in particular (Fasbender and Wang, 2017), we focus on recruiters' chronological age as a potential boundary condition of implicit age effects. Two competing perspectives have been put forward regarding implicit social evaluation. On the one hand, implicit evaluations may favor members from the in-group (i.e., in-group favoritism). In a simulated hiring study, Krings et al. (2011) found recruiters' own age to attenuate age bias to some extent: The probability of selecting the older candidate instead of the younger candidate increased with increasing age of the evaluator. Specifically, age bias was no longer observed or even turned into older worker favoritism when recruiters were equal in age or older than the older job candidate himself. These findings support the idea of in-group favoritism. Recently, Axt et al. (2014) showed that for both race and gender, the hierarchy of implicit evaluations places in-group members at the top, therefore also evidencing in-group favoritism. Indeed, to preserve one's social identity, one might favor in-group members (Tajfel and Turner, 1979). Interestingly, however, Axt et al. (2014; see also Nosek et al., 2002) showed a peculiar feature of implicit *age* effects: The hierarchy of implicit evaluations did *not* reflect in-group favoritism for age. Instead, older participants also placed older adults at the

bottom of the social hierarchy (Axt et al., 2014). Thus, older adults were preferred considerably less than younger adults, also by older-aged participants, which runs counter to the idea of in-group favoritism as found in the context of implicit race and gender evaluations. Corroborating with this, Christopher (1998) also reported older-age effects (based on first names) among both younger and older participants. Why implicit in-group favoritism does not occur for age cannot be inferred from these data. Yet, Marcus and Sabuncu (2016) recently suggest evolutionary explanations for ageism. Individuals may tend to systematically avoid and even discriminate against older individuals that are reminiscent of potential sickness or decline, in order to protect one's social group status and one's individual ego from the threat of sickness, decline, and eventually death. Since thoughts about decline and death tend to particularly operate at the implicit level (Levy and Banaji, 2002), they may exacerbate the negative effects of implicit old-age cues on both older and younger recruiters' hiring decisions. Hence, evolutionary theories of ageism consider prejudice and discrimination against older applicants as a 'defense mechanism' that equally affects older and younger evaluators. In line with these assumptions, one could also expect the opposite, namely a *lack* of in-group favoritism from the part of the older-aged recruiter in case he/she evaluates resumes with implicitly mentioned old-age cues. Yet, given the limited empirical evidence in the context of resume-screening, we formulated the following research question on the potential effect of recruiters' chronological age:

> **Research question.** Will applicant resumes with more implicit age cues referring to older age receive *higher* job suitability ratings from chronologically older recruiters than younger recruiters (*in-group favoritism*) or will applicant resumes with more implicit old-age cues receive equally low job suitability ratings from older recruiters as from younger recruiters (*lack of in-group favoritism*)?

MATERIALS AND METHODS

Ethics Statement

The study was carried out in accordance with the guidelines of the 'General Ethical Protocol for Scientific Research at the Faculty of Psychology and Educational Sciences' of the Ethical Commission of the Faculty of Psychology and Educational Sciences at Ghent University, which is the relevant university institutional review board that considers ethical aspects. In accordance with the Declaration of Helsinki, participants provided informed written consent prior to their participation. Participants were debriefed after all the data were collected.

Participants

Participants of the main study were HR professionals in organizations who regularly recruited applicants and who were identified through researchers' professional contacts, databases, and networks. In total, 1424 HR professionals were emailed the study link to participate, of which 45.86% ($N = 653$) agreed to participate. Of this group, 93.42% ($N = 610$) were eligible because they recruited applicants on a daily base (i.e., spending about 38% of their daily activities on recruiting). Hence, the final sample comprised 610 participants who recruited applicants frequently (also called 'recruiters' or 'raters') with a mean age of 41.15 years ($SD = 11.25$ years), 50.70% males, of which 87% had a university degree (bachelor or higher), and about 1/3rd held a lower/junior (32.8%), middle/senior (36.4%), or higher (24.9%) position.

Procedure and Design

A field-based randomized experimental study (i.e., resume-screening experiment over the internet) was conducted. Participants received an email with an url and personal code that asked for participation in a study on the development of a tool aimed to train/assess recruiters' competencies (see Derous et al., 2015, for a similar approach). To mask the study purpose to a further extent and to reduce potential item priming, we also included several filler items (Podsakoff et al., 2003).

After having completed the informed consent form, participants read a job description for a 'project manager' (i.e., age-neutral as pilot tested; Perry, 1994). Subsequently, participants read and evaluated four resumes (i.e., equally qualified, see 'Development of study materials and pilot studies'). Specifically, we conducted a 2 (Date of birth: absent vs. present) by [2 (Name: young vs. old-sounding) by 2 (Extracurricular activities: modern vs. old-fashioned)] mixed factorial design. Date of birth (i.e., explicit cue about applicants' chronological age) was the between-subjects factor, with chronologically younger applicants born in 1987 and older applicants in 1959. The younger applicants were 26 years' old (born in 1987) whereas the chronologically older applicants were 54 years' old (born in 1959) at the moment of the data collection. These birth years were selected because previous studies showed more age discrimination for people over 30, and especially when being over 50 (Albert et al., 2011; Ahmed et al., 2012; Richardson et al., 2013). Name and Extracurricular activities (i.e., implicit age cues) were the within-subjects factors. We paired the explicit age cue with the corresponding (young vs. old-sounding) name on the job applicants' resumes to avoid unrealistic combinations (Christopher, 1998). Job applicants' sex was kept constant (male applicants only[3]), and applicants' resumes were counterbalanced to avoid order effects. The dependent variable was job suitability (or hirability rating; see 'Measures'). After the resume-sifting task, participants completed a filler task, consisting of several distractor items (e.g., asking how they screen applicants). As part of this filler task, we also asked participants to indicate applicants' age based on names and affiliations (i.e., *manipulation checks*). In the end, participants were asked to fill-out an 'opinion survey' that included measures of old-age stereotypes[4], social desirability,

[3]Only male applicants were considered because men participate more in the labor market where this study was conducted than women and because of the need to remove gender as a potentially confounding factor in the design (Sidanius and Veniegas, 2000; OECD, 2015).

[4]We administered the 'Beliefs About Older Workers Scale' (Hassell and Perrewe, 1995). Because confirmatory factor analysis with maximum likelihood estimation (Lisrel v. 9.2) showed a bad fit for a one-factor model (i.e., meaning that the scale was not unidimensional as suggested by the authors), we did not consider

and participants' demographics. We ended the study with an open-ended probe to ask for any suspicion regarding the study purpose. After data were collected, participants were debriefed.

Development of Study Materials and Pilot Studies

Prior to the main study, study materials (i.e., advertisement and resumes) were developed and a series of pilot studies (N_{total} = 183) were conducted to ensure relevance and equivalence of study materials. (see Supplementary Material for a more detailed description).

First, 25 jobs were selected to evaluate whether these jobs were equally accessible for older and younger workers. Given that there is evidence for the effect of job-related age stereotypes on hiring outcomes (Perry, 1994; Abrams et al., 2016), we aimed to select an age-neutral job. Results of *Pilot Study 1* ($n = 47$, $M_{age} = 27.39$, $SD_{age} = 5.1$, 68% males) showed that the job of 'project manager' was perceived as equally accessible for younger and older workers and therefore selected for this study.

Second, implicit age cues were developed and pilot tested. Applicant names were selected based on the annual statistical reports of the local government and onomastics that indicate the popularity of first names in the geographical area where this study was conducted. We also selected 24 extracurricular activities. Based on the results of *Pilot Study 2* (n = 60, M_{age} = 27.86, SD_{age} = 7.51; 73% males), we selected 'Fons' and 'Frans' as names of older people and 'Jens' and 'Niels' as names of younger people. We further selected old-fashioned extracurricular activities (i.e., being a member of a bridge club; being a pigeon/finches fancier; being a walking club member) and extracurricular activities that are seen as modern/typically performed by younger people (i.e., being a member of boy scouts; being a snowboarder; being a life board crew member/rescuer).

Third, we listed all other information needed for the resume template (i.e., educational degree/level, work experiences, language, IT proficiency, home address) based on actual resumes posted on job search websites in the area of interest (note that identifying information was deleted). We had to make sure this information to be relevant, age neutral, and equivalent across resumes (as in the case of work experiences) and had to keep this resume information constant (as in the case of language, IT proficiency, home address/neighborhood). Based on *Pilot Study 3* ($n = 76$, $M_{age} = 25.91$, $SD_{age} = 9.8$, 65.4% males), we therefore selected a 'Master of Science degree in economics' (relevant as pilot tested) and four work experiences (equivalent as pilot tested). Finally, we held language (English, French, German, and Dutch) and IT proficiency (SAP, MS office, team foundation server) constant as well as applicants' neighborhood (middle class).

Based on the results of the pilot studies, we then integrated all information to create the final resumes. In sum, the resume template included information about the applicant's name (old-sounding vs. young-sounding first names as pilot tested), sex (male), date of birth (born in 1987 vs. 1959), home address (middle-class area), relevant educational background and level (Master of Science degree in economics as pilot tested), relevant work experiences (without any indication of the number of years of professional/work experience and considered equivalent across resumes as pilot tested), language and IT proficiency (held constant), and extracurricular activities (modern vs. old-fashioned activities as pilot tested).

recruiters' beliefs about older workers in any further analyses (see also Discussion section).

Measures

After participants observed the job ad and the four resumes, they responded to questions using a 5-point Likert-type response scale (unless otherwise mentioned). *Job suitability* was measured with a 4-item measure adapted from Derous et al. (2009). An example item is "Given all information you read about this applicant, how suitable do you believe this applicant is for this function?" (1 = *not suitable at all* to 5 = *very suitable*). Cronbach's alpha for the four resumes ranged from 0.91 to 0.93 (see **Table 1**). Second, to check *manipulations,* participants rated applicants' perceived age based on the job applicant's name and extracurricular activities using the following, self-constructed item: "With what age do you associate [extracurricular activities] or [name of applicant as appearing on the resume]" (1 = *very young* to 5 = *very old*). Third, to control for *social desirable responding*, eight items were adapted from the Impression Management Scale (BIDR, Paulhus, 1991). An example item is: "When I hear people talking privately, I avoid listening" (1 = *strongly disagree* to 5 = *strongly agree*). Cronbach's alpha was 0.70. Finally, participants indicated *demographics* including their chronological age (*open answer*), their sex (0 = *female*; 1 = *male*), educational level (1 = *college*; 2 = *university*), job level (1 = *lower*, 2 = *middle*, 3 = *higher level*) as well as recruiting experience. Recruiting experience was measured with one self-constructed item, namely "How much time do you spend on recruiting activities on a daily base?" (1 = *1–30%* to 4 = *70–100%*).

RESULTS

Preliminary Analyses

Before testing the hypotheses, preliminary analyses were conducted to check model assumptions, randomization, manipulations, intercorrelations and potential covariate variables. *First,* we tested assumptions of normality and homogeneity of variances, which were met for each of the applicant resumes. Inspection of the PP-plots, skewness and kurtosis showed that distributions were approximately normal, so that there is support for the assumption of normality. (Since the repeated measure variables only had two levels, assumption of sphericity was not tested.). Levene's test further showed that homogeneity of variances was met for all repeated measures. *Second*, female and male applicants were equally distributed across conditions, $\chi^2(1,610) = 0.22$, $p = 0.64$, and experimental conditions did not differ from each other in participant age, $F(1,608) = 0.15$, $p = 0.70$, participants' educational level, $\chi^2(1,610) = 0.74$, $p = 0.39$, job level, $\chi^2(2,574) = 0.32$, $p = 0.85$, and recruiting experience, $\chi^2(3,610) = 4.19$, $p = 0.24$, supporting the assumption of randomization.

TABLE 1 | Descriptives, reliabilities and correlations among study variables.

		M	*SD*	1	2	3	4	5	6	7	8	9	10
(1)	Job suitability 'Jens'[a]	3.79	0.67	(0.92)									
(2)	Job suitability 'Frans'[b]	3.54	0.71	0.361**	(0.91)								
(3)	Job suitability 'Niels'[c]	3.21	0.76	0.461**	0.307**	(0.93)							
(4)	Job suitability 'Fons'[d]	3.32	0.70	0.310**	0.328**	0.395**	(0.91)						
(5)	Social desirability	3.73	0.55	0.069	−0.006	−0.011	0.010	(0.70)					
(6)	Chronological age[e]	41.15	11.3	0.066	−0.099*	−0.089*	−0.111**	0.114**	–				
(7)	Recruiting experience[f]	1.37	0.83	−0.031	0.078	0.094*	0.088*	−0.015	−0.359**	–			
(8)	Gender[g]	0.51	0.50	−0.033	−0.084*	−0.147**	−0.086*	−0.085*	0.333**	−0.275**	–		
(9)	Educational level[h]	1.87	0.33	0.058	−0.043	0.021	−0.050	0.031	−0.063	0.063	−0.097*	–	
(10)	Job level[i]	1.92	0.77	0.008	−0.070	−0.025	−0.042	0.095*	0.270**	−0.174**	0.288**	0.015	-

Note. Cronbach's alpha are on the diagonal. [a]*'Jens': Resume with young-sounding name and modern extracurricular activities;* [b]*'Frans': resume with old-sounding name and modern extracurricular activities;* [c]*'Niels': resume with young-sounding name and old-fashioned extracurricular activities;* [d]*'Fons': resume with old-sounding name and old-fashioned extracurricular activities.* [e]*Chronological age of the participants.* [f]*Only participants who actually recruited applicants were included in the final sample (N = 610); recruiting experiences were coded as: 1 = less than or about 30% recruiting activities per day, 2 = 30–50% recruiting activities per day; 3 = 50–70% recruiting activities per day; 4 = 70% or more recruiting activities per day.* [g]*Gender: 0 = female; 1 = male.* [h]*Educational level: 1 = college, 2 = university.* [i]*Job level: 1 = lower, 2 = middle, 3 = higher. * $p < 0.05$, ** $p < 0.01$.*

Third, manipulation checks were successful: Young-sounding names were perceived as significantly younger ($M = 2.07$; $SD = 0.47$) than old-sounding names ($M = 4.00$; $SD = 0.47$), $t(609) = 59.82$, $p = 0.00$. Old-fashioned activities were perceived as significantly older ($M = 4.09$; $SD = 0.52$) than modern activities ($M = 1.96$; $SD = 0.46$), $t(609) = -64.64$, $p = 0.00$.

Fourth, inspection of the correlation table (see **Table 1**) indicated that correlations were not overly strong and in line with what could be expected (e.g., no relation between job suitability ratings of any of the applicant profiles on the one hand and social desirable responding, educational level, and job level on the other hand). Finally, as literature suggests that recruiters' gender and recruiting experience might affect resume evaluations (e.g., Cole et al., 2003, 2007; Waung et al., 2015), we also checked whether participants' gender and recruiting experience needed to be controlled for in the main analyses (Bernerth and Aguinis, 2016). Gender and resume screening experience related significantly to the job suitability ratings of some of the applicant profiles/resumes. However, because further analyses showed that homogeneity of regressions was not supported, participants' gender and recruiting experience did not appear to be good covariates and therefore were not included in the final analyses[5] (Weinfurt, 1995; Tabachnick and Fidell, 2007).

Testing of Hypotheses and Research Question

Table 1 presents descriptives, reliabilities, and correlations among study variables. Hypotheses were tested with a series of mixed analyses of covariances and simple effects analyses, given the experimental set-up and nature of this study (see Derous et al., 2015, for a similar approach). Hypothesis 1 investigated whether applicant resumes with old-sounding names (Hypothesis 1a) and old-fashioned activities (Hypothesis 1b) would receive lower job suitability ratings than those from equally qualified applicants with young implicit age cues (i.e., young-sounding names; modern activities) in their resumes. Job suitability was lower for resumes with old-sounding names than young-sounding names, $F(1,608) = 9.32$, $p < 0.01$, $\eta^2 = 0.02$, and old-fashioned activities than modern activities, $F(1,608) = 278.91$, $p < 0.001$, $\eta^2 = 0.31$, thereby supporting effects of implicit age cues (Hypotheses 1a and 1b were supported). Interestingly, results further showed that job suitability was lowest when the explicit age cue (i.e., date of birth) was *omitted* from resumes, $F(1,608) = 5.32$, $p = 0.02$, $\eta^2 = 0.02$ (see **Table 2**).

TABLE 2 | Results of mixed analyses of variance for job suitability.

Source	*df*	*F*	*p*	η^2
Between subjects				
Date of birth (A)	1	5.32	0.02	0.02
Error (A)	608	(0.26)		
Within subjects				
Name (B)	1	9.32	0.00	0.02
Date of birth (A) × Name (B)	1	0.56	0.45	0.00
Error (B)	608	(0.36)		
Activities (C)	1	278.91	0.00	0.31
Date of birth (A) × Activities (C)	1	0.69	0.41	0.00
Error (C)	608	(0.34)		
Name (B) × Activities (C)	1	73.72	0.00	0.11
Date of birth (A) × Name (B) × Activities (C)	1	0.53	0.47	0.00
Error (B × C)	608	(0.27)		

Note. The between-subjects factor refers to the explicit age cue (date of birth: absent vs. present) whereas the within-subjects factors refer to the implicit age cues (name/extracurricular activities: old vs. young) on resumes. The pattern of results remained the same when participants' recruiting experience and gender were controlled for.

Hypothesis 2 further investigated whether resumes with more implicit cues referring to older age would receive lower job suitability ratings than those with less implicit cues referring

[5]Additional analyses in which participants' gender and recruiting experience were included did not result in different effects than when gender and recruiting experience were not included (see Results section).

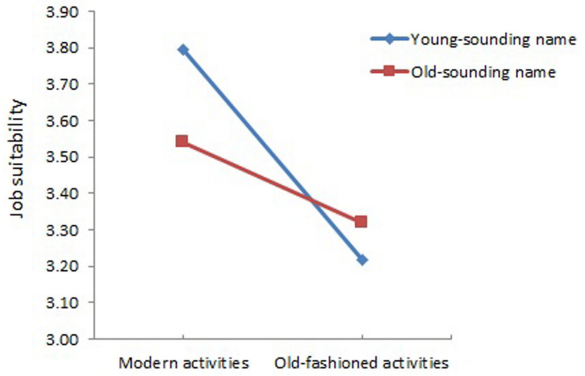

FIGURE 1 | Interaction of implicit age cues (names; extracurricular activities) in resumes on job suitability ratings.

FIGURE 2 | Moderating effects of recruiters' chronological age and implicit age cues (names; extracurricular activities) on job suitability ratings.

to older age. A significant two-way interaction was found for implicit age cues (Name × Extracurricular activities), $F(1,608) = 73.72$, $p < 0.001$, $\eta^2 = 0.11$, and this effect did not depend on explicit age cues, $F(1,608) = 0.53$, $p = 0.47$, $\eta^2 = 0.00$. Simple effects analyses (i.e., to break down the interaction term) further showed significant effects of each of the repeated measures variable (i.e., name or activities) at levels of the other repeated measures variable (i.e., activities or name, respectively) with $p = 0.00$ (in all cases). Inspection of simple effects and **Figure 1** showed that the resume with both a young-sounding name and modern activities received the highest ratings, followed by the resume with an old-sounding name/modern activities, and the resume with an old-sounding name/old-fashioned activities. The resume with an old-sounding name and old-fashioned activities was rated significantly *higher* than the one with a young-sounding name and old-fashioned activities (**Table 2** and **Figure 1**). Hypothesis 2, therefore, was partially supported.

Finally, we formulated a research question to explore potential effects of recruiters' chronological age. Specifically, we questioned whether resumes with more implicit cues referring to the applicant's older age would receive higher job suitability ratings when recruiters were chronologically older, or whether applicant resumes with more implicit cues referring to the applicant's older age would receive equally low job suitability ratings from both older and younger recruiters? Results showed that participants' chronological age moderated effects of implicit age cues (i.e., name and activities) on applicants' job suitability ratings, $F(1,607) = 6.07$, $p = 0.014$, $\eta^2 = 0.01$. The test of within-subjects effects further showed that chronologically older participants gave lower scores to resumes of applicants with old-sounding names, whereas no differences were found for resumes of applicants with young-sounding names, $F(1,607) = 6.73$, $p = 0.01$, $\eta^2 = 0.01$. In a similar vein, chronologically older participants gave lower scores to resumes of applicants with old-fashioned activities, whereas no differences were found for resumes of applicants with modern activities, $F(1,607) = 6.31$, $p = 0.01$, $\eta^2 = 0.01$ (see **Figure 2**).

DISCUSSION

Intrigued by the ongoing debate about the usefulness of anonymous resume screening in many Western societies (e.g., Behaghel et al., 2015; Maurer, 2016), coupled with limited studies that considered AAP effectiveness and subtle mechanisms in hiring discrimination, this study investigated whether omitting explicit age cues (like date of birth) might be beneficial to older applicants or whether more implicit/subtle age cues in resumes may still affect older job applicants' hirability ratings. Further, because research in personnel recruitment and selection has often failed to consider differences in raters' tendencies to differentiate among applicants (e.g., Fasbender and Wang, 2017), we investigated raters' chronological age as a potential moderator.

Overall Findings

Antidiscrimination legislation and diversity policies typically focus on the impact of explicit age markers on resumes. Unfortunately, the *implicit age cues* on hiring decisions may pass somewhat unnoticed. Building on the principles of job market signaling theory, we found support for the assumption that recruiters make inferences about applicants' age based on implicit (i.e., 'hard-to-fake' and 'hard-to-resist') cues in resumes (i.e., applicant first names; extracurricular activities), even in the absence of explicit age cues. Specifically, resumes with both a young-sounding name and modern activities received the highest job suitability ratings, followed by resumes with an old-sounding name/modern activities, and resumes with an old-sounding name/old-fashioned activities. This provides support for so-called 'within-category' effects (i.e., Kaiser and Pratt-Hyatt, 2009): Resumes with more implicit cues referring to older age received lower job suitability ratings than less strongly 'old-age' identified resumes or those from presumably younger applicants.

Remarkably and somewhat unexpectedly, resumes with a young-sounding name and old-fashioned activities received the lowest job suitability ratings. Because this resume might not have matched the 'prototypical' image of young applicants, recruiters might have rated this applicant lowest in overall suitability due to attributional discounting (Kelley, 1973). Indeed, as young applicants are expected to engage rather in modern activities than old-fashioned

activities, young applicants (as perceived on the basis of their young-sounding name) who do not do so might have disconfirmed and discounted the dominant young age stereotypes.

Furthermore, omitting *explicit age cues* led to overall lower job suitability ratings. In many Western European societies (as where this study was conducted) it is good practice to indicate date of birth on one's resume. Not doing so might deviate from the social norm and result in overall lower ratings. Alternatively, implicit age cues might have subtle though stronger effects in the absence of explicit age cues, given that they are hard-to-fake by applicants and hard-to-resist by raters. Moreover, some resume information (like unexplained interruptions in one's work history) might not be understood properly when recruiters do not know the applicant's socio-demographic background (like age). Although this was not the case in the present study design (and no significant interaction of the implicit age cues with the explicit age cue was found, either), it has been suggested that anonymous resume screening might not be ideal when there are structural differences between majority-minority applicants (like disparate length of unemployment or educational attainment) as explicit age cues (like age) might also explain, contextualize, and alleviate any subgroup differences (Behaghel et al., 2015). The latter could be investigated to a further extent.

Finally, compared to applicant characteristics, *recruiter characteristics* have been investigated to a considerable lesser extent in hiring discrimination literature (Finkelstein and Burke, 1998); we explored HR professionals' chronological age to address this gap. First, individuals of different ages may differ in their attitudes toward older adults (Gordon and Arvey, 2004). Indeed, and although effects were small, older participants compared to younger participants gave somewhat lower job suitability scores to older applicants than to younger applicants. Interestingly, this finding does not support in-group favoritism which predicts participants *to prefer* rather than to disfavor in-group members. According to Levy and Banaji (2002), the psychologically permeable nature of boundaries between age groups might allow one to dissociate from his/her own age group. This finding further seems to fit evolutionary theories on (implicit) ageism, that explain bias against older persons as a function of mortality salience, and – at the individual level- as one's fear of aging and a way to avoid psychologically and physically weak and parasitized individuals to protect one's own ego and sense of self-esteem (Martens et al., 2005; Marcus and Sabuncu, 2016). Alternatively, findings also remind of the 'black sheep effect' (Marques et al., 1988; Brewer, 2007): Older recruiters may reject in-group members as a self-enhancement strategy (i.e., positive distinctiveness) or as a manner of securing one's position in an organization (i.e., optimal distinctiveness). Finkelstein and Burke (1998) found similar results on in-group bias. However, they used the availability heuristic to explain why older raters disfavored older applicants when applicants' age was highly salient and when the raters identified with their age groups. Specifically, older HR professionals might be more aware of potential risks when hiring peers (e.g., negative attributes, more expensive, early retirement intentions; Kite et al., 2005; Rau and Adams, 2014). Younger generations of workers, on the other hand, may grow-up in a climate where discrimination issues receive much more attention than previously was the case, which may make younger HR professionals somewhat more cautious about age-related bias.

One might also consider other recruiter characteristics than chronological age, like recruiters' old-age stereotypes. Old-age stereotypes typically include views that older people are less productive, economically beneficial, competent, creative, flexible, and harder to train (Finkelstein and Burke, 1998; Kulik et al., 2000; Fiske et al., 2002). However, old-age stereotypes are not unequivocal negative in nature (Fiske et al., 2002). Finkelstein et al. (2013), for instance, revealed a balanced view of older workers' stereotypes, with many positive older-worker stereotypes (e.g., well-mannered, strong work ethic, and reliable). Hence, old-age stereotypes may affect hiring decisions in a complex way (Krings et al., 2011). Yet, few studies considered recruiters' old-age stereotypes as potential moderators of hiring decisions (Krings et al., 2011; Lu et al., 2011; Fasbender and Wang, 2017). Research might therefore include validated measures of old-age stereotypes (like the Work-related Age-based Stereotypes scale; Marcus et al., 2016). Also more implicit measures of old-age stereotypes might be particularly interesting when one aims to investigate effects of implicit older-age cues on resumes (like the Implicit Association Test; see Levy and Banaji, 2002; Axt et al., 2014).

In sum, this paper explored one recruiter characteristic that might contribute to implicit old-age bias in the context of resume screening, namely recruiters' own chronological age. No evidence was found for in-group favoritism, which is in line with previous findings on implicit age attitudes (Axt et al., 2014). Older-age bias seems a pressing and complex issue. Yet, as illustrated, and with the exception of a few studies (e.g., Marcus and Sabuncu, 2016; Fasbender and Wang, 2017), its psychological roots are still less well understood, particularly as regards implicit age bias, and therefore in need for further investigation.

Limitations and Further Research Opportunities

As with any study, limitations need to be mentioned. First, we used a hypothetical job with job applicants in the form of 'paper' people (Landy, 2008). Yet, in an early phase of the application procedure, real applicants *are* 'paper' people as the only information we have is the information applicants provide on their resume. Moreover, in preliminary screening situations, individuating information about applicants is still limited, therefore, the use of paper people/resumes is ecologically valid in this setting (Copus, 2005).

Second, in our study we employed a mixed-factorial design with implicit age cues as within-subjects factors, which is more realistic than using them in a between-subjects manner (i.e., as this is what recruiters do, namely comparing applicants' resumes to each other), but which has also been criticized for its potential to inflate hiring discrimination scores (e.g., Bal et al., 2011). A meta-analysis on age bias in evaluations (i.e., hiring, promotion, and performance appraisal) by Gordon and Arvey (2004), however, showed higher mean *d*'s for

between-subjects designs than for within-subjects designs. Nevertheless, given that age may become more salient if operationalized in a within-subjects manner, follow-up studies may use between-subjects designs to further investigate implicit age effects.

Third, scenario-based studies can also be criticized on the ground of their lower external validity, but serve other purposes than field studies (like correspondence audit tests) as they may be conducted in a more controlled way and may test contingencies surrounding discriminatory decisions in hiring. Future studies, however, could investigate more and other moderators related to the applicant (like gender; Sidanius and Veniegas, 2000), the job (like type of job, differences in responsibility, and decision-making power; Abrams et al., 2016), and the recruiter (like prejudices and other individual difference variables of relevance; see Self et al., 2015; Fasbender and Wang, 2017). For instance, Brtek and Motowidlo (2002) and Self et al. (2015) showed that recruiters' accountability might affect discriminatory decision-making, with some types of accountability (like identity-blind accountability) leading to less bias and more objective decision-making than other types of accountability (like identity-conscious accountability). In our scenario-based study, accountability was not primed in any way and participants were randomized over conditions. Therefore, we believe accountability may not have played a large role in affecting findings. Further research on implicit age effects, however, might either control for types of rater accountability or might look at potential effects of recruiters' accountability on implicit age effects (e.g., by priming accountability). Further, despite our initial attempt to consider both recruiters' chronological age and older worker stereotypes as potential moderators of implicit age effects, we refrained from further investigating and reporting effects of raters' older-age stereotypes because of the suboptimal psychometric properties of the 'Beliefs About Older Workers' scale (Hassell and Perrewe, 1995) in our sample. Researchers interested in investigating moderating effects of recruiters' older worker stereotypes may use more recently developed and validated scales such as, for instance, the 'Beliefs about Older Workers' Ability and Desire for Learning and Development' scale (Maurer et al., 2008) or the 'Work-related Age-based Stereotypes' scale (Marcus et al., 2016).

Fourth, we distinguish explicit from implicit age cues. Whether cues are rather 'implicit' or 'explicit' may depend on the nature of the (protected) group status under consideration. For instance, applicants' names may signal in a rather explicit, direct way one's ethnic group membership (e.g., Mohammed vs. Mark), but in a rather implicit, indirect manner one's age. Furthermore, according to signaling theory, implicit age cues are more 'hard-to-fake' (or 'honest'). However, one could argue that both names and extracurricular activities are 'fakeable' to some extent. This would be the case when applicants are aware of the particular cues and associations they communicate through affiliations/names (Bangerter et al., 2012).

Another potential study limitation to our field-based, randomized experimental study may be non-response bias. About half of the HR professionals we emailed the study link also participated in this study, which is considerable. Yet, as the likelihood of non-response bias is inversely related to the response rate, this also means that about 50% of respondents did not participate in the study for some or another reason. Non-response bias may be a threat to the external validity of an experimental study if non-respondents' profiles and answers differ substantially from the profiles and answers of those who did respond to the study (Stone-Romero, 2002). We were not able to log personal information of non-respondents, nor were we able to register reasons of non-response. Given that participants were randomly assigned to the experimental conditions, one might expect non-response also to be random. Yet, whether non-response is random should be investigated empirically. Therefore, further research should take this potential limitation into account, for instance, by finding ways to examine reasons for non-response and by controlling for non-respondents' demographic attributes.

Finally, this study was conducted in a Western European country. Whereas there seems little evidence of a connection between cultural practices and recruitment and selection practices (see Ryan et al., 2017 for a recent review), cross-cultural differences could exist in the interpretation of age-related cues and attitudes toward older workers (e.g., North and Fiske, 2015), which was not considered here and may warrant further investigation.

Theoretical and Practical Implications

Our study aimed to extend work on age bias in resume screening in several ways. First, although the Nobel Prize winning paper of Spence (1973) included hiring as an example (Bangerter et al., 2012), relatively little research has applied Spence's job market signaling theory to (age-based) discrimination in recruitment and more particularly to the act of resume screening. Studies that applied job market signaling theory in recruitment typically considered how applicants interpret unobservable characteristics from signals sent by employers/recruiters through recruitment devices (like job advertisements; see Carter and Highhouse, 2014). Recruitment, however, is a two-way process in which applicants also send signals or cues upon which recruiters/employers may make hiring decisions, which we considered here. Second, research suggests that bias has become more subtle (Rosette et al., 2016), but few studies have measured this in the context of early screening and resume screening in particular, which we did. Hence, with our study, we extend applications of job market signaling theory in recruitment by considering how employers/recruiters may interpret age-related information from subtle cues in job applicants' resumes. Third, studies that did consider recruiters' inferences and indirect speech acts mainly focused on applicants' qualifications including personality inferences (Cole et al., 2007; Aguinis et al., 2005; Burns et al., 2014; Apers and Derous, 2017) but not on social group status, which we investigated and -to the best of our knowledge- has not been considered much. Finally, given the widespread use of resume screening there is a growing interest in studying age effects in this screening stage. Although job applicants' age shows no validity for predicting future job performance (Schmidt et al., 2016), age discrimination seems substantial as evidenced by a large number of recently conducted

correspondence audit studies. Correspondence audits offer a great amount of control and are a very powerful tool to detect labor market discrimination but fail to examine unobserved factors, such as recruiter characteristics. Our study adds to the literature on age discrimination in hiring that just began to investigate contingencies in recruiters (see for another example: Fasbender and Wang, 2017).

Findings might also be relevant to practitioners. When more individuating information about candidates becomes available in later stages of the screening procedure (such as in the job interview or assessment centers), category-based biases might have less of a chance to color decisions; however, this suggests the critical importance of ensuring a lack of discrimination at the earliest stage of resume screening. Anonymous resume sifting may be one tool to level the playing field, but is much debated by HR professionals and society at large (Maurer, 2016; Hiscox et al., 2017). Indeed, anonymous resume screening might be much more complex than it appears at first glance and our results bear that out. First, omitting explicit cues to one's chronological age (like one's date of birth) led to overall lower job suitability ratings, and this might have to do with codes of conduct (i.e., what recruiters deem appropriate to be mentioned in resumes). However, it has also been suggested that explicit age cues in resumes might help recruiters understand to a better extent some other, potentially stigmatizing resume information (Behaghel et al., 2015) and -hence- make recruiters even more attentive/sensitive to ageism, which could paradoxically *counter* age-related bias. Finally, blind screening is at odds with targeted recruitment initiatives if one aims to hire for more diversity (Newman and Lyon, 2009).

Whereas names are considered as identifying information and –hence- blotted in anonymous resume screening, extracurricular activities are typically not blotted. Yet, HR professionals still made age inferences based on implicit age cues like extracurricular activities. This raises the question whether one needs to entirely eliminate resumes or whether structured sifting processes with competency and experience checklists should be considered instead of blotting personal information? For instance, some consider resumes to be 'dead' and have moved to requiring anonymous work samples from applicants (Feintzeig, 2016), which seems promising given the fact that work samples mirror relevant future work behavior (Joseph, 2016). Despite this promising approach, applicants' socio-demographic group characteristics (such as age) will always become apparent at later stages of the hiring procedure. Therefore, any effect of (partially) blind recruiting might be nullified if such procedures do not safeguard against hiring bias in later assessment stages, too.

Given these findings, as well as older raters' slight tendency to in-group bias, organizations may deploy a mix of strategies to minimize ageism in hiring. Aside from screening and training recruiters for diversity (e.g., in how to deal with/interpret explicit and implicit stigmatizing cues in resume information), team-based hiring consisting of a mixed age group of raters (e.g., both older and younger recruiters) might counter age bias in screening too. Furthermore, both initiatives may signal to job seekers that the organization is committed to diversifying the workforce, at least as regards age (Barber, 1998), thereby also affecting the overall organizational image positively.

Conclusion

For a better understanding and averting hiring discrimination, one needs to move beyond prevalence studies and investigate determinants of hiring discrimination. Results of an experimental study among HR professionals showed hiring discrimination of older applicants based on implicit age cues in resumes and may help understand mixed effects of anonymous resume screening initiatives. Such findings may help organizational decision makers to understand the complexity of fair hiring and the effectiveness of interventions in order to limit age discrimination upon organizational entry.

AUTHOR CONTRIBUTIONS

ED designed, coordinated, helped collecting the data, and wrote the study/paper. JD supervised research assistants and collected data.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: http://journal.frontiersin.org/article/10.3389/fpsyg.2017.01321/full#supplementary-material

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Negative Attitudes toward Older Workers and Hiring Decisions: Testing the Moderating Role of Decision Makers' Core Self-Evaluations

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Organizational hiring practices have been charged for unfair treatment on the grounds of age. Drawing on theories of planned behavior and core self-evaluations, this research investigated the impact of negative attitudes toward older workers on hiring decisions and examined the moderating role of decision-makers' core self-evaluations. We tested our hypotheses based on a structured online questionnaire and a vignette study using a sample of 102 participants working in human resource management across different industries. As predicted, negative attitudes toward older workers were positively related to avoidance of hiring older people, which in turn was negatively related to the likelihood to select the oldest candidate. Because hiring decisions are not only about the hiring subject but also about the decision-maker, we tested the moderating role of decision-makers' core self-evaluations. Results showed that core self-evaluations buffered the relationship between negative attitudes toward older workers and avoidance of hiring older people. Theoretical implications of the findings with regard to hiring decisions about older people and practical recommendations to improve diversity management strategies and age-balanced hiring practices in organizations are discussed.

Keywords: core self-evaluations, avoidance tendencies, hiring decisions, negative attitudes toward older workers, selection likelihood, hiring bias

INTRODUCTION

Although age discrimination is against the law in many industrialized countries (Lahey, 2010), it is still a common phenomenon in hiring. A recent meta-analysis on age and reemployment success after job loss by Wanberg et al. (2016) revealed that older people receive fewer offers ($\rho = -0.11$), are less likely to obtain reemployment after job loss ($\rho = -0.15$), and take longer to

find reemployment (reemployment speed: $\rho = -0.17$). In particular, people over the age of 50 suffer from longer unemployment periods. Organizational hiring practices have often been challenged for unfair treatment on the grounds of age (Truxillo et al., 2015). Although many older people wish to work until an older age (Wöhrmann et al., 2016), they may be denied the opportunity due to relevant decision-makers' negative attitudes toward older workers. There is a substantial amount of research showing that older people face disadvantages in applying for jobs. In fact, existing field experiments based on correspondence testing almost always showed substantial age discrimination in hiring processes (e.g., Gringart and Helmes, 2001; Riach and Rich, 2010; Albert et al., 2011; Neumark et al., 2016).

Drawing on the theory of planned behavior (Ajzen, 1991), one explanation for the unfair treatment of older applicants is that negative attitudes toward older workers reign within organizations and lead to discrimination against them (Shore and Goldberg, 2005). Thus, age-related negative attitudes are thought to underlie discriminatory behaviors such as lower hiring rates for equally qualified older (vs. younger) job applicants. Despite their centrality for explaining age discrimination, they have not yet received much attention in organizational research on age bias in hiring (Shore and Goldberg, 2005; Finkelstein and Farrell, 2007; Finkelstein et al., 2015). There are numerous studies that investigated the existence of negative attitudes toward older workers (for review see for example Posthuma and Campion, 2009) but only few studies show their direct link to hiring decisions and the underlying mechanisms. For example, a field study by Lu et al. (2011) showed that positive attitudes toward older workers were positively related to mangers' intentions to hire older people. Further, experimental research by Krings et al. (2011) revealed that participants, who had more favorable attitudes toward older workers (i.e., high competence) were more likely to suggest an older applicant for a job interview. However, these studies neglect the role that decision-makers' self-concept plays during the hiring process.

Taking this into account, we argue that decision-makers' core self-evaluations – defined as a fundamental, bottom-line assessment of one's ability, merit and efficacy (Judge et al., 2003) – is a positive self-concept and can buffer the impact of negative attitudes toward older workers on decision-makers' avoidance tendencies, which in turn can determine their actual hiring decisions. Although the idea that decision-makers' self-concept and social identity can jointly influence hiring decisions has been highlighted before (Lewis and Sherman, 2003), no study has examined how core self-evaluations may interfere the relationship between negative attitudes toward older workers and avoidance of hiring older people.

To address this research gap, we investigate negative attitudes toward older workers in hiring decisions and examine the moderating role of core self-evaluations. In particular, we make two contributions to the literature. First, we explore the process of age discrimination in hiring by disentangling discriminatory attitudes, intentions, and behavior. In particular, we reveal avoidance tendencies as a mediator between negative attitudes toward older workers and hiring decisions. Second, we test the moderating role of decision-makers' core self-evaluations in buffering the negative impact of age-related negative attitudes in the workplace. As most research demonstrates the problem of discriminatory behavior rather than to facilitate its prevention, identifying potential moderators is essential in challenging age discrimination in hiring. As a result, our study has important implications to organizational practice in terms of training and development of decision-makers with regard to their self-concept.

Theoretical Background

Hiring Decisions about Older People

Because chances of being hired are lower for older people, researchers have been searching for potential factors and circumstances to counter disadvantages that older people have to face in hiring. Previous research has mainly investigated environmental circumstances influencing employers' hiring decisions about older people (Earl et al., 2015). As such, scholars have indicated that experienced difficulties in recruiting or labor shortages in general are likely to facilitate hiring older people (Taylor et al., 2013). On the other hand, high cost pressure is likely to lower older people's hiring chances as that has been found to lower the probabilities for older workers to receive training and development (e.g., Erber and Danker, 1995; Loretto and White, 2006). Also, legal approaches (i.e., stronger age discrimination laws at the state level) aiming at improving equal opportunities for younger and older people have been found to be rather dysfunctional for older people in times of low labor demands (i.e., economic recession) (Neumark and Button, 2014). Therefore, research needs to continue its search for relevant factors underlying hiring decisions about older people. In the current study, we investigate negative attitudes toward older workers in hiring decisions and highlight the moderating role of core self-evaluations. Based on the theory of planned behavior (Ajzen, 1991) and the core self-approach (Judge et al., 1997), we argue that hiring decisions are not only about finding the most suitable candidate for a certain job vacancy, but also about one's internal evaluation of the potential consequences of the hiring decision for one's self-concept.

Negative Attitudes toward Older Workers and Hiring Decisions

According to the theory of planned behavior (Ajzen, 1991), behavior (i.e., the hiring decision) is determined by intention (i.e., the hiring intention) as the most proximal predictor, which in turn is entirely influenced by attitudes, norms and perceived behavioral control toward the behavior. Ajzen's theory of planned behavior is a well-established conceptual framework that has been frequently used to explain hiring decisions about members of discriminated groups (e.g., Lu et al., 2011; Ang et al., 2015; Araten-Bergman, 2016). In particular, attitudes (i.e., negative attitudes toward older workers) have been highlighted as important mechanism to influence the decision-making process

of hiring older people (e.g., Posthuma and Campion, 2009; Truxillo et al., 2015).

In the hiring context, attitude reflects decision-makers' affective or cognitive evaluation of the hiring targets (e.g., older people). For example, one decision-maker may think older workers are harder to train for jobs; whereas another might believe older people are more dependable at work (Fasbender, 2016). Further, it is assumed that one's positive attitudes lead to approach, whereas one's negative attitudes lead to avoid certain behaviors, such as hiring older people. This notion is partly supported by Lu et al. (2011), who found that managers' positive attitudes toward older workers were positively related to their intention to hire older people as opposed to avoid hiring them. Avoidance of hiring older people can be conceptualized as the intention not to hire older people, which eventually leads to an actual decision of not hiring a particular older person. Meta-analytical findings reveal that negative attitudes are more powerful in predicting important behavioral outcomes then positive attitudes do (Meisner, 2012). We therefore propose that negative attitudes toward older workers are likely to increase decision-makers' avoidance tendencies of hiring older people. In turn, it is likely that avoidance tendencies result in actual behavior, such as selecting younger candidates instead of an equally qualified older candidate in the hiring situation. To sum up, our first two hypotheses read:

H1: Negative attitudes toward older workers are positively related to avoidance of hiring older people.

H2: Avoidance of hiring older people is negatively related to the likelihood of selecting the equally qualified oldest candidate in the hiring situation.

Having introduced avoidance tendencies as the underlying mechanism, we draw a link between negative attitudes toward older workers and selecting the oldest candidate in the hiring situation. Taking Hypotheses 1 and 2 together, we assume that there is a negative relationship between negative attitudes toward older workers and selection likelihood, which is expected to be mediated by avoidance of hiring older people. Previous research partly supports this notion. Early research by Perry et al. (1996) found that bias against older workers was related to lower evaluation of an older applicant among business students. Similarly, Krings et al. (2011) showed that biased beliefs about older workers led to age discrimination at selection among business students and also among HR professionals. These studies point at a negative relationship between negative attitudes toward older workers and selection likelihood. However, based on the theory of planned behavior (Ajzen, 1991), we argue that the hiring decision is not directly undertaken but intended prior to the actual decision. Thus, we propose an indirect effect of negative attitudes toward older workers and selection likelihood via avoidance of hiring older people.

H3: There is a negative relationship between negative attitudes toward older workers and the likelihood of selecting the equally qualified oldest candidate in the hiring situation, which is mediated by avoidance of hiring older people.

Core Self-Evaluations as Moderator

Core self-evaluations can be defined as a positive self-concept referring to basic conclusions that individuals hold about themselves (Judge and Bono, 2001). Initially, Judge et al. (1997) have introduced core self-evaluations as a superordinate construct capturing self-esteem, generalized self-efficacy, locus of control, and emotional stability traits. Based on Cattell's (1965) personality theory, these traits were identified following three important criteria: evaluation-focus, fundamentality, and scope. Of the four traits, self-esteem has been described as "the most fundamental manifestation of core self-evaluations as it represents the overall value that one places on oneself as a person" (Judge and Bono, 2001, p. 80). Further, generalized self-efficacy constitutes one's ability to perform, cope, and be successful; internal locus of control reflects the belief of being able to control a broad array of factors in one's live; and finally, high emotional stability (vs. low neuroticism) refers to being confident, secure and steady (Judge and Bono, 2001). Since its initial introduction, there has been a substantial amount of evidence supporting the construct validity of core self-evaluations (e.g., Judge et al., 2003; Gardner and Pierce, 2009; Stumpp et al., 2010). Besides, core self-evaluations have been found to be powerful in predicting a range of important work-related outcomes. Results of a meta-analysis by Chang et al. (2012) suggest that core self-evaluations hold positive relationships with job satisfaction ($\rho = 0.36$), goal commitment ($\rho = 0.42$), intrinsic motivation ($\rho = 0.33$), task performance ($\rho = 0.19$) and organizational citizenship behaviors ($\rho = 0.23$) but negative relationships with turnover intentions ($\rho = -0.26$) and counterproductive work behavior ($\rho = -0.17$).

Despite its importance for individuals' work-related outcomes, research has so far neglected the impact of core-self evaluations on others in the workplace. Particularly, it is unknown to what extent decision-makers' core self-evaluations are related to hiring older people. Addressing the decision-maker perspective, we argue that as people often derive some aspects of their self-concept from the groups they belong to (Tajfel and Turner, 1986), they are motivated to achieve self-enhancement and self-esteem by developing a positive distinctiveness between the ingroup and outgroup (i.e., the self-esteem hypothesis; Abrams and Hogg, 2010). As such, decision-making is influenced by people's motivation to maximize their positive self-concept. In order to maintain a positive self-concept, people are keen on seeing their ingroup members in the most favorable light possible, whereas outgroup members are perceived as a potential threat to one's self. Core self-evaluations can function as a source of self-protection against external threats (Judge et al., 1997). Therefore, the perceived threat from outgroup members in a hiring decision is likely to be higher for people with low core self-evaluations. In other words, people with low core self-evaluations are particularly vulnerable to discriminate against outgroup members in making hiring decisions when holding negative attitudes toward

them, whereas people with high core self-evaluations are less vulnerable.

Previous research has mainly addressed the impact of self-esteem on discriminatory behavior. A meta-analysis revealed that both low and high self-esteem individuals tend to hold ingroup bias (Aberson et al., 2000). There is also research showing that emotional stability may impact managers' hiring decisions about members of discriminated groups (i.e., comparing native and immigrant job candidates) (Horverak et al., 2013). Core self-evaluations as a superordinate construct consisting of self-esteem, self-efficacy, locus of control, and emotional stability can be regarded as the baseline for any self-categorization process. We therefore argue that decision-makers' core self-evaluations can buffer the impact of negative attitudes toward older workers on decision-makers' avoidance tendencies, which in turn determine their actual hiring decisions. To sum up, our fourth hypothesis reads:

H4: Core self-evaluations moderate the relationship between negative attitudes toward older workers and avoidance of hiring older people in a way that the positive relationship is weaker when core self-evaluations are high (vs. low).

MATERIALS AND METHODS

Design, Sample, and Procedure

We used a structured online questionnaire and a vignette study to collect the data. A vignette study was designed to understand to what extent the hiring decision may be influenced by applicants' age as a proxy for discriminatory behavior. Vignette methodology has been described as a systematic approach in achieving both internal and external validity (Aguinis and Bradley, 2014). In the current study, participants were given a job description for a managerial position vacancy for a fictitious company and were required to choose the best candidate based on their Curriculum Vitae (CV) for this vacancy. Three candidates' CVs were designed to indicate equivalent work experience in a series of pilot studies (see Materials and Piloting below), but the candidates' ages were varied (i.e., 38, 49, and 60 years). Participants were then asked to prioritize CVs for hiring. Whether the participant selected the 60-year old candidate for the vacancy constituted the dependent variable in this study.

Potential participants living in the United States were invited to take part using a professional research platform (i.e., Call For Participants), where they were offered gift voucher as compensation for their participation. As with other online crowdsourcing mechanisms (i.e., Amazon's Mechanical Turk), the data obtained can be regarded as reliable as the data collected via traditional methods (Buhrmester et al., 2011). Participants were included if they currently worked in human resource management and had hiring power on their jobs. In other words, our sample contains human resource managers dealing with hiring decisions on a daily basis. Also, we checked the amount of time that participants spent on the task and eliminated participants who spent very little time to complete the study in order to ensure sufficient data quality. In total, 165 participants completed the study across different industries ranging from industrial goods to technology, media and telecommunications. Of these, 51 participants were excluded because they reported to have no hiring power at work. Another 12 participants were excluded because they spent very little time to complete the study. Overall, the final sample consisted of 102 participants of which 64 (62.7%) were male and 87 (85.3%) held a higher education degree. Participants' ages ranged from 22 to 52 years, with a mean age of 36.10 years ($SD = 6.64$). Of the excluded participants, 35 (55.56%) were male and 48 (76.19%) held a higher education degree; the percentage of participants did not statistically differ from the percentage of participants in the final sample (sex: χ^2 [1, $N = 165$] = 0.84, $p = 0.36$; education: χ^2[1, $N = 165$] = 2.17, $p = 0.14$). Further, they were a bit younger compared to participants of the final sample [$t(163) = 2.93$, $p < 0.01$]; their ages ranged from 25 to 46 with a mean age of 33.19 years ($SD = 5.37$).

Materials and Piloting

Following the procedure of Derous et al. (2012), two pilot studies were conducted to ensure the equivalence of the templates used as study material. Three templates were designed so that work experience over the last 10 years shown on the CV corresponds to the job description used in the main study. The work experience was matched to the job description based on information available on common job search platforms (e.g., Indeed and Monster). *A priori* power analysis (calculated in G*Power) revealed a sample size of at least 42 participants to detect a small to medium effect ($f = 0.20$) for the one-way repeated measures Analysis of Variance (ANOVA) with a test power of 80%. Participants of the pilot samples were recruited via the same professional research platform (i.e., Call For Participants) used in the main study. The initial pilot sample of 50 participants evaluated the different templates presented according to the job description. Participants have been asked to evaluate the person-job fit with five items on a 7-point Likert-type scale (1 = *not at all* to 7 = *extremely*). One example item was: "Candidate [X] is qualified for this job." One-way repeated measures analysis of variance (ANOVA) revealed significant differences between the three templates [$F(1.71,83.83) = 6.54$, $p < 0.01$]. *Post hoc* tests were conducted to compare all pairs of templates. Results of pairwise *t*-tests showed that the templates were slightly different from each other as there were significant differences between one template with the other two [Template 2: $M = 6.01$, $SD = 0.70$ and Template 1: $M = 6.24$, $SD = 0.64$, $t(49) = 2.01$, $p < 0.05$; Templates 2 and 3: $M = 6.38$, $SD = 0.70$, $t(49) = -3.31$, $p < 0.01$]. Therefore, the templates were revised and tested for a second time. To revise the templates, the work experience presented was again carefully matched to the job description. Further, more attention was paid to small differences in language use. The second pilot sample consisted of 42 participants. This time, results of the one-way repeated measures ANOVA did not show significant differences between the templates [Template 1: $M = 6.03$, $SD = 0.72$; Template 2: $M = 6.02$, $SD = 0.83$; Template 3: $M = 6.03$, $SD = 0.87$,

TABLE 1 | Means, standard deviations, and correlations for all of the variables (N = 100–102).

Variable	*M*	*SD*	1	2	3	4	5	6	7	8
(1) Age	36.10	6.64	–							
(2) Sex (1 = male)	0.63	0.49	0.10	–						
(3) Education (1 = university degree)	0.85	0.36	−0.15	−0.03	–					
(4) Social desirability sum score	6.95	2.07	0.22*	0.10	0.00	–				
(5) Core self-evaluations	4.43	0.78	0.23*	0.02	0.27**	0.37**	–			
(6) Negative attitudes toward older workers	3.42	0.67	−0.10	0.10	0.15†	−0.17†	−0.10	–		
(7) Avoidance of hiring older people	3.15	1.00	−0.25*	0.10	0.06	−0.14	−0.27**	0.62**	–	
(8) Selection of the oldest candidate (1 = yes)	0.25	0.43	−0.00	0.06	−0.02	−0.07	−0.01	−0.05	−0.16†	–

†$p < 0.10$, *$p < 0.05$, **$p < 0.01$.

$F(2,82) = 0.02$, $p = 0.98$]; these templates were used in the main study.

Measures

Negative Attitudes toward Older Workers

Participants' negative attitudes toward older workers were measured by the means of their responses to the negatively framed items of the Beliefs about Older Workers Questionnaire from Hassell and Perrewe (1995). Respondents rated the degree to which they were holding negative beliefs about older people in the work context on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). One example item was: "Most older workers cannot keep up with the speed of modern industry." The 15 items yielded a good internal consistency (Cronbach's $\alpha = 0.88$) in this study.

Core Self-Evaluations

Core self-evaluations were measured by the means of the Core Self-Evaluations Scale (Judge et al., 2003). Respondents rated their endorsement to several statements about themselves on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). One example item was: "I am confident I get the success I deserve in life." The scale yielded an acceptable internal consistency (Cronbach's $\alpha = 0.71$) in this study.

Avoidance of Hiring Older People

Avoidance of hiring older people was measured by the means of three items adapted from Hutchison et al. (2010). Respondents rated the degree they were avoiding to hire older people if they can on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The three items were: "If I had a choice I would rather not hire an older person.", "If I can avoid hiring older people, I do.", and "I would want to avoid hiring an older person." The scale yielded a good internal consistency (Cronbach's $\alpha = 0.81$) in this study.

Selection of the Oldest Candidate

Selection of the oldest candidate was measured with one item related to the task of prioritizing applicants' CVs for hiring. The responses to this task were coded as a dichotomous variable (i.e., 0 = *not selecting the oldest candidate*; 1 = *selecting the oldest candidate*). Because the different CVs were tested for equivalence with regard to applicants' work experience (see Materials and Piloting above), not selecting the oldest candidate serves as a proxy for discriminatory behavior. Of the 102 participants, 25 participants (24.5%) ranked the oldest candidate to be the most suitable person for the described job vacancy, which is below the chance level (33.3%) if no discrimination was present.

Control Variables

As the outcome variable may be affected by participants' age, sex, and education, we included these variables as covariates in the analyses. In addition, we controlled for social desirability using a 13-item scale (Reynolds, 1982) to provide a more conservative examination of the hypothesized relationships and to gauge the extent to which our results might be biased by common method bias (Wang et al., 2015).

RESULTS

Preliminary Analysis

The descriptive statistics and correlations of all study variables are shown in **Table 1**. Avoidance of hiring older people was positively correlated with negative attitudes toward older workers ($r = 0.62$, $p < 0.01$) providing initial support for Hypothesis 1. Further, avoidance of hiring older people was negatively related to participants' age ($r = -0.25$, $p < 0.05$) and to core self-evaluations ($r = -0.27$, $p < 0.01$). Correlations with sex, education, and social desirability were weaker and not significant. Selection of the oldest candidate was negatively related to avoidance of hiring older people ($r = -0.16$, $p < 0.10$), providing initial support for Hypothesis 2. Given the low base rate of selecting the oldest candidate, this relationship can be regarded as quite substantial. Correlations with selection of the oldest candidate were weaker (and not statistically significant) for age, sex, education, social desirability, core self-evaluations, and negative attitudes toward older workers.

Hypothesis Testing

To investigate the hypothesized relationships between negative attitudes toward older workers, core self-evaluations, avoidance of hiring older people, and selecting the oldest candidate,

TABLE 2 | Fit indices for structural models (*N* = 100).

Model	Log likelihood	AIC	BIC	SABIC
Mediation model (partial) with interaction	**−160.809**	353.617	395.300	344.768
Mediation model (full) with interaction	−161.001	**352.003**	**391.080**	**343.706**

Bold entries signify the lowest values in each column, AIC, Akaike Information Criteria; BIC, Bayesian Information Criteria; SABIC, Sample-size Adjusted Bayesian Information Criteria.

we used path analysis to analyze the data. In Mplus 7.31 (Muthén and Muthén, 2015), we applied robust maximum likelihood estimator (MLR) and logistic link function because the dependent variable (i.e., selection of the oldest candidate) was dichotomous in nature (Yuan and Bentler, 2008). We tested our hypotheses by including all variables and hypothesized effects simultaneously in the model. We then compared the partial against the full mediation model (the partial mediation model has a direct effect from negative attitudes toward older workers to the dependent variable). The fit indices for the two models are presented in **Table 2**. Due to the use of MLR estimator, chi-square based fit indices are not available to evaluate model fit. Therefore, we rely on information criteria [i.e., Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Sample-size Adjusted Bayesian Information Criterion (SABIC)] to determine which model fit to the data better while being parsimonious (Preacher et al., 2007). Lower values of AIC, BIC, and SABIC indicate the most optimal balance between model fit and parsimony. The results indicated that the hypothesized full mediation model had lower values of AIC, BIC, and SABIC as compared to the partial mediation model and can therefore be considered as the most parsimonious and better-fitting model. The estimated path model showing relationships between control variables, negative attitudes toward older workers, core self-evaluations, avoidance of hiring older people, and selecting the oldest candidate is presented in **Figure 1**. With regard to the control variables, only age was negatively related to avoidance of hiring older people ($\gamma = -0.03$, $p < 0.01$), indicating that older decision-makers reported lower avoidance tendencies toward hiring older people.

Hypotheses 1–3 addressed the relationships between negative attitudes toward older workers and selection of the oldest candidate. The path coefficients suggested that negative attitudes toward older workers were positively related to avoidance of hiring older people ($\gamma = 0.89$, $p < 0.01$), supporting Hypothesis 1. This indicates that decision-makers, who reported more negative attitudes toward older workers, were more likely to avoid hiring them. In turn, avoidance of hiring older people was negatively related to selecting the oldest candidate ($\gamma = -0.49$, $p < 0.05$, OR = 0.61). This result supports Hypothesis 2 and indicates that decision-makers, who reported one-unit higher avoidance tendencies toward hiring older people, were 0.61 times less likely to select the oldest candidate in this study. With regard to the relationship between negative attitudes toward older workers and selecting the oldest candidate, the compound coefficient suggested that there was a negative indirect effect via avoidance of hiring older people (*indirect effect* $= -0.44$, $p < 0.05$). This result supports Hypothesis 3 and indicates that there was a negative relationship between negative attitudes toward older workers and selecting the oldest candidate, which is mediated by decision-makers' avoidance of hiring older people.

Hypotheses 4 addressed the moderating role of core self-evaluations. The estimated coefficients showed that core self-evaluations moderated the relationship between negative attitudes toward older workers and avoidance of hiring them ($\gamma = -0.33$, $p < 0.05$). Simple slope analysis revealed that the positive relationship was weaker when core self-evaluations were high (*simple slope* $= 0.63$, $z = 3.93$, $p < 0.01$) than when core self-evaluations were low (*simple slope* $= 1.16$, $z = 7.20$, $p < 0.01$). As can be seen in **Figure 2**, high (vs. low) core self-evaluations buffered the positive relationship between negative attitudes toward older workers and avoidance of hiring older people, supporting Hypothesis 4.

DISCUSSION

The aim of the current study was to investigate the impact of negative attitudes toward older workers on hiring decisions and to examine the moderating role of decision-makers' core self-evaluations. We tested our hypotheses based on a structured online questionnaire and a vignette study using a sample of 102

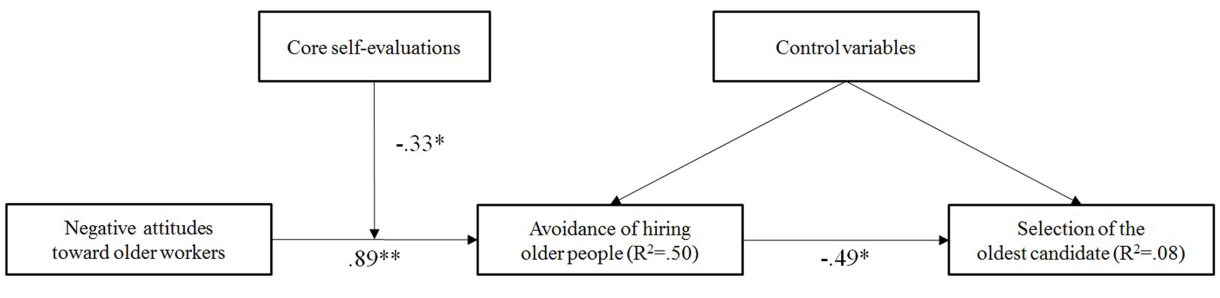

FIGURE 1 | Estimated path model showing relationships between negative attitudes toward older workers, core self-evaluations, avoidance of hiring older people, and selection of the oldest candidate with unstandardized coefficients (*N* = 100). $^{*}p < 0.05$, $^{**}p < 0.01$.

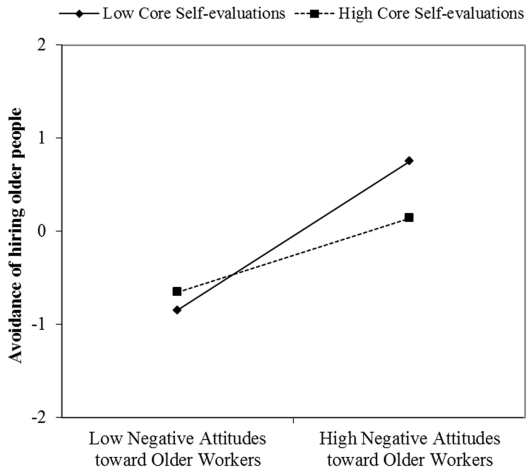

FIGURE 2 | Core self-evaluations moderate the relationship between negative attitudes toward older workers and avoidance of hiring older people.

decision-makers with hiring power across different industries. Results of the vignette study revealed that only 24.5% of participants ranked the oldest candidate to be the most suitable person for a given job vacancy, which is below the chance level of 33.3%. The selection likelihood can be regarded as a proxy for discriminatory behavior because the three candidates were equally qualified.

We found that negative attitudes toward older workers were positively related to avoidance of hiring older people, which in turn was negatively related to the likelihood to select the oldest candidate. Further, the present study revealed an indirect effect of negative attitudes toward older workers and selection likelihood via avoidance of hiring older people. Consistent with the literature on the theory of planned behavior (Ajzen, 1991) and hiring decisions about members of discriminated groups (e.g., Perry et al., 1996; Krings et al., 2011; Lu et al., 2011; Ang et al., 2015; Araten-Bergman, 2016), these findings confirm that negative attitudes toward older workers as hiring subjects lead to avoidance tendencies, which in turn result in an actual decision not to hire older people.

Moreover, the current study revealed the moderating role of decision-makers' core self-evaluations in hiring decisions about older people. As predicted, we found that core self-evaluations buffered the relationship between negative attitudes toward older workers and avoidance of hiring older people. In line with the literature on self-concept, social identity, and hiring decisions (Lewis and Sherman, 2003), this finding highlights decision-makers' core self-evaluations as a relevant mechanism in challenging age discrimination in hiring. As older people can be a threat to younger and middle-aged decision-makers' self-concept, people with low core self-evaluations are particularly susceptible to discriminate against others when holding negative attitudes toward them, whereas people with high self-evaluations are less susceptible to discriminate against others during hiring decisions. Thus, decision-makers' high (vs. low) core self-evaluations can reduce the impact of negative attitudes toward older workers on decision-makers' avoidance tendencies, which in turn determine their actual hiring decisions.

Theoretical and Practical Implications

The findings of the current study extend previous research on hiring decisions about older people and offer relevant theoretical and practical implications. With regard to theory, we extend previous knowledge on age discrimination in hiring by disentangling discriminatory attitudes, intentions, and actual decision-making. Although negative attitudes toward older workers are thought to underlie discriminatory behaviors such as lower hiring rates for equally qualified older (vs. young and middle-aged) job applicants, they have not received much attention in organizational research on hiring bias (Shore and Goldberg, 2005; Finkelstein and Farrell, 2007). Numerous studies have investigated the existence of negative attitudes toward older workers (Posthuma and Campion, 2009) but very few studies show the direct link to hiring decisions and its underlying mechanisms. The present study confirms the previous notion that hiring decisions about older people are intended before the actual decision is made and that this hiring intention (i.e., avoidance vs. approach tendency) is strongly influenced by decision-makers' negative attitudes toward older workers as hiring subject.

Moreover, the present study highlights that hiring decisions are not only about finding the most suitable candidate for a certain job vacancy but also about protecting one's self-concept. Most notably, our findings shed light on the moderating role of decision-makers' core self-evaluations. In particular, we reveal that decision-makers' core self-evaluations can buffer the impact of negative attitudes toward older workers on decision-makers' avoidance tendencies, which in turn determine their actual hiring decisions. This supports the previous notion that decision-making is influenced by people's motivation to maximize their positive self-concept (Lewis and Sherman, 2003). In general, people are keen on seeing their ingroup members in the most favorable light possible, whereas outgroup members are perceived as a potential threat to one's self. This potential threat is stronger for people with low (vs. high) core self-evaluations. In hiring, decision-makers with low core self-evaluations are therefore more susceptible to discriminate against older people when holding negative attitudes toward them as compared to decision-makers with high core self-evaluations. Future studies need to replicate our study findings in order to consolidate theoretical implications about the moderating role of decision-makers' core self-evaluations.

With regard to practice, the current study contributes to the improvement of diversity management strategies in organizations facilitating age-balanced hiring practices. To begin with, organizations need to tackle the issue of often existing negative attitudes toward older workers. As such, negative attitudes toward older workers should be reduced and positive attitudes toward older workers should be encouraged, for instance, by shaping a positive age climate and an age-friendly organizational culture leading to an appreciation of age diversity at work. Previous research has shown that intergenerational contact may be able to facilitate positive views toward older

people at work (Iweins et al., 2013; Henry et al., 2015). In the workplace, regular and high quality exchange among decision-makers with different ages may be therefore effective in transforming negative attitudes into positive views toward older workers.

Another angle to look at age-balanced hiring practices, is to focus on decision-makers' self-concept. Because hiring decisions are not only about the hiring subject but also about the decision-maker, it is important to ensure that decision-makers carry positive basic conclusions about themselves reducing the risk of being vulnerable for discriminatory mechanisms in hiring. This may be achieved by selecting or promoting decision-makers based on their core self-evaluations. However, Chang et al. (2012, p. 114) point out that "researchers and practitioners must ascertain whether the use of CSE (core self-evaluations) leads to adverse impact," before using such measures for staffing. An alternative may be to train decision-makers' core self-evaluations. Although core self-evaluations are defined as a superordinate construct capturing self-esteem, generalized self-efficacy, locus of control, and emotional stability traits (i.e., stable characteristics), it is almost certain that core self-evaluations are malleable and can change over time. For instance, research has reported changes in self-esteem (Orth et al., 2010), self-efficacy (e.g., West et al., 2008) and emotional stability traits (Roberts et al., 2006) over time. Thus, workplace interventions (e.g., personal training and development activities) may be able to enhance core self-evaluations among decision-makers and in turn support positive organizational outcomes. Further research is needed to assess the effectiveness of these interventions and to estimate to what extend core self-evaluations can be changed in the workplace.

Limitations and Directions for Future Research

Notwithstanding the theoretical and practical implications of our findings, we address the limitations of this research and highlight directions for future research. First, the cross-sectional design does not allow for causal inferences. In fact, it is possible that the relationships between negative attitudes toward older workers, decision-makers' core self-evaluations and hiring decisions about older people are bi-directional. However, the possible reverse causation cannot explain the interaction effect between negative attitudes toward older workers and decision-makers' core self-evaluations on hiring decisions about older people. Nevertheless, future studies should adopt longitudinal and (quasi-)experimental research designs to allow for more conclusive findings.

Second, given that our study variables were assessed via self-reported data, common-method bias could be a concern. However, we controlled for social desirability in our analyses, which had a rather low correlation with avoidance of hiring older people as mediator ($r = -0.17$) and selecting the oldest candidate as outcome variable ($r = -0.07$). Also, in our final path model, social desirability has not been found to significantly predict the mediator or the outcome variable. This partly reduces the concern for common-method bias, as the covariation of social desirability and self-reported data represents a rather small systematic error variance explained by the common rating source (Smith and Ellingson, 2002; Wang et al., 2015).

Third, the number of vignettes has been limited to three candidates (i.e., aged 38, 49, and 60 years), which oversimplifies the hiring decision and therefore may reduce external validity. Future research should replicate our study findings using a larger number of vignettes in order to rule out the potential concern for external validity. Future studies can also vary vignettes by using additional person characteristics (e.g., gender, race/ethnicity, social status) to understand the intersectionality of social categorizations as previous research has revealed double jeopardy against applicants having a multiple stigmatized background (Derous et al., 2012). In addition, hiring decisions about older people may depend on the job type. For example, previous research has shown that age-related hiring bias may differ in relation to whether the job role is of low or high status (Abrams et al., 2016). Varying candidates' profiles as well as investigating different types of jobs can help to understand the complex interplay between job candidate, job type, and decision-maker during hiring decisions.

Fourth, the present study has mainly focused on the fit between the candidate and the job. Even if a person is hired because of his or her qualifications with regard to the demands of the job, there is no guarantee that this person will fit to the organization. More recent approaches on hiring decision-making emphasize on the importance of person-organization fit, describing the compatibility between employees and the organization, which has been found to predict relevant work attitudes ($\rho = 0.31$; including job satisfaction and organizational commitment), job performance ($\rho = 0.15$; including task performance and contextual performance such as organizational citizenship behavior), and turnover ($\rho = 0.24$), respectively (Arthur et al., 2006). Given the importance of these outcome variables, future research should investigate the impact of negative attitudes on the decision-making about hiring older people with regard to the varying organizational contexts. Also, it would be worth investigating how shared negative attitudes in the organization (e.g., age discrimination climate; Kunze et al., 2011) influence older workers' employment-related decisions (e.g., withdrawal and early retirement; Zaniboni, 2015; Griffin et al., 2016), as well as to what extent the decision-makers' core self-evaluations can moderate these effects.

Moreover, the current study leaves some issues unaddressed and suggests directions for further investigation. As this study was tailored toward the cultural environment of the United States, future research needs to replicate our findings in other countries. Particularly, it is relevant to explore whether the link between negative attitudes toward older workers, core self-evaluations, and hiring decisions about older people are generalizable across different cultures. Recently, North and Fiske's (2015) cross-cultural meta-analysis found relevant differences between Eastern and Western cultures regarding their attitudes toward older people, which may be reflected in hiring decisions. Also, the impact of core self-evaluations on hiring decisions is expected to differ across cultures. Some scholars have stated that people's self-concept

should be more influential in individualistic than in collectivistic cultures (e.g., Markus and Kitayama, 1998; Judge and Hurst, 2008), yet, Chang et al. (2012) meta-analytical findings suggest that the relationships between employees' core self-evaluations and different work-related outcomes were stronger for collectivistic (vs. individualistic) cultures. Thus, future research ought to consider cultural differences in understanding the relationships between decision-makers' core self-evaluations, their negative attitudes toward older workers, and decisions about hiring them. In addition, future research could explore different moderators as a means to inhibit age discrimination in hiring, such as decision-makers' age group salience, their motivation to respond without prejudice, and organizational values and norms.

ETHICS STATEMENT

This study was carried out in accordance with the recommendations of the University Research Ethics Committee of Oxford Brookes University with an informed consent from all study participants. Oxford Brookes' University Research Ethics Committee has a multi-disciplinary membership that includes academic researchers (staff and students) from across the Faculties and non-research lay members from within and outside the University. It has specific responsibility for reviewing research that involves human participants, data or material, including both approving proposed research studies prior to the commencement of data collection and monitoring the progress of research that it has approved, to ensure compliance with approved ethics procedures. The University adheres to the principles of research ethics as laid out by the Economic and Social Research Council (ESRC 2015) – the UK's largest research and training organization addressing economic and social concerns.

AUTHOR CONTRIBUTIONS

UF: Research design, data collection, data analysis, theorizing and writing. MW: Contribution to research design, contribution to data analysis, contribution to theorizing and writing.

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Age Bias in Selection Decisions: The Role of Facial Appearance and Fitness Impressions

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This research examined the impact of facial age appearance on hiring, and impressions of fitness as the underlying mechanism. In two experimental hiring simulations, one with lay persons and one with Human Resource professionals, participants evaluated a chronologically older or younger candidate (as indicated by date of birth and age label) with either younger or older facial age appearance (as indicated by a photograph). In both studies, older-looking candidates received lower hireability ratings, due to less favorable fitness impressions. In addition, Study 1 showed that this age bias was reduced when the candidates provided counter-stereotypic information about their fitness. Study 2 showed that facial age-based discrimination is less prevalent in jobs with less costumer contact (e.g., back office).

Keywords: age discrimination, facial age appearance, hireability, fitness impressions, personnel selection

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INTRODUCTION

Population aging is a major topic around the world (e.g., United Nations, 2013; The United States Census Bureau, 2014; European Union, 2015). It profoundly affects, among other things, the composition of the labor force, which is becoming more age-diverse with an increasing number of older workers. Within organizations, this age composition can increase intergenerational collaboration and lead to change and innovations, but it also can lead to conflicts by heightened generational tension (Joshi et al., 2011; North and Fiske, 2015).

In order to benefit from the age diversity and attract the best talent, organizations need to make sure that their recruitment and hiring processes are free of age bias against older workers. However, analyses of legal claims (von Schrader and Nazarov, 2015), workforce surveys (e.g., Kelly Services, 2006), and experimental as well as field studies (e.g., Gordon and Arvey, 2004; Bal et al., 2011) suggest that organizations have not yet reached this goal: discrimination against older workers is prevalent, particularly at hiring. In fact, organizations are reluctant to invest in older workers (North and Fiske, 2016) and show bias in hiring older workers (Abrams et al., 2016), especially older female workers (Neumark et al., 2015). Often, the age bias goes back to negative stereotypes about older workers that are activated when recruiters learn about the age of the job candidate (Perry et al., 1996; Shore and Goldberg, 2005). That is, older workers are viewed as being less competent than younger workers, and are thus less likely to be hired (Krings et al., 2011). This negative age stereotype persists despite evidence for the maintenance of job performance with age (Gordon and Arvey, 2004; Bal et al., 2011).

Associations between candidates' chronological age, age stereotypes and recruiters' hiring decisions are well-known and documented in the literature. That is, the activation of age

stereotypes, based on information about a candidate's chronological age, plays a central role in explaining age discrimination at hiring (e.g., Krings et al., 2011). However, recruiters' impressions of job candidates are not only affected by beliefs that are activated by demographic information (i.e., the job candidate's age) but also by trait impressions that are triggered by facial age appearance. When people perceive another person's face, they readily and within milliseconds make inferences concerning this person's traits and competencies, and these inferences in turn influence their judgments of and behaviors toward the person (e.g., Zebrowitz, 1996; Todorov et al., 2005; Leopold and Rhodes, 2010). There is initial evidence that an older facial appearance too has an impact on how people behave toward a target. That is, people are less likely to hire older-looking than younger-looking job candidates. More specifically, older-looking candidates were less likely to be hired than younger-looking ones, presumably because older age appearance triggered impressions of lower health and fitness (Kaufmann et al., 2016). Thus, an older facial appearance can lead to discrimination at hiring. However, several crucial elements are not well-understood yet, notably the joint effect of chronological age and facial age appearance, its underlying mechanisms and boundary conditions, and need further investigation. This is the goal of the present research.

THE IMPACT OF FACIAL AGE APPEARANCE AT HIRING

During the recruitment process, decision makers typically have both types of age information about a candidate at their disposal, the candidate's chronological age and his or her facial age appearance: in most European countries, chronological age as well as facial age appearance are readily available on the résumé because candidates systematically include their date of birth as well as a photograph. This practice is very common and even obligatory in some countries (see, for example, recommendations by manpower at https://www.manpower.ch/en/candidates/advice/the-application/the-striking-cv/the-cv-content/; or by the European Union at http://www.yourfirsteuresjob.eu/en/home). If date of birth and/or a photograph are not included on the résumé, as it is common practice for example in the United States, recruiters can easily discover this information from sources like professional networks (e.g., LinkedIn or Xing) or video applications.

Accordingly, chronological age as well as facial age appearance of candidates are likely to influence decision makers' judgments and hence need to be considered when studying age discrimination at hiring. To our knowledge, only one study has investigated the impact of these two types of information, but it examined their effects separately (Kaufmann et al., 2016). More specifically, in this experimental study, both types of age information were manipulated separately, i.e., decision makers either saw the candidate's date of birth or photograph. Results showed that older-looking candidates had lesser chances of being selected for an interview than younger-looking candidates.

However, as pointed out above, in most personnel selection procedures, decision makers possess both types of age information. Thus, in spite of the first evidence that candidates' facial age appearance affects selection decisions (Kaufmann et al., 2016), the key question regarding the joint or interactive effects of chronological age and facial age appearance and their relative strengths remains open. How do decision makers evaluate candidates when they see both candidates' age as well as their facial age appearance? Will a candidate who is known to be older be discriminated against if he or she looks younger? Or will a candidate known to be younger be a target of discrimination if he or she looks older?

MECHANISMS UNDERLYING EFFECTS OF FACIAL AGE APPEARANCE

Impressions based on faces have a profound impact on how people perceive and judge others. More specifically, people quickly derive impressions and infer personal attributes from sensory cues in the face (such as facial symmetry, size and placement of the eyes; Zebrowitz, 1996; Bodenhausen and Macrae, 2006; Freeman and Ambady, 2011). These impressions, in turn, may guide their behaviors (e.g., voting decisions, Olivola and Todorov, 2010; hiring decisions, Sczesny and Kühnen, 2004; avoidance of sick individuals or approaching competent people; Zebrowitz, 2011).

In general, an older physical appearance signals lack of fitness (Zebrowitz et al., 2003; Zebrowitz and Montepare, 2008). Correspondingly, impressions of overall fitness have been found to mediate the effect of older facial age appearance on hiring (Kaufmann et al., 2016). However, fitness impressions can be broken down into aspects of physical condition (e.g., healthy) and aspects of cognitive fitness (e.g., intelligent), and older-looking people are typically perceived as both less physically and less cognitively fit (e.g., Rosen and Jerdee, 1976; Montepare and Zebrowitz, 2002; Zebrowitz et al., 2003; van Dalen et al., 2010).

In work settings, cognitive fitness indicates not only worker's ability to handle a complicated task, but also how quickly new skills can be acquired. On the other hand, physical fitness is not only important for physically demanding jobs, but also indicates the activity and endurance of an employee at work. Thus, both physical and cognitive fitness signal workers' capability and potential productivity. Therefore, both are expected to play a role in age discrimination in hiring decisions (Landy et al., 1995). In line with this consideration, we expected decision makers to ascribe lower (physical and cognitive) fitness to older-looking candidates than to younger-looking ones.

OVERVIEW OF THE PRESENT RESEARCH AND HYPOTHESES

The aim of the present research was to analyze the joint impact of chronological age and facial age appearance on hiring and to determine fitness impressions as underlying mechanisms. In two experimental hiring simulations, we examined whether

impressions of fitness mediated effects of facial age appearance on hireability ratings. Participants assumed the role of the personnel manager and evaluated the résumé of a fictitious job candidate. To examine the joint impact of the candidate's facial age appearance and chronological age, we manipulated the two variables in a fully crossed design: depending on the experimental condition, the candidate was either 50 years old and looking his or her age, 50 years old and looking younger, 30 years old and looking his or her age, or 30 years old and looking older.

Current models of person construal (e.g., Freeman and Ambady, 2011) provide the theoretical framework for explaining the influence of both types of age information. According to this model, person perception is the result of the joint influence of category information (e.g., demographics which may activate stereotypical beliefs; top–down processes) and information derived from sensory cues (e.g., facial features; bottom–up process). Because facial appearance is more vivid and salient information than demographic information (Zebrowitz, 1996; Leopold and Rhodes, 2010), facial age appearance may be more influential than chronological age. Accordingly, we expected a candidates' older facial age appearance, independent of a candidates' chronological age, to trigger less favorable ratings at hiring.

Specifically, we predicted that older-looking candidates would be perceived as less fit (Hypothesis 1a) and receive less favorable hireability ratings (Hypothesis 1b) than younger-looking ones, independent of their chronological age. Moreover, we predicted that the lower hireability ratings for older-looking versus younger-looking candidates would be mediated by impressions of lower fitness (Hypothesis 2).

In Study 1 we examined whether the impact of facial age appearance on hiring can be reduced by targeting the presumed underlying mechanism, namely impressions of fitness. If facial age appearance influences hiring decisions via impressions of fitness, then targeting this mediating process should help to circumvent age discrimination. More specifically, information about candidates' fitness may counteract the otherwise detrimental impact of an older facial appearance by attenuating or even eliminating the influence of appearance-related fitness impressions. Information that signals candidates' capability should increase older-looking candidates' perceived hireability compared to when no information about candidates' capability is presented. Moreover, no such effect is expected for younger-looking candidates. We expected this to be the case for information about the cognitive fitness of older-looking candidates (capability in an activity that does not obviously require physical fitness) but to be more pronounced for physical fitness (capability in an activity that obviously requires high levels of physical fitness), compared to when no information about older-looking candidates' capability is presented (Hypothesis 3).

Study 1 uses a sample of lay persons who live in the United States. In Study 2, we recruited Human Resource (HR) professionals from three countries (Austria, Germany, and Switzerland) in order to increase the generalizability of the findings of Study 1. In addition, we tested the context-dependency of the effects of facial age appearance on hireability. Previous research has shown that the fit between various aspects of age and specific job demands affects the degree of age bias (Gordon and Arvey, 2004). For instance, age discrimination based on candidates' chronological age is particularly prevalent in organizations characterized by rapid change, that is, organizations that have grown and expect to grow rapidly, which highlights the incongruence of stereotypes about older candidates and job requirements (Diekman and Hirnisey, 2007). Thus, it is reasonable to assume that facial age appearance plays a more crucial role in some professional contexts, for instance, when a candidate's physical appearance is salient, as in a front office job. In this context, we expect that there may be greater perceived incongruence of an older facial age appearance and the job requirements of an appealing physical appearance, leading to increased age discrimination. Whereas managers ascribe to older workers better soft skills in costumer contact because of their experience-based know-how (North and Hershfield, 2014), the fact that first impressions from facial qualities can be formed without awareness (Willis and Todorov, 2006), led us to expect those to take precedence over a more considered evaluation of experience-based know-how.

We therefore manipulated the salience of physical appearance for the job, with high salience of appearance indicated by a job with customer contact, and low salience indicated by a job with no customer contact. We predicted that the tendency for older-looking candidates to receive less favorable hiring ratings than younger-looking ones would be stronger when appearance has high salience than when it has low salience (Hypothesis 4).

Moreover, we considered the gender of job candidates and the age of judges. Past research has not revealed clear evidence for a double standard of appearance for older women vs. men. In a recent field study, age discrimination against older women was found to be more robust compared to age discrimination against older men (Neumark et al., 2015), whereas experimental research failed to show a consistent double standard in hiring (Kaufmann et al., 2016). Research also has revealed that older adults showed greater positivity in their evaluations of older people than did younger adults (Gordon and Arvey, 2004; Zebrowitz and Franklin, 2014). We took both variables into consideration in our analyses.

STUDY 1

Method

Participants

The study was conducted online via MTurk. The final sample consisted of 383 participants from the United States (174 women and 209 men; aged between 18 and 77 years; *M*age = 35.44, *SD* = 11.20). Two participants were excluded, because they did not correctly answer the careless responder item ("Please choose "not at all" to answer this question"). The majority, that is, 80% ($n = 306$) of the participants were employed. Thirteen percent of the participants ($n = 48$) were students, 78% ($n = 298$) had a certificate in higher education (secondary school or higher), 6% ($n = 21$) had no school-leaving certificate, and 3% ($n = 10$) gave no information about their educational background.

Experimental Design

The experiment was a 2 (Candidates' Facial Age Appearance: older, younger) × 2 (Candidates' Chronological Age: older, younger) × 3 (Candidates' Capability: physical fitness, cognitive fitness, no fitness information) between-subjects design with perceived fitness and hireability as dependent variables. Participants were randomly assigned to the experimental conditions.

Procedure

The advertised job was travel agent, an occupation that is perceived as equally suitable for younger and older candidates as well as for men and women (see for example, Kaufmann et al., 2016). The job advertisement contained the job title (travel agent), the name of the travel agency, the educational degree required, and the main tasks of the future incumbent. Participants read a job advertisement and the short résumé of one qualified male or female candidate, which contained information about the candidate's chronological age and a photo depicting the candidates facial age-appearance, and the candidate's hobby. We included three men and three women as candidates to increase the generalizability of our findings. The name on the résumé was either male (Mr. Peter Keller) or female (Mrs. Petra Keller). Participants were informed that the short résumés included only essential information. After reviewing the job advertisement and the résumé, participants responded to the manipulation checks, evaluated the candidate, and provided demographic information about themselves. Finally, they were debriefed and thanked for their participation.

Age information

Chronological age was manipulated by specifying the candidate's birth date and age (50 or 30 years). Facial age appearance was manipulated by including a photograph of the candidate in the résumé. We used the six photographs (three men, three women) to manipulate facial age appearance. Specifically, we obtained photographs of three women and three men looking 30 years old from iStockphoto and morphed them with April Age to produce morphs that looked roughly 50 years old yielding a total of 12 photographs. Pretesting established that the photographs of all ages did not differ in perceived attractiveness or likeability, while they were perceived as young- or old-looking as intended (30 years vs. 50 years (see **Figure 1**; see pretest in Kaufmann et al., 2016).

Capability information

Candidate's capability was manipulated by indicating fitness of the candidate on the résumé. To include extracuriccular activities (e.g., hobbies) in a résumé is recommended by job search platforms since they signal skills that might be important for future work activities (e.g., www.manpower.ch/en/the-cv). Specifically, we manipulated candidates' capability by indicating winning the fifth place in their age category in a cooking hobby contest (cognitive fitness information) or in a marathon hobby contest (physical fitness information), or provided no information about fitness (control condition). We chose these hobbies based on a pretest to identify hobbies that might increase perceptions of older-looking candidates fitness. Participants (39 women and 55 men; aged between 18 and 57 years; $M_{age} = 30.39$, $SD_{age} = 7.91$) evaluated in random order the photographs of the six older-looking candidates combined with one of six hobbies (marathon running, cooking, puzzling, golf, craftwork, writing) or with no hobby. Evaluations were made on the 10 items measuring fitness impressions that are described below with the following instruction: "Please rate your first impression of the person concerning the following aspects" (1 = *not at all,* 7 = *very much*). Compared to no hobby, marathon increased physical fitness ascriptions ($t(22) = 2.89$, $p = 0.005$, $d = 1.25$), and cooking slightly increased cognitive fitness ascriptions ($t(22) = 1.48$, $p = 0.077$, $d = 0.55$). Based on these pretest results, we choose cooking to provide information about the candidate's cognitive fitness and running marathons to provide information about physical fitness. Moreover, to make the hobbies more salient, we described candidates as earning fifth place in his or her age category in a contest, with no information about hobbies and contest provided in the control condition.

FIGURE 1 | Examples of photographs that were used in the experiment. The younger and the older morph of one male and one female stimulus person are shown.

Fitness impressions

Because there are no validated scales assessing physical and cognitive fitness impressions from faces, we developed our own scales. In another pre-test, we asked participants (18 women

and 17 men; aged between 20 and 55 years; $M_{age} = 25.11$, $SD_{age} = 7.50$) to list all terms they could think of to describe physical fitness or cognitive fitness as evident in a face. From this word list, we selected the five most frequently mentioned terms for physical fitness ($N \geq 10$), namely physically fit, athletic, vital, active, and energetic, and the five most frequently mentioned terms for cognitive fitness ($N \geq 10$), namely cognitively fit, cognitively active, intelligent, attentive, and interested, and used them in our pretest and both experiments.

In the main experiment of Study 1, responses to these 10 items were measured on seven-point Likert scales, with the following instruction: "Please rate your first impression of the candidate concerning the following aspects" (1 = *not at all,* 7 = *very much*). A principal component factor analysis confirmed that these items could be combined into a single scale (all factor loadings ≥ 0.71; eigenvalue of the first factor 5.86; 59% of explained variance) that captured perceivers' fitness impressions of the candidate (Cronbach's $\alpha = 0.92$).

Hireability assessments

To measure *hireability* we asked three questions that capture person-job fit: "To what extent does this applicant fit the demands of the job?," "To what extent will other employees think this candidate is qualified to do the job?," "How confident are you that this applicant is qualified for the job?" (Kristof-Brown, 2000). A fourth question assessed hiring intentions: "More than 60 applications were submitted. However, only a small number of applicants can be invited for the job interview. Would you invite this candidate for an interview?" Responses were given on seven-point Likert scales (1 = *not at all/definitely not*, 7 = *very much/definitely yes*), and combined into one scale (Cronbach's $\alpha = 0.91$).

Results

We conducted a preliminary analysis of the data to explore whether candidates' gender or participants' age had an impact on the results. That is, we conducted a 2 (Candidates' Facial Age Appearance: older, younger) × 2 (Candidates' Chronological Age: older, younger) × 3 (Candidates' Capability: physical fitness, cognitive fitness, no fitness information) × 2 (Candidates' Gender: female, male) multivariate analysis of covariance (MANCOVA) with fitness impressions and hireability ratings as dependent variables and age of participants as covariate. We found no significant main effect of candidates' gender or any interactions of gender with candidates' age. Moreover, all effects held true when age of participants was used as covariate (see Supplementary Table 1).

We then conducted the main analysis, a 2 (Candidates' Facial Age Appearance: older, younger) × 2 (Candidates' Chronological Age: older, younger) × 3 (Candidates' Capability: physical fitness, cognitive fitness, no fitness information) multivariate analysis (MANOVA) with fitness impressions and hireability ratings as dependent variables. Means and standard deviations are displayed in **Table 1** and statistical effects in **Table 2**.

As expected, we found a significant overall effect of candidates' facial age appearance [*Wilks'* $\lambda = 0.93$, $F(2,370) = 13.04$, $p = 0.000$, $\eta^2 = 0.07$]. Older-looking candidates were perceived as less fit than younger-looking candidates, $F(1,371) = 25.97$, $p = 0.000$, $\eta^2 = 0.07$, and older-looking candidates also received less favorable hireability ratings than younger-looking ones, $F(1,371) = 7.29$, $p = 0.007$, $\eta^2 = 0.02$.

We also found a significant overall effect of information about the candidate's capability [*Wilks'* $\lambda = 0.82$, $F(4,740) = 19.50$, $p = 0.000$, $\eta^2 = 0.10$], with an univariate effect on fitness impressions only, $F(2,371) = 34.93$, $p = 0.000$, $\eta^2 = 0.16$. Planned comparisons revealed that providing physical fitness information (running marathons) increased fitness perceptions of candidates, compared to providing no additional information (control), $t(246) = -6.91$, $p < 0.001$, $d = 0.89$, or cognitive fitness information (cooking), $t(260) = -7.12$, $p < 0.001$, $d = 0.89$. Moreover, fitness perceptions of candidates with cognitive fitness information did not differ from those with no fitness information, $t(256) = -0.10$, $p = 0.920$, $d = 0.01$. Moreover, the effect of candidate's capability on hireability ratings only approached significance, $F(2,371) = 2.60$, $p = 0.075$, $\eta^2 = 0.01$. Nevertheless, planned comparisons between conditions to test our specific hypothesis revealed that candidates who gave physical fitness information were perceived as more hireable than candidates who gave no fitness information, $t(246) = 6.91$, $p < 0.001$, $d = 0.89$, or who gave cognitive fitness information, $t(260) = 7.12$, $p < 0.001$, $d = 0.89$, while there was no difference in hireability ratings between those with cognitive fitness information and no fitness information, $t(254) = 0.10$, $p = 0.920$, $d = 0.01$.

We also found a significant multivariate interaction of facial age appearance and candidates' capability [*Wilks'* $\lambda = 0.97$, $F(4,740) = 3.20$, $p = 0.013$, $\eta^2 = 0.02$], with a univariate effect for fitness impressions only, $F(2,371) = 5.81$, $p = 0.003$, $\eta^2 = 0.03$, but not for hireability ratings, $F(2,371) = 2.05$, $p = 0.130$, $\eta^2 = 0.01$. Older-looking candidates compared to younger-looking ones, were perceived as less fit when no fitness information was provided, $t(119) = 5.76$, $p = 0.000$, $d = 1.05$. However, facial age appearance had no significant effect on fitness ratings when candidates gave physical fitness information, $t(125) = 1.32$, $p = 0.191$, $d = -0.24$, or cognitive fitness information, $t(133) = 1.63$, $p = 0.106$, $d = -0.30$.

Finally, an unexpected significant three-way interaction between facial age appearance, chronological age, and capability emerged for hireability ratings [*Wilks'* $\lambda = 0.97$, $F(4,740) = 2.50$, $p = 0.041$, $\eta^2 = 0.01$]. However follow-up Scheffé tests revealed no significant differences.

All other effects in the MANOVA were non-significant, $Fs \leq 2.32$, $ps \geq 0.056$, $\eta^2 \leq 0.01$, showing that also candidates' chronological age had no effect on fitness impressions nor hireability ratings; *Wilks'* $\lambda = 0.99$, $F(2,370) = 1.28$, $p = 0.278$, $\eta^2 = 0.01$.

Next, to test whether it was the effect of an older appearance on fitness impressions that led to reduced hireability ratings for older-looking candidates (Hypothesis 2), we conducted a mediation analysis (Hayes, 2013) with 5,000 iterations, and calculated accelerated confidence intervals (CI 95%).

TABLE 1 | Study 1. Means and standard deviations of hireability and fitness impressions by candidates' facial age appearance, chronological age, and capability information.

				Hireability		Fitness impressions	
Facial age appearance	**Chronological age**	**Capability information**	***N***	**Mean**	***SD***	**Mean**	***SD***
Younger-looking	Younger	No fitness information	34	6.07	0.84	5.49	0.75
		Cognitive fitness information	28	5.96	0.70	5.44	0.70
		Physical fitness information	31	6.30	0.57	6.03	0.63
	Older	No fitness information	30	6.28	0.72	5.71	0.71
		Cognitive fitness information	33	5.87	1.01	5.30	0.79
		Physical fitness information	29	6.16	0.96	6.01	0.80
Older-looking	Younger	No fitness information	28	5.91	0.70	4.83	0.81
		Cognitive fitness information	39	5.68	0.92	5.12	0.75
		Physical fitness information	32	6.03	0.99	5.59	0.87
	Older	No fitness information	29	5.51	0.95	4.81	0.69
		Cognitive fitness information	35	6.08	0.74	5.16	0.94
		Physical fitness information	35	6.02	0.80	6.08	0.64

TABLE 2 | Study 1. Statistical effects of MANOVAs and ANOVAs analyzing hireability and fitness impressions by candidates' facial age appearance, chronological age, and capability information.

	Multivariate tests						**Univariate tests**				
	Dependent variables	***Wilks'* λ**	***F***	**df**	***p***	**η^2**	**Dependent variables**	***F***	**df**	***p***	**η^2**
Candidates' Facial Age Appearance	Fitness impressions and hireability	0.93	13.04	(2/370)	0.000	0.07	Fitness impressions	25.97	(1/371)	0.000	0.07
							Hireability	7.29	(1/371)	0.007	0.02
Candidates' Chronological Age	Fitness impressions and hireability	0.99	1.28	(2/370)	0.278	0.01	Fitness impressions	1.59	(1/371)	0.208	0.00
							Hireability	0.00	(1/371)	0.965	0.00
Capability Information	Fitness impressions and hireability	0.82	19.50	(4/740)	0.000	0.10	Fitness impressions	34.93	(2/371)	0.000	0.16
							Hireability	2.60	(2/371)	0.075	0.01
Candidates' Facial Age Appearance * Candidates' Chronological Age	Fitness impressions and hireability	1.00	0.68	(2/370)	0.509	0.00	Fitness impressions	0.87	(2/371)	0.352	0.00
							Hireability	0.00	(2/371)	0.996	0.00
Candidates' Facial Age Appearance * Capability Information	Fitness impressions and hireability	0.97	3.20	(4/740)	0.013	0.02	Fitness impressions	5.81	(2/371)	0.003	0.03
							Hireability	2.05	(2/371)	0.130	0.01
Candidates' Chronological Age * Capability Information	Fitness impressions and hireability	0.98	2.32	(4/740)	0.056	0.01	Fitness impressions	1.16	(2/371)	0.314	0.01
							Hireability	0.86	(2/371)	0.426	0.01
Candidates' Facial Age Appearance * Candidates' Chronological Age * Capability Information	Fitness impressions and hireability	0.97	2.50	(4/740)	0.041	0.01	Fitness impressions	1.81	(2/371)	0.166	0.01
							Hireability	3.42	(2/371)	0.034	0.02

Results are depicted in **Figure 2**. As predicted, we found a significant indirect effect of facial age appearance on hireability that was mediated by fitness impressions. Older-looking candidates evoked less favorable fitness impressions, and this reduced hireability ratings for older-looking candidates compared to younger-looking ones, thus confirming Hypothesis 2.

Finally, we tested whether information about the candidate's capability provided within the résumé led to more favorable fitness impressions for older-looking candidates and hence to an increase in perceived hireability (Hypotheses 3). To this end, we calculated two moderated mediation analyses (physical fitness information vs. no fitness information and cognitive fitness information vs. no fitness information as moderator variables) with 5,000 iterations, and calculated accelerated confidence intervals (CI 95%; Hayes, 2013). First, physical fitness information compared to no fitness information was included as moderator for the effect of facial age appearance

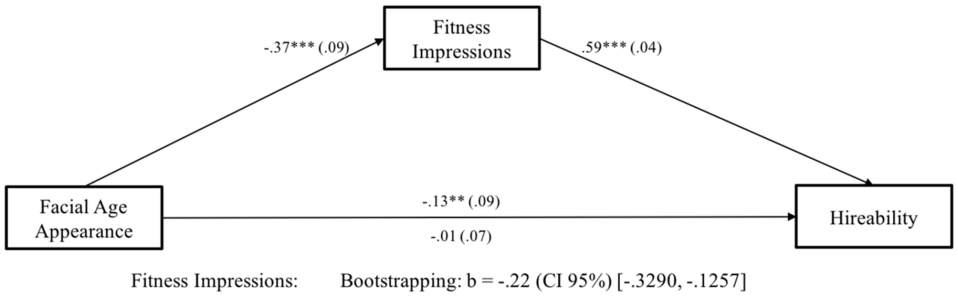

FIGURE 2 | Study 1. $N = 383$. Facial Age Appearance was coded as 0 = younger-looking, 1 = older-looking. Numbers are unstandardized beta-coefficients, with the standard errors shown in parentheses. $^{+}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

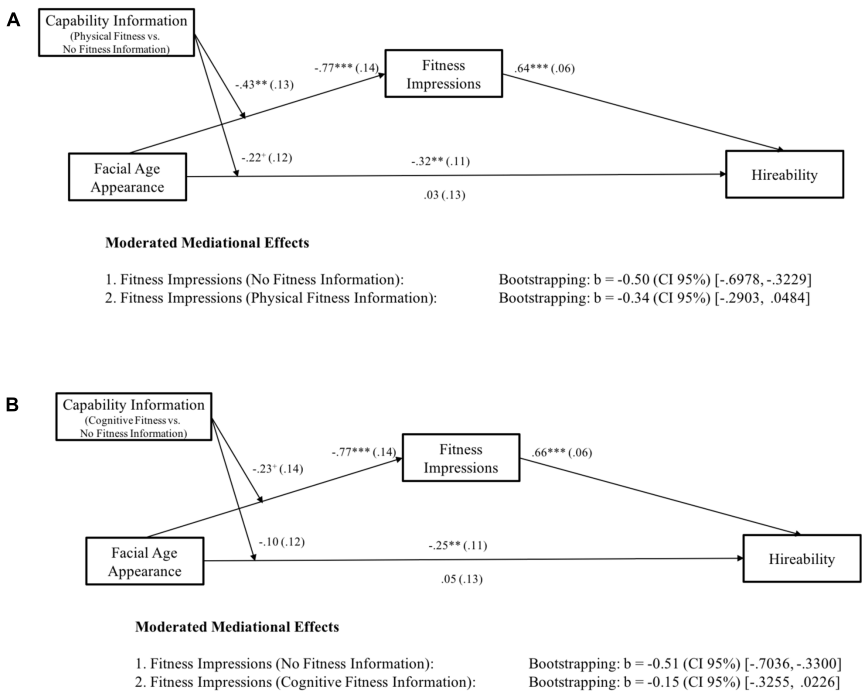

FIGURE 3 | (A,B) Study 1. **(A)** $N = 248$ and **(B)** $N = 256$. Facial age appearance was coded as 0 = younger-looking, 1 = older-looking. Capability Information was coded in **(A)** as 0 = no fitness information, 1 = physical fitness information and in **(B)** as 0 = no fitness information, 1 = cognitive fitness information. Numbers are unstandardized beta-coefficients, with the standard errors shown in parentheses. $^{+}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

on fitness impressions and, in turn, on hireability ratings. As predicted (see **Figure 3A**), we found that the indirect effect of facial age appearance on hireability via fitness lost significance when physical fitness information was included compared to when no fitness information was included. Moreover, the indirect effect of facial age appearance on hireability via fitness impressions also lost significance when cognitive fitness information compared to no fitness information was included (see **Figure 3B**).

Discussion

Results of Study 1 demonstrate that facial age appearance impacts hireability ratings via impressions of fitness: older-looking candidates received less favorable hireability ratings compared to younger-looking ones because they were perceived as less physically and cognitively fit. This mediation effect was altered if candidates' hobbies provided clear information about their cognitive fitness or their physical fitness. More specifically, if candidates indicated on their résumé that they engaged in award winning cooking or marathon running, an older age appearance no longer decreased perceived fitness or hireability. Moreover, we did not find any effects of chronological age on hireability nor fitness ratings.

Whereas Study 1 showed that capability information moderates effects of facial age-appearance on hireability, Study 2 examined moderation by the job context. More specifically, we investigated to what extent the salience of appearance for a job alters the effects of facial age appearance at hiring.

In Study 2 we tested our hypotheses in a sample of HR professionals.

STUDY 2

Method

Participants

Participants were 264 HR professionals (121 women and 143 men; aged between 18 and 72 years; $M_{age} = 42.76$, $SD = 11.07$) who were recruited with the help of Qualtrics online panels[1]. The data were collected in Austria, Germany, and Switzerland. Eighty-five percent of the participants worked full time, 76% had a leadership position with a mean of 301 subordinate employees. On average, participants had 11 years of experience in HR and had conducted 36 job interviews over the last 5 years.

Experimental Design

The experiment was a 2 (Candidates' Facial Age Appearance: older, younger) × 2 (Candidates' Chronological Age: older, younger) × 2 (Salience of Appearance for the Job: front office, back office) between-subjects design with perceived fitness and hireability as dependent variables. Participants were randomly assigned to the experimental conditions.

Procedure

The experiment was conducted online, and participants were randomly assigned to the different conditions. Participants read a job advertisement and the short résumé of one qualified male or female candidate, which contained the two age manipulations. As in Study 1, chronological age was manipulated by specifying the candidate's birth date and age and facial age appearance was manipulated by including a photograph of the candidate in the résumé.

The advertised job was again travel agent. To manipulate the salience of appearance for a job of we used two different versions of the job advertisement, one involving more front-office activities and one involving more back-office work. One version of the job advertisement stated that "The applicant will work in the front office in the flagship store." (high salience of appearance), while the other version claimed that "The applicant will work in the back office without customer contact." (low salience of appearance).

We used the same measures for the dependent variables as in Study 1. Again a principal component factor analysis confirmed a single scale for the 10 fitness impressions (all factor loadings ≥ 0.75; eigenvalue of the first factor 6.79; 68% of explained variance; Cronbach's $\alpha = 0.95$). The four hireability measures also were combined into one scale (Cronbach's $\alpha = 0.88$). In Study 2 we also asked participants "Would you hire the candidate if you had to decide solely on the basis of the documents available?" providing a dichotomous choice (1 = *yes*, 2 = *no*).

[1]http://www.qualtrics.com/panel-management/

Results

Again a preliminary analysis of the data was conducted to explore whether candidates' gender or participants' age had an impact on the results. We conducted a 2 (Candidates' Facial Age Appearance: older, younger) × 2 (Candidates' Chronological Age: older, younger) × 2 (Salience of Appearance for the Job: front office, back office) × 2 (Candidates' Gender: female, male) MANCOVA with fitness impressions and hireability ratings as dependent variables and age of participants as a covariate. Again, we found no significant main effect of candidates' gender, and no significant interactions of candidates' gender with candidate's age. Also all effects held true when age of participants was used as covariate (see Supplementary Table 2).

We then conducted a 2 (Candidates' Facial Age Appearance: older, younger) × 2 (Candidates' Chronological Age: older, younger) × 2 (Salience of Appearance for the Job: front office, back office) MANOVA with fitness impressions and hireability as dependent variables. Means and standard deviations are displayed in **Table 3** and statistical effects in **Table 4**.

We found a significant overall effect of facial age appearance as predicted [*Wilks'* $\lambda = 0.97$, $F(2,255) = 2.78$, $p = 0.064$, $\eta^2 = 0.02$]. Older-looking candidates compared to younger-looking ones were perceived as less fit, $F(1,256) = 5.37$, $p = 0.021$, $\eta^2 = 0.02$, and tended to receive less favorable hireability ratings, $F(1,256) = 3.55$, $p = 0.061$, $\eta^2 = 0.01$.

We found no overall effects of candidates' chronological age [*Wilks'* $\lambda = 0.99$, $F(2,255) = 1.31$, $p = 0.273$, $\eta^2 = 0.01$], or the salience of appearance for the job [*Wilks'* $\lambda = 1.00$, $F(2,255) = 0.64$, $p = 0.530$, $\eta^2 = 0.01$]. However, we found a significant interaction of facial age appearance and salience of appearance for the job [*Wilks'* $\lambda = 0.98$, $F(2,255) = 3.03$, $p = 0.050$, $\eta^2 = 0.02$] for fitness impressions, $F(1,256) = 5.95$, $p = 0.015$, $\eta^2 = 0.023$, indicating that older- compared to younger-looking candidates applying for a front office position were perceived as less fit, $t(131) = 3.30$, $p = 0.000$, $d = 0.57$. No such difference in fitness impression emerged for a back office position, $t(129) = -0.04$, $p = 0.482$, $d = 0.01$. All other effects of the MANOVA were not significant, $F \leq 1.31$, $p \geq 0.273$, $\eta^2 \leq 0.01$.

We conducted Chi-Square tests for the dichotomous selection decision. We found that for a front office job, participants were more likely to hire younger-looking candidates ($N = 46$) compared to older-looking ones ($N = 25$; $\chi^2 = 6.21$, $df = 1$, $p = 0.013$), whereas for a back office job, participants did not differentiate significantly between younger-looking candidates ($N = 21$) and older-looking ones ($N = 34$; $\chi^2 = 3.07$, $df = 1$, $p = 0.080$). There were no effects of candidates' chronological age on likelihood of being chosen for a front or back office job ($\chi^2 \geq 1.47$, $p \leq 0.225$).

As in Study 1, we conducted a mediation analysis (Hayes, 2013), using bootstrapping technique with 5,000 iterations, and calculating accelerated confidence intervals (CI 95%). Results are depicted in **Figure 4**. As predicted in Hypothesis 2, we found a significant indirect effect of facial age appearance on hireability through fitness

TABLE 3 | Study 2. Means and standard deviations of hireability, fitness impressions and hiring decision by candidates' facial age appearance, chronological age, and the salience of appearance for the job.

Facial age appearance	Chronological age	Salience of appearance for the job	N	Hireability		Fitness impressions		Hiring decision	
				M	*SD*	*M*	*SD*	N (yes)	N (no)
Younger-looking	Younger	Back office	32	5.03	1.35	4.50	1.32	13	19
		Front office	35	5.33	1.11	5.07	1.18	23	12
	Older	Back office	30	4.95	1.02	4.71	0.93	8	22
		Front office	35	5.01	1.37	5.06	1.20	23	12
Older-looking	Younger	Back office	37	4.75	1.09	4.45	1.27	19	18
		Front office	30	4.75	1.36	4.36	1.41	14	15
	Older	Back office	32	5.07	0.94	4.79	0.93	15	17
		Front office	33	4.64	1.23	4.39	1.08	11	22

TABLE 4 | Study 2. Statistical effects of MANOVAs and ANOVAs analyzing hireability, fitness and hiring decision by candidates' facial age appearance, chronological age, and the salience of appearance for the job.

	Multivariate tests						Univariate tests				
	Dependent variables	*Wilks'* λ	*F*	df	*p*	η^2	Dependent variables	*F*	df	*p*	η^2
Candidates' Facial Age Appearance	Fitness impressions and hireability	0.98	2.78	(2/255)	0.064	0.02	Fitness impressions	5.37	(1/256)	0.021	0.02
							Hireability	3.55	(1/256)	0.061	0.01
Candidates' Chronological Age	Fitness impressions and hireability	0.99	1.31	(2/255)	0.273	0.01	Fitness impressions	0.98	(1/256)	0.324	0.00
							Hireability	0.10	(1/256)	0.758	0.00
Salience of Appearance for the Job	Fitness impressions and hireability	1.00	0.64	(2/255)	0.530	0.01	Fitness impressions	0.59	(1/256)	0.442	0.00
							Hireability	0.01	(1/256)	0.912	0.00
Candidates' Facial Age Appearance * Candidates' Chronological Age	Fitness impressions and hireability	1.00	0.66	(2/255)	0.516	0.01	Fitness impressions	0.09	(1/256)	0.760	0.00
							Hireability	1.07	(1/256)	0.301	0.00
Candidates' Facial Age Appearance * Salience of Appearance for the Job	Fitness impressions and hireability	0.98	3.03	(2/255)	0.050	0.02	Fitness impressions	5.95	(1/256)	0.015	0.02
							Hireability	1.79	(1/256)	0.182	0.01
Candidates' Chronological Age * Salience of Appearance for the Job	Fitness impressions and hireability	1.00	0.65	(2/255)	0.523	0.01	Fitness impressions	0.83	(1/256)	0.364	0.00
							Hireability	1.25	(1/256)	0.264	0.01
Candidates' Facial Age Appearance * Candidates' Chronological Age * Salience of Appearance for the Job	Fitness impressions and hireability	1.00	0.06	(2/255)	0.944	0.00	Fitness impressions	0.02	(1/256)	0.881	0.00
							Hireability	0.11	(1/256)	0.743	0.00

impressions. Older-looking candidates evoked less favorable fitness impressions resulting in reduced hireability ratings for older-looking candidates compared to younger-looking ones.

Finally, we tested whether greater salience of appearance for the job led to less favorable fitness impressions and hireability ratings for older-looking candidates (see Hypothesis 4). We conducted a moderated mediation analysis with 5,000 iterations, and calculated accelerated confidence intervals (CI 95%; Hayes, 2013). We found an indirect effect for a front office job with customer contact. Specifically, the less favorable hiring ratings for older-looking candidates were mediated by the perception of them as less fit than those who were younger-looking. However, when applying for a back office job, there was neither a direct effect of facial age appearance on hireability nor an indirect effect via fitness impressions (see **Figure 5**).

Discussion

Replicating results of Study 1, Study 2 revealed that HR professionals perceived older-looking candidates as less fit and less hireable than younger-looking candidates, with the effect of age appearance on hireability mediated by its effect on perceived fitness. Furthermore, this facial age-based discrimination was moderated by the professional context: older-looking candidates evoked less favorable fitness impressions resulting in reduced hireability ratings when applying for a front office job, with a

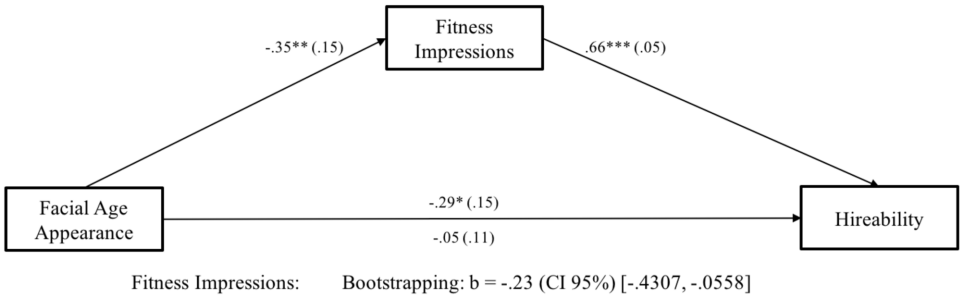

FIGURE 4 | Study 2. $N = 264$. Facial Age Appearance was coded as 0 = younger-looking, 1 = older-looking. Numbers are unstandardized beta-coefficients, with the standard errors shown in parentheses. $^{+}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

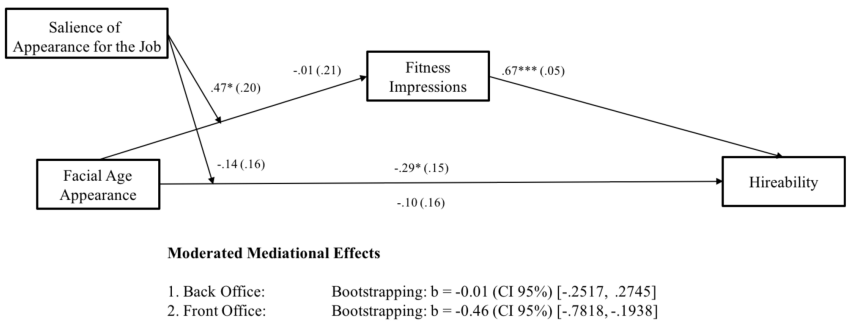

FIGURE 5 | Study 2. $N = 264$. Facial Age Appearance was coded as 0 = young-looking, 1 = old-looking and Salience of Appearance for the Job as 0 = back office, 1 = front office. Numbers are unstandardized beta-coefficients, with the standard errors shown in parentheses. $^{+}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

lot of customer contact, where presumably appearance is made salient. In the case of a back office job, there was neither a direct effect of age appearance on hireability nor an indirect effect mediated by fitness impressions. Thus, age appearance effects seem to be activated only when the nature of the job makes appearance salient. The same pattern of results emerged for selection decisions: when participants had to decide if they would hire the candidate, older-looking candidates were chosen less frequently than younger-looking ones but only when applying for the front office job. As in Study 1, we did not find any effects of chronological age on hireability nor fitness ratings.

GENERAL DISCUSSION

This research shows the detrimental effect of an older facial age appearance in selection decisions as well as its underlying mechanism. The results of two experimental studies show that employees as well as HR professionals give lower hireability ratings to older-looking than to younger-looking candidates, because they perceive the former as less fit than the latter. Moreover, this effect persisted, independently of the chronological age of the candidate.

It has been suggested that judgments of more experienced evaluators differ from those of students because the two groups use different criteria (Finkelstein et al., 1995). However, impression formation based on faces is an automatic process (e.g., Hassin and Trope, 2000; Todorov and Uleman, 2003), and facial appearance can evoke trait impressions without the influence of previous experience or knowledge of this process (Freeman and Ambady, 2011). This might explain why not only lay persons but also HR experts perceived older-looking candidates as less fit and thus judged their hireability as lower than younger-looking candidates. Our research also showed that facial age appearance has a greater impact on hiring than chronological age. This replicates earlier research (Kaufmann et al., 2016), and confirms that facial age appearance is very salient and vivid information.

Moreover our research showed that job context has an impact on face-based age discrimination. Older-looking candidates were chosen less often and their hireability ratings were lower than younger-looking ones when applying for a front office job with a great deal of customer contact but not when applying for a back office job with no customer contact. This suggests that the negative effects of an older facial appearance are not activated when the job description makes appearance less salient.

Results of this research point to fitness impressions as one central mechanism that underlies the effect of facial age appearance on hiring. This was demonstrated by mediation analyses as well as by direct manipulations of the mediator, i.e., candidates' fitness (Study 1). More specifically, the results of Study 1 showed that clear information about candidates' fitness in the résumé buffered the negative effect of an older appearance on

fitness impressions and hireability. Interestingly, this buffering was achieved not only by information that specifically targeted a candidate's physical and cognitive fitness (in this research, running marathons as a hobby) but also by more general information about cognitive fitness (in this research, award winning cooking as a hobby). Both circumvented the face-based age bias by reducing negative fitness impressions which in turn increased hireability ratings of older-looking candidates. The ameliorative effect of the cooking hobby might be related to early research showing that effects of diagnostic information (like age appearance) are mitigated by irrelevant individuating information, which has been called the dilution effect (Nisbett et al., 1981).

Taken together, the results of this research point to the importance of differentiating between candidates' chronological age and age-appearance when investigating age discrimination in personnel selection procedures. Whereas candidates' facial age appearance was found to drive age discrimination explained by negative fitness impressions of an older appearance, chronological age did not explain older candidates disadvantages in personnel selection. Therefore, new directions for models of age discrimination are demanded. Whereas models of age discrimination claim that chronological age triggers age stereotyping which in turn results in discrimination, current models of person construal (e.g., Freeman and Ambady, 2011) propose that discrimination is a product of the joint influence of category information (e.g., chronological age) and sensory cues (e.g., facial age appearance). We therefore investigated, for the first time, both sources of age information in combination and found that the influence of facial age appearance exceeds that of chronological age. Moreover, we identified one key mechanism of facial-age based discrimination by showing that an older facial age appearance triggers lower fitness impressions resulting in less favorable hireability ratings for older-looking candidates compared to younger-looking ones. Furthermore, we also documented that the impact of an older facial age appearance on hireability depended on the professional context, namely specific job requirements (back versus front office). Taken together our results indicate that current models of age discrimination need to be extended by taking the effects of facial age information and its underlying mechanisms into account.

Reducing Face-Based Age Discrimination at Hiring

The results of Study 1 suggest that job candidates themselves can use a strategy to reduce age discrimination: providing counter-stereotypic information to refute potentially prejudiced impressions in recruiters (e.g., Heilman and Okimoto, 2007). It has been observed that older job applicants who are aware of age-related biases attempt to signal skills their age group is believed to lack or to change their appearance to look more youthful (Berger, 2009). However, such strategies combat only the symptoms and not the cause of age discrimination in personnel selection. Therefore, not only do candidates themselves need strategies to prevent discrimination, but also organizations need measures to create a discrimination-free environment in recruitment (Spencer et al., 2016).

One promising organizational strategy to reduce face-based age discrimination at hiring would be to exclude photographs from résumés, so that there is no information on facial-age appearance, at least during the first phase of résumé screening. Indeed, chronologically older and older-looking candidates were found to have similar chances of employment as did both chronologically younger and younger-looking candidates in anonymous application procedures (Kaufmann et al., 2016). In some countries, there is already a tendency to use résumés without photographs in recruitment suggesting that the classic application photograph will become less important in the future (Weitzel et al., 2015). But at the same time, the problem of facial age-based discrimination survives in modern forms of recruitment, where candidates' photographs are gaining importance, for instance, in social media like LinkedIn, where candidates are encouraged to upload a photograph in order to be successful.

Limitations and Directions for Future Research

In past research, when candidate's chronological age and facial age appearance were examined independently of each other, only an older facial appearance, but not a chronological older age had a negative effect on being selected for an interview (Kaufmann et al., 2016). In the present research, detrimental effects of an older facial age appearance on hireability persisted, independently of the chronological age of the candidate. One explanation might be that chronological age is less salient and vivid, although, we tried to make candidate's chronological age as salient as possible by including date of birth as well as years of life in parentheses. Additionally, age biases are generally weak (e.g., Kite et al., 2005) and we described all candidates in the fictitious résumés as highly qualified (e.g., detailed information about qualifications and work experiences). Another possibility is that people made an effort not to discriminate based on age. Whereas this may engage controlled processing that eliminates discrimination based on chronological age, it is less likely to mitigate discrimination based on age-appearance which involves automatic processing. Finally, earlier research has shown that most jobs are associated with a specific (implicit) age norm (Lawrence, 1988). Age norms that favor younger workers are found to be strongly associated with industries such as finance, insurance, retailing, and information technology/computing (Arrowsmith and McGoldrick, 1996; Perry and Finkelstein, 1999). If older workers apply for a job with a younger age norm, they will be more likely to face age discrimination (Perry et al., 1996). Thus, it might be that not only older-looking candidates but also chronologically older candidates will receive less favorable hireability ratings compared to younger candidate if the respective job is associated with a younger age norm. Nevertheless, more research is needed about the influence of chronological age and facial age appearance in hiring decisions for different jobs in different industries.

We did not find a double standard of aging for older women compared to older men in hireability ratings, which some previous research suggests might be expected due to the so-called double standard of aging: women are more readily categorized as "old" than men are. As a consequence (negative) age stereotypes hit women at a younger age than men (e.g., Kite et al., 2005). Older women are also perceived as less attractive than men of the same age (McKelvie, 1993; McLellan and McKelvie, 1993; but for an exception see Zebrowitz et al., 1993 who compared the same people across the lifespan). Our study may have been insensitive to the double standard of aging because we choose photographs of older and younger candidates who were perceived as equal in both attractiveness and likeability (Kaufmann et al., 2016). However, this methodology has the strength of ruling out the possibility that older-looking applicants were judged as less hireable simply because they were less attractive or less likeable.

We only used photographs of Caucasians in our studies. Like age-related facial qualities, those related to ethnicity lead to categorization and are directly associated with stereotypic traits that may affect perceived fitness for a job (e.g., Maddox and Gray, 2002). It remains to be determined whether the effects of facial age appearance and the null effects of chronological age would generalize to different ethnic groups.

Finally, future research should investigate ageist attitudes as potential moderators of face-based age discrimination, as meta-analytical research showing that ageist attitudes and age stereotypes can produce stronger discriminatory reactions to older workers in organizational settings (Kite and Johnson, 1988; Finkelstein et al., 1995; Gordon and Arvey, 2004).

CONCLUSION

The present research underlines the importance of facial age appearance at hiring. Results of two experimental studies demonstrate the detrimental effects of an older facial appearance that exist independently of candidates' chronological age, and that are driven by unfavorable fitness impressions of older-looking candidates. However, although older faces automatically evoke unfavorable fitness impressions, which have a negative impact on hiring decisions, our research also shows that this negative impact is most pronounced for jobs where appearance is salient and that it is possible to reduce face-based age discrimination by providing positive information about candidates' fitness and capability. One important implication of our findings is that removing photographs from applications may eliminate age discrimination in the first phase of a recruitment process or before employers see a candidate's social media profile. Our results further imply that older candidates can take steps to increase their hireability by including personalizing information on their résumé, particularly those demonstrating physical or cognitive fitness.

ETHICS STATEMENT

Prior to data collection, the ethical committee of the University of Lausanne (Faculty of Business and Economics) approved both studies as being risk-free for participants and as maintaining their anonymity.

AUTHOR CONTRIBUTIONS

MK, FK, and SS developed the initial research idea and the concrete study concept was generated by those authors. MK performed the data analysis. MK together with FK and LZ interpreted the results. MK drafted the manuscript, and FK, SS, and LZ provided critical revisions. All authors approved the final version of the manuscript for submission.

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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.2017.02065/full#supplementary-material

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Age-Differential Effects of Job Characteristics on Job Attraction: A Policy-Capturing Study

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Based on an integration of job design and lifespan developmental theories, Truxillo et al. (2012) proposed that job characteristics interact with employee age in predicting important work outcomes. Using an experimental policy-capturing design, we investigated age-differential effects of four core job characteristics (i.e., job autonomy, task variety, task significance, and feedback from the job) on job attraction (i.e., individuals' rating of job attractiveness). Eighty-two employees between 19 and 65 years (M_{age} = 41, SD = 14) indicated their job attraction for each of 40 hypothetical job descriptions in which the four job characteristics were systematically manipulated (in total, participants provided 3,280 ratings). Results of multilevel analyses showed that the positive effects of task variety, task significance, and feedback from the job were stronger for younger compared to older employees, whereas we did not find significant age-differential effects of job autonomy on job attraction. These findings are only partially consistent with propositions of Truxillo et al.'s (2012) lifespan perspective on job design.

Keywords: age, job design, job characteristics, job attraction, policy-capturing

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INTRODUCTION

Populations and workforces around the globe are aging and becoming increasingly age diverse (Hedge and Borman, 2012; Truxillo et al., 2015). This implies that organizations have to identify effective ways to attract highly qualified younger and older job applicants. So far, however, only a small number of survey studies have examined age-differential associations between job characteristics and work outcomes (e.g., Zaniboni et al., 2013, 2014). Using an experimental policy-capturing design (Aguinis and Bradley, 2014), the goal of the present study was to investigate which jobs are most attractive to younger and older workers, respectively. Adopting a lifespan perspective on job design, Truxillo et al. (2012) suggested that young and older workers have different preferences with regard to job characteristics. They offered a model, based on an integration of job design and lifespan developmental theories, that outlines possible moderating effects of age on relationships between various job characteristics and work outcomes.

With this article, we aim to contribute to the literature on age and job design in three ways: First, using an experimental vignette methodology design, we conduct a rigorous empirical investigation of core propositions of Truxillo et al.'s (2012) lifespan perspective on job design. In particular, we investigated how four core job characteristics influence workers' job attraction, and whether these influences vary depending on age (see also Griffiths, 1999; Truxillo and Zaniboni, 2017).

Second, Truxillo et al. (2012) included job satisfaction, work engagement, and performance as outcome variables in their model. We extend research on this model by focusing on job attraction,

or individuals' ratings of job attractiveness, as an outcome variable. Job attraction describes the extent to which applicants would like to carry out a given job (Singh, 1975; Rynes and Lawler, 1983; Rynes and Miller, 1983). In the context of an aging workforce and a "war for talent," it is important to investigate predictors of job attraction, as organizations are interested in attracting and hiring highly qualified or qualifiable younger and older job applicants (Zacher et al., in press).

Job attraction is a popular criterion in the recruitment literature. It differs from other recruitment-related constructs such as job pursuit intentions, acceptance intentions, and job choice (Chapman et al., 2005). Job attraction is typically measured by asking applicants to provide an overall evaluation of the attractiveness of the job they are applying for (e.g., "How attractive is the job to you?"; Saks et al., 1994). In contrast, job pursuit intentions include "a person's desire to submit an application, attend a site visit or second interview, or otherwise indicate a willingness to enter or stay in the applicant pool without committing to a job choice" (Chapman et al., 2005, p. 929). Acceptance intentions describe "the likelihood that an applicant would accept a job offer if one were forthcoming" (Chapman et al., 2005, p. 929). Finally, job choice is an action that entails "choosing whether to accept a real job offer involving an actual job" (Chapman et al., 2005, p. 929).

According to Chapman et al. (2005), the influence of job characteristics on job attraction can be explained by objective factor theory (Behling et al., 1968), which states that applicants form their job-related attitudes based on evaluations of objective job or position characteristics. Surprisingly, however, research on the effects of motivational job characteristics, particularly those proposed by the job characteristics model (i.e., job autonomy, task variety, task identity, task significance, feedback from the job; Hackman and Oldham, 1976), is very sparse. We identified only one early study by Farh and Scott (1983), which showed that three of these job characteristics (i.e., job autonomy, task variety, and feedback from the job) are positively and moderately related to job attraction. Thus, our study also contributes to the literature by investigating general effects of job characteristics on job attraction.

Finally, the results of our study could inform how jobs are designed and advertised, to increase the likelihood that younger and older people apply for open job positions in the first place. In addition, our results may provide advice to companies on how to (re-)structure jobs so that younger and older workers are more likely to stay with the organization, are more satisfied with their job conditions, and potentially work more efficiently (Zacher and Schmitt, 2016).

JOB CHARACTERISTICS AND AGE

Organizational researchers have argued that job characteristics influence employees' psychological states and, in turn, work outcomes such as job satisfaction, strain, absenteeism, and turnover (Hackman and Oldham, 1976; Fried and Ferris, 1987; Steyn and Vawda, 2014). Chapman et al. (2005) showed in their meta-analysis that job attraction is influenced directly by job and position characteristics (i.e., compensation and advancement, pay, type of work) and organizational characteristics (i.e., work environment, organizational image, location, size, familiarity, work hours). However, these researchers did not include motivational job characteristics in their meta-analysis.

Morgeson and Humphrey (2006) reviewed an extensive array of important job characteristics and combined several characteristics in a comprehensive measurement tool, the Work Design Questionnaire (WDQ). In our study, we focus on four job characteristics included in both job characteristics theory (Hackman and Oldham, 1976) and the WDQ, which have been identified as having age-differential effects on work outcomes by Truxillo et al. (2012). Specifically, we included four job characteristics (i.e., job autonomy, task variety, task significance, feedback from the job) that belong to the broader category of task characteristics. According to Morgeson and Humphrey (2006), task characteristics include those features of the job that describe how the work itself is done and the nature and breadth of tasks in a job (in addition to task characteristics, Morgeson and Humphrey (2006) include knowledge characteristics, social characteristics, and contextual characteristics).

Job Autonomy

Job autonomy refers to the extent to which workers are able to independently make decisions, and have autonomy in planning and carrying out their work tasks (Hackman and Oldham, 1976; Morgeson and Humphrey, 2006). Job autonomy has been shown to be positively related to job satisfaction and work motivation (Humphrey et al., 2007). In their model, Truxillo et al. (2012) suggest that job autonomy has a stronger positive effect on job satisfaction and performance among older compared to younger workers. Older workers typically have been working in their jobs for longer and therefore are more interested in autonomy to make use of their experiential knowledge and skills (see also Zacher and Frese, 2009). They further proposed that younger workers are still gaining work experience and have a higher need for supervision and thus expect less autonomy. Furthermore, Truxillo et al. (2012) suggested that older workers value job autonomy more than younger workers because it allows them to adapt to job demands and possibly compensate for age-related limitations, such as decreases in physical strength and fast information processing abilities (Kanfer and Ackerman, 2004). Therefore, job autonomy should be more attractive to older compared to younger workers. Consistent with these assumptions, a study by Zaniboni et al. (2016) showed that job autonomy was stronger positively related to the job satisfaction of older compared to younger construction workers. Job satisfaction, in turn, was positively related to mental health.

Hypothesis 1: *The positive effect of job autonomy on job attraction is moderated by age, such that the effect is stronger for older compared to younger workers.*

Task Variety

Task variety describes the diversity of the job requirements, that is, how many different tasks a worker is expected to perform as part of the job (Hackman and Oldham, 1976; Morgeson and Humphrey, 2006). Jobs that have higher levels of task variety are generally assumed to be more pleasant to perform

(Humphrey et al., 2007). Lifespan theories (e.g., Carstensen et al., 1999) propose that younger workers will find high task variety more useful than older workers, as they have yet to gain experience in different tasks, whereas older workers already have acquired skills necessary for the job (see also Truxillo et al., 2012). Thus, older workers might see task variety as a burden in that they have to fulfill tasks that do not focus on their existing experience and specialized expertise. Task variety should therefore be more attractive for younger compared to older workers. This proposition has been supported by survey research which found that task variety has a stronger influence on younger workers' job satisfaction (Zaniboni et al., 2013, 2014).

Hypothesis 2: *The positive effect of task variety on job attraction is moderated by age, such that the effect is stronger for younger compared to older workers.*

Task Significance

Task significance refers to the influence and impact that people's jobs have on other people's lives or work (Hackman and Oldham, 1976; Morgeson and Humphrey, 2006). Perceptions of task significance are thought to enhance workers' experience of meaningfulness, which is believed to mediate the relationship between task significance and work outcomes (Humphrey et al., 2007). Furthermore, task significance is positively related to job satisfaction, work motivation, and performance (Humphrey et al., 2007; Grant, 2008). Based on the lifespan theory of socioemotional selectivity (Carstensen et al., 1999), Truxillo et al. (2012) argued that older workers are more likely to value task significance in a job than younger workers. Workers are increasingly looking for meaning in their jobs as they get older (and their future time perspective becomes more limited), whereas younger workers (who typically have higher levels of future time perspective) are more focused on acquiring new and useful skills and various job-related experiences.

Hypothesis 3: *The positive effect of task significance on job attraction is moderated by age, such that the effect is stronger for older compared to younger workers.*

Feedback from the Job

Feedback from the job reflects the extent to which workers receive direct and explicit feedback on how effectively they are performing the required tasks (Hackman and Oldham, 1976; Morgeson and Humphrey, 2006). Feedback from the job refers to feedback that is obtained through the results of a worker's performance rather than feedback given by other people (Morgeson and Humphrey, 2006). Feedback has a positive influence on job satisfaction, work motivation, as well as job performance (Humphrey et al., 2007). Truxillo et al. (2012) suggested in their model that feedback from the job will be particularly valued by younger workers as they still lack work experience and seek feedback to improve their performance to further their careers. In contrast, older workers are more experienced and have more confidence regarding their performance and therefore need less feedback (Wang et al., 2015). Feedback should therefore be more attractive for younger compared to older workers.

Hypothesis 4: *The positive effect of feedback from the job on job attraction is moderated by age, such that the effect is stronger for younger compared to older employees.*

METHODS

We used a policy-capturing design, a specific design that is part of the broader category of experimental vignette methodology designs, to test our hypotheses. Experimental vignette methodology designs can be used to assess behaviors, attitudes, and intentions in experimental settings while improving experimental realism through the construction of realistic scenarios (Aguinis and Bradley, 2014). Aguinis and Bradley (2014) suggest that policy-capturing designs are a particularly useful method for assessing implicit decision-making processes.

In the present study, we created hypothetical scenarios in which each of the four job characteristics (i.e., job autonomy, task variety, task significance, and feedback from the job) was manipulated (Karren and Barringer, 2002). Specifically, a number of scenarios was created using statements from the German version of the WDQ (Morgeson and Humphrey, 2006; Stegmann et al., 2010). For each scenario, participants were asked to rate the attractiveness of the job described in the scenario. In line with best practices (Aiman-Smith et al., 2002; Rotundo and Sackett, 2002; Ohme and Zacher, 2015), we conducted a pilot study before the main study to validate the statements used in the scenarios.

Both the pilot study and the main study were reviewed and approved by the Ethical Committee Psychology at the University of Groningen (Netherlands; see http://www.rug.nl/research/heymans-institute/organization/ecp/?lang$=$en). All participants gave written informed consent in accordance with the Declaration of Helsinki.

Pilot Study

Participants and Procedure

In total, 20 participants completed the pilot study after they were provided with a link to an online survey. Participants were recruited through personal and professional contacts in Germany. No demographic data were collected.

Materials and Measures

Statements describing different levels of each of the four job characteristic were shown to the pilot study participants. For each job characteristic, three statements were chosen randomly from the respective items provided by the WDQ (Morgeson and Humphrey, 2006). Each statement was shown with three different levels of intensity (low, medium, high). Thus, there were nine statements per job characteristic. Participants were asked, "How much autonomy does this job offer?," "How much task variety does this job offer?," "How significant or important is this job?," and "How much feedback does this job offer?," respectively. Participants were asked to indicate their answers on 7-point scales ranging from "very little" (1) to "very much" (7). **Table 1** shows the wording of the items and descriptive statistics of the pilot study.

TABLE 1 | Descriptive statistics from pilot study ($N = 20$).

Job characteristics/Items	Low level		Medium level		High level		Difference low-medium	Difference medium-high
	M	*SD*	*M*	*SD*	*M*	*SD*	*t*	*t*
JOB AUTONOMY								
The job (very rarely/sometimes/very often) gives me a chance to use my personal initiative or judgment in carrying out the work.	1.53	0.77	3.68	0.75	6.16	0.77	−12.30***	−13.96***
The job allows me to make (very few/some/a lot of) decisions on my own.	1.37	0.76	3.74	0.65	6.63	0.50	−12.43***	−22.25***
The job provides me with (very little/moderate/significant) autonomy in making decisions.	1.74	1.28	4.11	0.46	6.32	1.16	−8.52***	−7.84***
TASK VARIETY								
The job involves performing a (low/moderate/great) variety of tasks.	1.30	0.47	4.15	0.49	6.45	0.76	−26.05***	−14.04***
The job (very rarely/sometimes/very often) involves doing a number of different things.	1.25	0.44	4.00	0.80	6.55	0.61	−15.64***	−12.07***
The job (very rarely/sometimes/very often) requires the performance of a wide range of tasks.	1.30	0.57	4.00	0.46	6.35	0.75	−16.48***	−15.67***
TASK SIGNIFICANCE								
The results of my work (very rarely/sometimes/very often) significantly affect the lives of other people.	2.35	1.27	4.20	0.41	6.35	0.81	−6.75***	−10.30***
The work performed on the job has a (very small/moderate/significant) impact on people outside the organization.	2.40	1.43	4.35	0.75	6.25	0.79	−7.61***	−7.03***
The job has a (little/moderate/large) impact on people outside the organization.	2.37	1.17	4.11	0.81	6.47	0.84	−5.90***	−10.21***
FEEDBACK FROM THE JOB								
The work activities themselves provide (very rarely/sometimes/very often) direct and clear information about the effectiveness (e.g., quality and quantity) of my job performance.	1.50	0.76	3.95	0.69	6.45	0.76	−10.97***	−9.38***
The job itself (very rarely/sometimes/very often) provides feedback on my performance.	2.45	1.57	3.90	0.64	6.20	1.06	−3.81***	−9.52***
The job itself provides me (very rarely/sometimes/very often) with information about my performance.	1.90	0.91	3.90	0.85	6.55	0.76	−7.65***	−11.40***

*Items were adapted from the Work Design Questionnaire (Morgeson and Humphrey, 2006). Items were followed by the questions: "How much autonomy does this job offer?," "How much task variety does this job offer?," "How significant is this job?," and "How much feedback does this job offer?," respectively. Responses were provided on 7-point scales ranging from 1 (very little) to 7 (very much). ***$p < 0.001$.*

Results of a series of *t*-tests showed that the differences between participants' ratings of low intensity statements vs. medium intensity statements, as well as the differences between participants' rating of medium intensity statements vs. high intensity statements for each of the job characteristic statements were significant and consistent with expectations, in that low intensity statements were rated lower than medium intensity statements and medium intensity statements were rated lower than high intensity statements (see **Table 1**). Thus, we concluded that it was acceptable to use the statements to create the scenarios for our main study.

Main Study

Participants and Procedure

We recruited a convenience sample for the main study, again relying on personal and professional contacts in Germany. Participants were contacted by the second author and asked whether they would be willing to take part in a research study on job design. After a short introduction and explanation of the study, participants were provided with a link to an online survey. In total, 114 people started the online survey and answered at least one question. However, only 82 workers provided sufficient information on the study variables to be included into the analyses. All participants were employed or self-employed. There were 46 female participants and 36 male participants. Ages ranged from 19 to 65 years ($M = 41.41$, $SD = 14.08$). Participants had been working in their current jobs for an average of 14.44 years ($SD = 12.57$). The sample was highly educated with 42 of the participants (51.2%) holding a university degree, and another 20 (24.4%) of the participants having acquired the German general qualification for entering university. Participants' professions were very

diverse. For example, job descriptions included teachers, lawyers, administrators, and biologists.

Materials and Measures

We set up an online survey in which participants were first asked to answer some general demographic questions, including age, gender, education, job tenure, and job description. Subsequently, participants were instructed to read a series of descriptions of hypothetical job descriptions and rate how much they would like to carry out these jobs. Each job description included four statements validated in the pilot study; the statements presented different levels of job autonomy, task variety, task significance, and feedback from the job. As in the pilot study, for each job characteristic there were three different statements based on the WDQ items (Morgeson and Humphrey, 2006), and for each statement there were three different levels of intensity: low, medium, and high. The statements for each scenario were chosen randomly with regard to the statement itself, as well as with regard to the intensity level of each job characteristic. In total, we created 41 scenarios, including one duplicate scenario to assess reliability (Rotundo and Sackett, 2002; Ohme and Zacher, 2015). Each scenario contained four randomly selected and randomly ordered statements. This was done to avoid possible primacy or recency effects (Rotundo and Sackett, 2002). The order in which the scenarios were presented to participants was also randomized. Participants provided their ratings of job attraction on a 7-point Likert scale ranging from "very strongly disagree" (1) to "very strongly agree" (7). An example scenario is shown in **Figure 1**. Overall, 82 participants provided 3,280 ratings, suggesting that all participants rated all 40 job descriptions.

As participants' demographic characteristics and characteristics of their current jobs may influence job attraction (Chapman et al., 2005), we controlled in the analyses for gender (1 = *male*, 2 = *female*), education (ranging from 1 = *no school degree* to 5 = *university degree*), job tenure (in years), and the characteristics of participants current jobs. We coded job descriptions provided by participants using the Occupational Information Network (O*Net) database (Peterson et al., 2001; see https://www.onetonline.org/) and a coding scheme developed by Gonzalez-Mulé (2015). Specifically, as outlined by Gonzalez-Mulé (2015), we used values of items from the work activities and work context inventories of O*NET that correspond to the four job characteristics of interest. Specifically, job autonomy was measured with the item "freedom to make decisions" (i.e., how much decision making freedom, without supervision, does the job offer?); task variety was measured with the item "importance of repeating the same task" (reverse coded; i.e., how important is repeating the same physical activities... or mental activities... over and over, without stopping, to performing this job?); task significance was measured with the item "impact of decisions on co-workers or company results" (i.e., what results do your decisions usually have on other people or the image or reputation or financial resources of your employer?); and feedback from the job was measured with the item "making decisions and solving problems" (i.e., how often workers receive feedback on their performance and act upon it; see Table 5 in Gonzalez-Mulé, 2015). The values of the O*Net items were obtained from a large random sample of job incumbents who rated the extent to which their jobs are characterized by the different descriptors. Previous research has demonstrated the high reliability of the O*Net inventories (Childs et al., 1999; Strong et al., 1999; Peterson et al., 2001).

Statistical Analyses

Data were analyzed with random coefficient (i.e., multilevel) models using the hierarchical linear modeling software (Hofmann et al., 2000; Raudenbush et al., 2011), because scenario ratings were nested within participants and the software supports the analysis of both within- as well as between-person variance (Kristof-Brown et al., 2002; Rotundo and Sackett, 2002). The within-person predictors of job attraction (i.e., the independent variables of job autonomy, task variety, task significance, and feedback from the job) were group-mean centered. Age as a between-person predictor and moderator variable was centered at the grand mean (the control variables

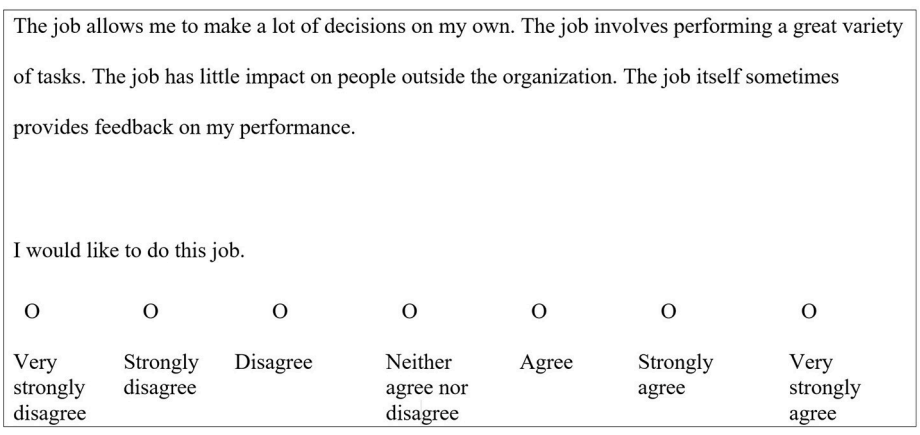

FIGURE 1 | Example Scenario. The scenario describes a job with high levels of job autonomy and task variety, as well as low levels of task significance and medium levels of feedback from the job.

were also grand mean centered). To probe significant interaction effects, we created plots of the regions of significance, which show the simple slopes (i.e., effect of job characteristic on job attraction) for different values of the moderator variable (i.e., age; Bauer and Curran, 2005; Preacher et al., 2006). In addition, this plotting technique may help detect potential curvilinear moderating effects of age (Rauschenbach et al., 2013; Zacher and Schmitt, 2016).

RESULTS

Preliminary Analyses

Descriptive statistics and correlations of the study variables are shown in **Table 2**. Of note, at the bivariate and between-person level, aggregated job attraction ratings were negatively related to age, job tenure, and job autonomy (O*Net). Thus, older workers, as well as workers with higher job tenure and higher job autonomy generally rated the hypothetical job descriptions less favorably.

We first ran a null (or intercept-only) model to test whether the use of multilevel modeling was appropriate. The chi-square test for the intercept (r_0) was significant, $\chi^2_{(81)} = 473.90$ with $p < 0.001$, and the intraclass correlation coefficient was 0.12 (see **Table 3**). This value indicates that approximately 12% of the variance in job attraction can potentially be explained by between-person factors (e.g., participants' age), leaving approximately 88% of the variance that could potentially be explained by within-person factors (i.e., the job characteristics in our study). Thus, the use of multilevel modeling in our study was appropriate.

To assess test-retest reliability, we included a duplicate scenario in our study (see also Rotundo and Sackett, 2002; Ohme and Zacher, 2015). The duplicate scenario was not included in subsequent analyses. Results showed that Cronbach's alpha was $\alpha = 0.65$, indicating acceptable test-retest reliability of the job attraction ratings.

Main Effects of Age and Job Characteristics

Results of the multilevel analysis showed that, at the between-person level, neither age nor the other demographic characteristics and control variables significantly predicted job attraction (see **Table 3**). In contrast, at the within-person level, all four job characteristics positively predicted job attraction

TABLE 3 | Results of multilevel analysis predicting job attraction.

Predictor	Null model			Predictor model		
	γ	*SE*	*t*	*γ*	*SE*	*t*
Intercept	3.55	0.06	56.36***	3.55	0.06	59.54***
BETWEEN-PERSON PREDICTOR AND CONTROL VARIABLES						
Age				−0.01	0.01	−1.39
Gender				0.09	0.14	0.63
Education				0.00	0.08	0.04
Job tenure				−0.00	0.01	−0.03
Job autonomy (O*Net)				−0.01	0.01	−1.65
Task variety (O*Net)				−0.00	0.00	−0.54
Task significance (O*Net)				0.00	0.01	0.52
Feedback from the job (O*Net)				−0.00	0.01	−0.13
WITHIN-PERSON PREDICTORS						
Job autonomy				0.73	0.03	27.74***
Task variety				0.58	0.03	19.87***
Task significance				0.36	0.03	13.64***
Feedback from the job				0.37	0.03	14.47***
CROSS-LEVEL INTERACTIONS						
Job autonomy × Age				−0.00	0.00	−1.89
Task variety × Age				−0.01	0.00	−3.69***
Task significance × Age				−0.01	0.00	−4.99***
Feedback from the job × Age				−0.01	0.00	−3.12***
VARIANCE COMPONENTS						
Level 1 (σ^2)		1.95			1.30	
Level 2 Intercept (τ_{00})		0.26			0.25	
ADDITIONAL INFORMATION						
ICC		0.12				
Pseudo R^2					0.30	

*N = 82 participants provided 3,280 job attraction. Unstandardized coefficients (γ) and standard errors (SE) are shown. ICC, intraclass correlation coefficient. The ICC is calculated by dividing the between-person variance component (τ_{00}) of the null model (i.e., the model with no predictors) by the sum of τ_{00} and the within-person variance component (σ^2) of the null model. Pseudo R^2, proportion of variance explained in dependent variable by predictors at the between-person and within-person levels. ***p < 0.001.*

TABLE 2 | Descriptive statistics and correlations.

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9
1. Job attraction	3.57	0.58	–								
2. Age	41.41	14.08	−0.37**	–							
3. Gender[a]	1.56	0.50	0.16	−0.34**	–						
4. Education	4.24	0.88	0.03	−0.07	0.19	–					
5. Job tenure	14.44	12.57	−0.28*	0.82**	−0.30**	−0.34**	–				
6. Job autonomy (O*Net)	81.49	9.79	−0.25*	0.19	0.10	0.08	0.06	–			
7. Task variety (O*Net)	40.65	16.75	−0.10	0.08	−0.05	0.26*	−0.07	0.14	–		
8. Task significance (O*Net)	71.84	12.86	−0.10	0.01	0.11	0.14	−0.09	0.70**	0.26*	–	
9. Feedback from the job (O*Net)	63.17	11.40	−0.09	0.07	−0.18	0.11	−0.03	0.30**	0.38**	0.59**	–

*N = 82. [a]1, male; 2, female. O*Net, Occupational Information Network (https://www.onetonline.org).*
***p < 0.01; *p < 0.05.*

(**Table 3**). Specifically, we found positive and significant main effects of job autonomy ($\beta_1 = 0.73$, $p < 0.001$), task variety ($\beta_2 = 0.58$, $p < 0.001$), task significance ($\beta_3 = 0.36$, $p < 0.001$), and feedback from the job ($\beta_4 = 0.37$, $p < 0.001$). These findings suggest that job autonomy and task variety were somewhat more important predictors of job attraction than task significance and feedback from the job.

Moderating Role of Age

Hypothesis 1 states that age moderates the positive effect of job autonomy on job attraction, such that the effect is stronger for older compared to younger workers. Results showed that the moderating effect of age was not significant ($\beta_{11} = -0.00$, $p = 0.060$; see **Table 3**). Thus, Hypothesis 1 did not receive support. Nevertheless, we plotted the effect of job autonomy on job attraction for different values of age, including younger workers (i.e., $-1SD$ of age), middle-aged workers (i.e., mean age), and older workers (i.e., $+1SD$ of age). **Figure 2** shows that the simple slope was positive and significant for younger ($\gamma = 0.78$, $SE = 0.04$, $t = 20.88$, $p < 0.001$), middle-aged ($\gamma = 0.73$, $SE = 0.03$, $t = 27.74$, $p < 0.001$), and older workers ($\gamma = 0.68$, $SE = 0.04$, $t = 18.37$, $p < 0.001$). The non-significant interaction effect and the plot of the regions of significance suggest that the simple slopes did not differ for the various age groups included in our sample.

According to Hypothesis 2, age moderates the positive effect of task variety on job attraction, such that the effect is stronger for young compared to older workers. Consistent with this hypothesis, we found a moderating effect of age ($\beta_{22} = -0.01$, $p < 0.001$; **Table 3**). As can be seen in **Figure 3**, the positive effect of task variety on job attraction was stronger for younger workers ($\gamma = 0.69$, $SE = 0.04$, $t = 16.66$, $p < 0.001$) than for middle-aged workers ($\gamma = 0.58$, $SE = 0.03$, $t = 19.87$, $p < 0.001$) and for older workers ($\gamma = 0.47$, $SE = 0.04$, $t = 11.47$, $p < 0.001$). In addition, the plot of the regions of significance suggests that the simple slopes were significant across all age groups included in our sample. Hypothesis 2 was, therefore, supported.

Hypothesis 3 states that age moderates the positive effect of task significance on job attraction, such that the effect is stronger for older compared to younger workers. We found a significant moderating effect of age ($\beta_{33} = -0.01$, $p < 0.001$; **Table 3**). However, the positive effect of task significance on job attraction was stronger for younger workers ($\gamma = 0.49$, $SE = 0.04$, $t = 59.54$, $p < 0.001$) than for middle-aged workers ($\gamma = 0.36$, $SE = 0.03$, $t = 13.64$, $p < 0.001$) and for older workers ($\gamma = 0.23$, $SE = 0.04$, $t = 6.16$, $p < 0.001$; see **Figure 4**). Again, the plot of the regions of significance suggests that the simple slopes were significant across all age groups included in our sample. Thus, as we found the opposite to what we proposed, Hypothesis 3 was not supported.

Finally, Hypothesis 4 proposes that age moderates the positive effect of feedback from the job on job attraction, such that the effect is stronger for younger compared to older workers. This hypothesis was supported by a significant moderating effect of age ($\beta_{44} = -0.01$, $p < 0.001$) and an interaction consistent with the hypothesized pattern. The plot of the regions of significance suggests that the simple slopes were significant across all age groups included in our sample (**Figure 5**). Specifically, the positive effect of feedback from the job on job attraction was stronger for younger workers ($\gamma = 0.46$, $SE = 0.04$, $t = 12.55$, $p < 0.001$) than for middle-aged workers ($\gamma = 0.37$, $SE = 0.03$, $t = 14.47$, $p < 0.001$) and for older workers ($\gamma = 0.29$, $SE = 0.04$, $t = 7.93$, $p < 0.001$).

Overall, according to the pseudo R^2 statistic (LaHuis et al., 2014), age, control variables, job characteristics, and interactions between age and job characteristics explained 30% of the variance in job attraction (see **Table 3**).

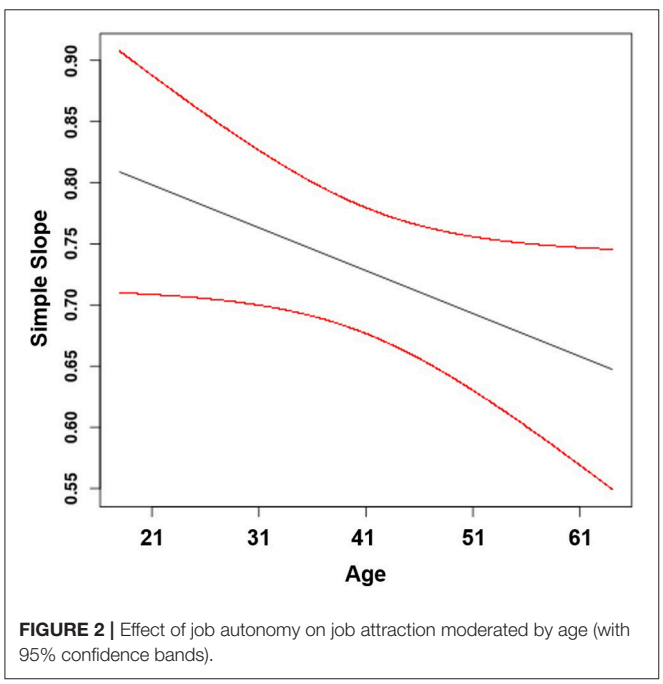

FIGURE 2 | Effect of job autonomy on job attraction moderated by age (with 95% confidence bands).

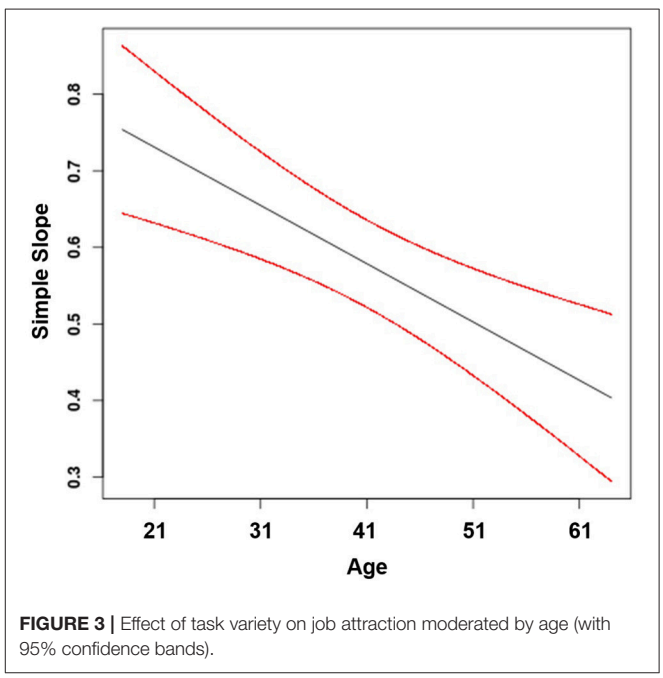

FIGURE 3 | Effect of task variety on job attraction moderated by age (with 95% confidence bands).

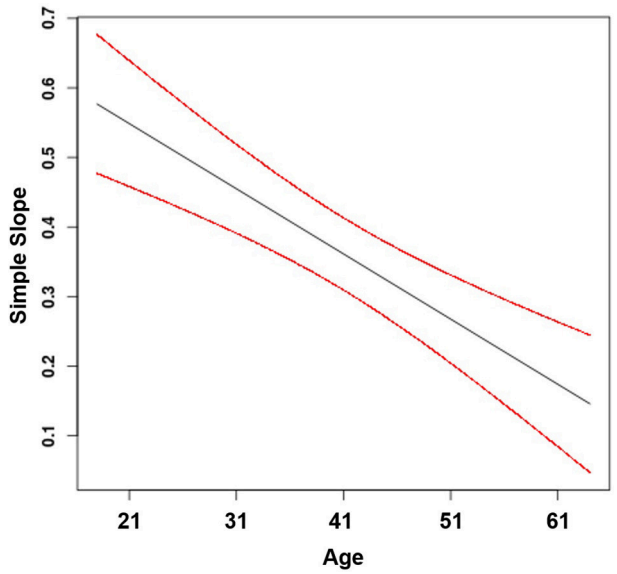

FIGURE 4 | Effect of task significance on job attraction moderated by age (with 95% confidence bands).

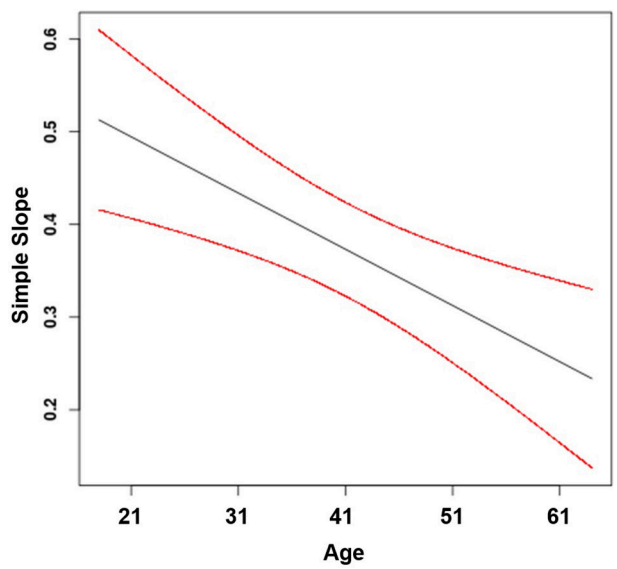

FIGURE 5 | Effect of feedback from the job on job attraction moderated by age (with 95% confidence bands).

DISCUSSION

Summary and Interpretation of Findings

The goal of this study was to test core propositions of Truxillo et al. (2012) lifespan perspective on job design using a policy-capturing design, which is one type of experimental vignette methodology designs. Consistent with previous research on the positive effects of job characteristics on other work outcomes such as job satisfaction, work engagement, and job performance (Fried and Ferris, 1987; Humphrey et al., 2007), we found that job autonomy, task variety, task significance, and feedback from the job had positive main effects on participants' ratings of job attraction. Furthermore, we found age-differential effects for three out of the four job characteristics, of which two were consistent with the hypothesized pattern (i.e., those including task variety and feedback).

We did not find support for our first hypothesis, which stated that job autonomy has a stronger positive effect on job attraction among older compared to younger workers. It is important to note here that the interaction effect was not significant according to conventional cut-offs ($p = 0.06$) and, thus, statistical power may have been a problem. However, the interaction plot suggested that job autonomy has somewhat stronger effects among younger compared to older workers, which is contrary to our assumption based on the lifespan perspective on job design. In their model, Truxillo et al. (2012) suggested that older workers value job autonomy more than younger workers because they are more experienced and need less supervision compared to younger, less experienced workers. Consistently, Zaniboni et al. (2016) found that job autonomy was more important for older construction workers in terms of job satisfaction and mental health. However, meta-analytic research on age-differential effects of job autonomy on work outcomes has yielded mixed results (Ng and Feldman, 2015). For instance, the association between job autonomy and job performance was stronger for older workers, whereas the associations of job autonomy with job satisfaction and affective commitment were weaker for older workers. A potential explanation offered by Ng and Feldman (2015) for these mixed results is that the effects depend on the particular outcomes under study. It may be possible that job autonomy is particularly important for younger workers with regard to job attraction and other attitudinal outcomes, because most younger workers apply for a career job for the first time in their lives and, thus, motivational job characteristics such as autonomy may be more important to them than materialistic factors. In other words, it could be that younger people pay more attention to what makes a new job interesting, challenging, and important, as compared to factors such as pay and the physical work environment. In contrast, job autonomy may be more important for older workers with regard to job performance, because it allows them to make use of their accumulated knowledge, experience, and skills.

Second, we hypothesized that the positive effect of task variety on job attraction are stronger for younger compared to older workers. This hypothesis was supported, providing further support for the notion that task variety is more important for younger than older workers. For instance, survey research showed that younger workers with higher task variety are more satisfied with their jobs (Zaniboni et al., 2013, 2014); we extend this research by showing that younger workers are more attracted to jobs that promise to provide them with high levels of task variety. High task variety is particularly important for younger workers, because it allows them to gain diverse work-related experiences and develop new and useful skills (Truxillo et al., 2012).

Third, we expected that the effect of task significance on job attraction is stronger for older compared to younger workers. Our findings did not support this hypothesis, but instead showed the opposite pattern: younger workers were more attracted to jobs with higher task significance than older workers. This finding contradicts assumptions based on the lifespan theory of socioemotional selectivity (Carstensen et al., 1999). Specifically, Truxillo et al. (2012) argued that older workers value task significance more than younger workers as their limited future time perspective renders meaningfulness and intrinsic rewards more important than other job-related factors (e.g., pay). However, our findings are consistent with some recent research that suggested that younger workers are more interested in what influence their work has on other people and outside of the company (Scroggins, 2008; Murray et al., 2011). As noted above, it may also be the case that the motivational job characteristics we studied are particularly relevant for younger workers in terms of job attraction, because they focus more on motivational job characteristics (i.e., interesting, important, and challenging work) when evaluation a new career job as compared to materialistic factors (e.g., pay, physical work environment).

Finally, our hypothesis on age-differential effects of feedback from the job on job attraction was supported, suggesting that feedback from the job is more important for job attraction of younger compared to older applicants. This supports Truxillo et al.'s (2012) assumption that younger workers are less experienced and are interested in more feedback to improve their performance, whereas older workers already have a great amount of experience to rely on and hence need less feedback.

Taken together, we could confirm only two out of four hypotheses based on Truxillo et al.'s (2012) lifespan perspective on job design. While job autonomy did not have an age-differential effect on job attractiveness ratings, task variety, feedback, and, unexpectedly, task significance had stronger effects among younger compared to older workers. We extended research based on Truxillo et al.'s (2012) model, and the literature on recruitment more broadly, by focusing on job attraction as an outcome of motivational job characteristics. Moreover, the use of the policy-capturing method has advantages over survey designs, as it maximizes internal validity and realism (Aguinis and Bradley, 2014). Despite these strengths, our findings need to be interpreted in light of a number of limitations.

Limitations and Future Research

First, participants had to read a large number of job descriptions. The hypothetical nature of these descriptions and increasing fatigue while participating in policy-capturing studies have frequently been mentioned as limitations of these designs (Kristof-Brown et al., 2002; Rotundo and Sackett, 2002). For example, Graham and Cable (2001) found that participants experienced more stress and felt more exhausted when responding to 32 scenarios as compared to only 8 scenarios. We took a number of precautions while designing the study to prevent fatigue from influencing our results, including relatively short descriptions and randomization of scenarios.

Second, critics may question the external validity and generalizability of studies using a policy-capturing design (Karren and Barringer, 2002). We asked participants to form a judgment about a hypothetical job description based on only four variables, whereas in reality applicants and workers may have access to more information about job openings. Furthermore, it could be argued that our participants, who were all currently working as employees or self-employed, may have answered differently if they were actually searching for a job at the time of answering the survey. Future research could replicate our study with jobseekers, possibly with realistic job advertisements. Moreover, future research could assess different or additional outcome variables, such as intentions to apply for a job opening (Chapman et al., 2005).

Third, we used a single item to assess job attraction, which may raise concerns about reliability. Some researchers have suggested that homogeneous constructs, such as global job satisfaction, can be reliably assessed using single items (Wanous et al., 1997; Fisher et al., 2016). We argue that job attraction is a rather homogeneous attitudinal construct that is distinct from other job-related attitudes and behavioral intentions (Highhouse et al., 2003; Chapman et al., 2005). Moreover, previous research has used similar single item measures to assess job attraction (Singh, 1975; Rynes and Lawler, 1983; Rynes and Miller, 1983). Also, due to the time-intensive nature of this approach, many policy-capturing studies use single items and report test-retest reliabilities across scenarios (Rotundo and Sackett, 2002; Ohme and Zacher, 2015). The test-retest reliability was acceptable in our study.

Fourth, consistent with Truxillo et al.'s (2012) lifespan model of job design, we did not include task identity (i.e., the extent to which workers perform complete tasks, including goal setting, planning, execution, and feedback processing; Hackman and Oldham, 1976; Hacker, 1986; Morgeson and Humphrey, 2006) in our study. Future research could focus on the importance of tasks identity among younger and older workers (see Zacher et al., 2016).

Finally, further research is needed that compares our current findings with age-differential effects of job characteristics with regard to different work outcomes, such as job satisfaction, work engagement, and job performance. The difference between these outcomes and job attraction is that the former outcomes can only be answered by job incumbents, whereas job attraction is mainly relevant among job seekers and job applicants who are not yet in a concrete work role. Moreover, researchers could investigate whether additional moderators of the job characteristics-outcome relationships may play a role. For instance, Truxillo et al. (2012) suggested that age-related factors such as future time perspective, self-regulatory strategies, and socioemotional selectivity processes (cf. Rudolph, 2016) may mediate the moderating effect of age. Furthermore, they proposed that additional individual differences (e.g., personality, health, cognitive abilities) and contextual factors (e.g., organizational culture, climate), as well as interactions among different job characteristics may act as boundary conditions of the age-differential effects of job characteristics on work outcomes.

Practical Implications and Conclusion

Our study provides useful information for recruiters and human resource managers interested in addressing the challenges of an aging and increasingly age diverse workforce. Our findings suggest that younger workers value certain job characteristics more than older workers, including task variety and feedback from the job. Thus, organizations aiming to recruit younger job applicants could adjust their job advertisements by emphasizing high levels of task variety and feedback from the job (i.e., targeted recruitment; Newman and Lyon, 2009). At the same time, younger, middle-aged, and older applicants appear to value job autonomy to a similar extent. Employers could use this information in the recruitment process to gain more interest from applicants by advertising the position as providing high levels of job autonomy.

In summary, our findings suggest that younger and older workers differ with regard to their preferences for task variety, task significance, and feedback from the job, but not job autonomy. Specifically, younger workers rated jobs with high levels of task variety, task significance, and feedback from the job as more attractive than older workers. So far, most research on age and job characteristics has focused on how to design jobs to motivate older employees. In contrast, our findings provide practitioners with suggestions on how to change job characteristics to make jobs more attractive to younger job applicants, as well as workers of all ages.

AUTHOR CONTRIBUTIONS

HZ and BD designed the study. BD collected the data. HZ analyzed the data and wrote the first draft of the manuscript, and SK and BH revised the manuscript.

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Job Satisfaction, Retirement Attitude and Intended Retirement Age: A Conditional Process Analysis across Workers' Level of Household Income

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In the contemporary workplace, insight into retirement behaviors is of crucial importance. Previous empirical evidence has found mixed results regarding the relationship between work attitudes, such as job satisfaction, and retirement behaviors, suggesting that further scholarly examination incorporating moderating and mediating variables into retirement models is needed. Drawing on comparative models of attitude to retirement, we hypothesized a direct relationship between job satisfaction and intended retirement age for workers with a high household income and an indirect relationship between job satisfaction and intended retirement age, via retirement attitude, for workers with a low or mean household income. We collected data from a sample of 590 United Kingdom workers aged 50+. Using conditional process analysis, we found that the underlying mechanisms in our research model differ according to socio-economic status. We found no direct effect between job satisfaction and intended retirement age. However, an indirect effect was observed between job satisfaction and intended retirement age, via retirement attitude, for both low- and mean-household income individuals. Specifically, the relationship between job satisfaction and retirement attitude differed according to socio-economic group: for high-household income older workers, there was no relationship between job satisfaction and retirement attitude. However, for low- and mean-household income older workers, we observed a negative relationship between job satisfaction and retirement attitude. Otherwise stated, increases in job satisfaction for mean and low household income workers are likely to make the prospect of retirement less attractive. Therefore, we argue that utmost care must be taken around the conditions under which lower income employees will continue their work when getting older in order to protect their sustainable employability.

Keywords: older workers, intended retirement age, job satisfaction, retirement attitude

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INTRODUCTION

Populations ages are rising in the United Kingdom and more broadly the developed world, and alongside demographic changes, retirement ages are also increasing. United Kingdom retirement ages have risen 1.2 years for men and 1.4 years for women, respectively, since 2004. At the same time, the government is raising State Pension Ages, with current policy projected to reach 70 in

30 years (Cridland, 2016). Given the actual and normative pressures to extend working life and because it is potentially amenable to intervention by employers (Kautonen et al., 2012), there have been calls for research to give insight into the motivational factors impacting retirement plans (Taylor et al., 2016). As the most significant transition in later adulthood, retirement provides an opportunity for workers to re-evaluate their roles and identity, and requires the development of non-work based activities (Reitzes et al., 1996). Retirement intentions have been the focus of extensive scholarly research in recent years and, in addition to demographic and personal factors such as financial position (Beehr et al., 2000), gender (Feldman, 1994; Talaga and Beehr, 1995; Quick and Moen, 1998), marital status (Feldman, 1994; Szinovacz, 2003), health (Topa et al., 2009) and age (Beehr, 1986; Taylor and Shore, 1995), more recently, scholars have also examined psychological factors affecting retirement including job satisfaction (Mein et al., 2000; Adams et al., 2002; Fisher and Herrick, 2002; Sibbald et al., 2003; Dendinger et al., 2005; Davies and Cartwright, 2011; Kautonen et al., 2012; Oakman and Wells, 2013), organizational commitment (Adams, 1999; Schmidt and Lee, 2008), job-related stress (Wahrendorf et al., 2013), work-family conflict (Raymo and Sweeney, 2006), job demands and control (Blekesaune and Solem, 2005; Elovainio et al., 2005; Harkonmäki et al., 2006; Oakman and Wells, 2013), social networks and cohesion (Henkens and Tazelaar, 1997; Mein et al., 2000; Kosloski et al., 2001; Oakman and Wells, 2013), retirement self-efficacy (Taylor and Shore, 1995; Van Solinge and Henkens, 2005; Topa and Alcover, 2015), and older worker's identity (Zaniboni et al., 2010; Bayl-Smith and Griffin, 2014; Topa and Alcover, 2015).

As giving up work as a dominant life sphere is a key feature of retirement (Newman et al., 2012), job satisfaction has been considered to be an important factor during retirement decisions (Kosloski et al., 2001). As a central work-related construct, the relationship between job satisfaction and retirement remains a core focus of interest to scholars because individuals' evaluations, beliefs and feelings about both their job and the idea of leaving their job is likely to influence their retirement behaviors. Prior studies have yielded inconsistent results suggesting that further scholarly examination incorporating moderating and mediating variables into retirement models is needed to advance our understanding (Bidewell et al., 2006; Aguinis et al., 2011).

In this paper, we investigate whether the way workers anticipate their future state of retirement (retirement attitude) mediates the relationship between job satisfaction and intended retirement age at different levels of household income (see **Figure 1**). Our focus is on the *intended* retirement age of employees 50+ who are still in work rather than the *actual* retirement age of those who have already permanently left the labor market. We do so for two reasons. First, from a theoretical perspective, we are interested in the relationship between present job satisfaction and retirement planning. A focus on actual retirement age would necessitate a retrospective approach to how retirees had felt about their jobs, with substantial hindsight, and thus weaken the link between the two. Second, from a practical perspective, employers are interested in whether

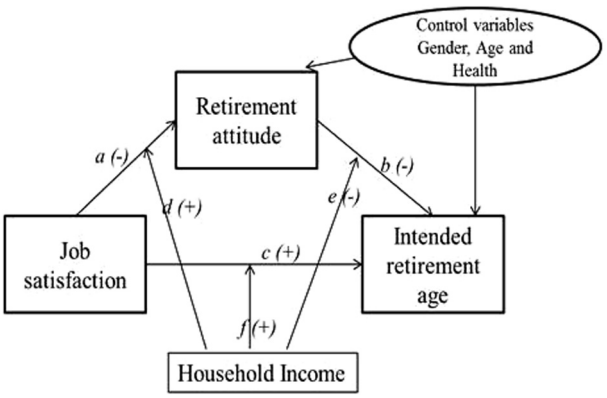

FIGURE 1 | Research model.

and how job satisfaction influences current retirement plans. This study contributes to the prior retirement literature by assessing, first, the robustness of job satisfaction as a predictor of intended retirement age, second, by investigating the possible mediating role of retirement attitude in this relationship, and, third, by examining the parameters of the relationship when socio-economic status (household income) is taken into consideration. As we have noted above, several demographic and personal factors have been shown to influence retirement age. We explicitly focus on socio-economic status as it has been identified as a significant public policy concern within the context of rising pension ages. Specifically, old age poverty and the limited employment choices for older low-skilled workers necessitate a better understanding of the impact of class and income on retirement patterns (Lain, 2012).

Job Satisfaction and Intended Retirement Age

Job satisfaction is an attitude, defined by Weiss (2002, p. 175) as "*a positive (or negative) evaluative judgment one makes about one's job or job situation*" which incorporates overall evaluative judgments about a job, affective experiences at work, and beliefs about a job. Both the turnover literature (March and Simon, 1958; Mobley et al., 1979; Holtom et al., 2008; Hayes et al., 2012) and the retirement literature (Mein et al., 2000; Topa et al., 2009; Smith et al., 2011; Kautonen et al., 2012) inform the theorized relationship between job satisfaction and intended retirement age. High job satisfaction is assumed to be a valuable psychological resource which influences the desirability of movement from the organization (March and Simon, 1958) and which an employee is unlikely to wish to relinquish through pronounced earlier retirement. This mechanism is consistent with the notion of continuity in relation to retirement (Atchley, 1989) which assumes that older individuals seek to preserve their existing internal and external continuity when making life choices. So, it is assumed that more highly satisfied employees tend to place higher value on their work (Cytrynbaum and Crites, 1989), are likely to experience greater discontinuity at the onset of retirement, and so will seek to prolong employment and delay

retirement. By contrast, older workers who perceive their job negatively, who experience lower satisfaction, and who derive little psychological satisfaction from it, are likely to seek ways to minimize the negative feelings associated with their job by retiring earlier rather than later.

Empirical evidence, however, has not yielded consistent support for the hypothesized association between job satisfaction and intended retirement age. Although some scholarly work supported the expected relationship (Hanisch and Hulin, 1990; Mein et al., 2000; Smith et al., 2011; Kautonen et al., 2012) others did not (McCune and Schmitt, 1981; Taylor and Shore, 1995; Adams and Beehr, 1998; Adams, 1999; Beehr et al., 2000; Davies and Cartwright, 2011; Smith et al., 2011; Post et al., 2013). Some studies have offered more nuanced perspectives. Bidewell et al. (2006), for example, distinguished between intrinsic and extrinsic job satisfaction and found that extrinsic job satisfaction was significantly associated with later increased retirement age whereas intrinsic job satisfaction appeared to be unrelated to preferred retirement age. In a similar vein, Kalokerinos et al. (2015) found that job satisfaction was negatively associated with phased retirement (a form of diminishing employment over time) which is consistent with the preference for continuity for highly satisfied employees.

All in all, the inconclusive empirical results from previous studies suggest that the relationship between job satisfaction and intended retirement age is not straightforward and that more needs to be known about the underlying mechanisms. In this particular contribution, we focus specifically on retirement attitude as a possible mediator in the relationship between job satisfaction and intended retirement age, and we will incorporate the possible moderation effect of household income.

MEDIATING EFFECT OF RETIREMENT ATTITUDE

Retirement attitude can variously refer to attitudes toward *retirement* (the role state of being retired), the act of *retiring,* and to attitude toward retirees (see Newman et al., 2012). We focus on retirement attitude as a valenced generalized cognitive evaluation of the expected state of retirement (Hanisch and Hulin, 1991; Post et al., 2013). This form of retirement attitude is usually a progressive transition, in which an anticipatory attitude is formed in the pre-retirement period before any actual 'event' takes place (Atchley, 1976; Pinquart and Schindler, 2007). Anson et al. (1989) argued that workers normally engage in a process of anticipatory socialization as they approach retirement (Merton, 1958), and that they adjust their attitude and expectation toward their own retirement in view of the approaching event. Glasmer (1981) suggested that during the latter years of one's working life, employees cognitively adjust their views on the importance of work so that they arrive at a position of cognitive balance by the time that retirement occurs (p. 106), thereby avoiding cognitive dissonance (Festinger, 1962). Some employers offer 'phased retirement' work arrangements in order to facilitate such planned adjustments out of work (Urwin et al., 2013).

As a life stage, retirement usually signals the end of work as a dominant life sphere and, unlike other forms of quitting a job, in retirement, once a person stops paid-work, it is typically not substituted by similar activities (Newman et al., 2012). Retirement characteristically entails multiple life changes and is closely interlinked to other social structures, such as family relationships, social relationships, professional identity, financial position (Szinovacz, 2003) as well as to changes in the organizing of one's daily life (Pinquart and Schindler, 2007; Wang and Shultz, 2010). Given the potentially profound nature of these changes in the life course, retirement attitude can vary significantly between individuals. Hornstein and Wapner (1985) captured this affective flavor of retirement in their four categories of retirement: (1) 'retirement as a new beginning'; (2) 'retirement as beginning of the end'; (3) 'retirement as a continuation'; and (4) 'retirement as imposed disruption.'

Empirically, strong associations have been found between the predictive ability of broad, positive retirement attitude and intended retirement age: people who expect to enjoy retirement are more likely to retire earlier than those who expect to be bored in retirement (Feldman, 1994; Hansson et al., 1997; Bidewell et al., 2006) and, indeed, positive expectations of retirement have been associated with lower intended retirement age (Zappala et al., 2008; Davies and Cartwright, 2011; Cochran et al., 2012).

It might be expected that attitude to work and attitude to retirement are inversely related to one another such that a worker with high job satisfaction might be expected to have a more negative attitude to retirement because the act of retiring requires foregoing a source of positive psychological well-being such as one's passion for work (Houlfort et al., 2015), socio-economic status, income (Post et al., 2013), maintaining lifestyle (Atchley, 1976) and keeping active (Illmarinen et al., 1997). Likewise, a person with lower job satisfaction might be expected to have a positive attitude to retirement because retirement sanctions the cessation of an unrewarding job, implies freedom from the pressures and demands of work, eliminates a source of stress, imposed time constraints, difficult political environments, and so on.

The nature of the relationship between job and retirement attitude has been framed as a comparative process (Anson et al., 1989; Newman et al., 2012; Chevalier et al., 2013) in which the state of work is compared to the state of retirement. Anson et al. (1989) considered retirement attitude in terms of the overall assessment of the *gains* and *losses* associated with both 'leaving work' and 'entering retirement.' Analogously, Newman et al. (2012) proposed that retirement attitude is formed from the sum of comparing *what is given up in retirement* against *what is gained in retirement*. Chevalier et al. (2013) referred to push (negative work-related factors that push an older worker into retirement), pull (positive perceptions that pull an older worker into retirement), anti-push (feelings of attachment to the current job) and anti-pull (costs and risks associated with retirement) factors to capture the complex influences on retirement decisions. As governments, especially in Europe, are shifting welfare states toward encouraging longer working lives, the academic focus has expanded to include need factors (delaying retirement for financial reasons) and stay factors (being encouraged to delay

retirement by positive work environments) in empirical models in this knowledge domain (Ebbinghaus and Hofäcker, 2013). Although the theoretical frameworks that have been outlined above illustrate the central role of attitude to the job in forming attitude to retirement, they also highlight the importance of non-work factors. For instance, retirement may provide gains such as increased free time, and the opportunity to pursue other hobbies, to develop new roles, to undertake voluntary and civic work, to devote time to one's family and friends, and to access welfare benefits, which are outcomes that may be quite independent of an individual's attitude to his/her job.

There is some scholarly debate regarding whether the gains made in one domain may compensate for the losses in another domain. Does, for example, a gain in increased family time, compensate for the loss of job-related status? Anson et al. (1989) argued that gains accrued in the non-work domain are unlikely to affect the overall perception of the gains and losses associated with leaving work because although leisure activities may serve as a substitute for work-related activities, the *'void is still there and the work-related losses do not necessarily fade away*' (Anson et al., 1989, p. 189). Or, retirement might provide relief from the burden of work, but it does not necessarily follow that work will be replaced by more satisfying activities.

The approach suggested by these comparative frameworks by Anson et al. (1989) and Newman et al. (2012) predicts that individuals will develop a broad-based overall attitude to retirement, based on their evaluation of the expected balance between the gains and losses associated with leaving working and being retired, and that is shaped in part by the expected disruption to their lifestyle (Pearlin et al., 1981; Kessler et al., 1985; Szinovacz, 2003; Burke, 2006). The net balance of perceived gains and losses will vary between individuals, with some older adults expecting greater gains or losses than others (Pinquart and Schindler, 2007). Moreover, given the scale and scope of potential changes across multiple life domains, attitude to retirement is likely to be characterized by attitudinal ambivalence in which individuals will hold both favorable and unfavorable attitudes toward the object of retirement simultaneously (Kaplan, 1972; Newman et al., 2012; Muratore and Earl, 2015). In sum, the discussion above leads us to suggest that job satisfaction and attitude to retirement are related but distinct constructs. In light of the unclear empirical findings, we therefore advance that different pathways operate between job satisfaction, retirement attitude and intended retirement age, for instance, depending on socio-economic status.

CONDITIONAL EFFECT OF SOCIO-ECONOMIC STATUS

The relationship between retirement and its antecedents is known to vary between social groups (Szinovacz, 2003) and, in this study, we focus specifically on socio-economic status (measured by household income) as a potential moderator. Household rather than individual income has been shown to be the dominant influence over retirement decisions as this encompasses family resources which are available to finance retirement (Loretto and Vickerstaff, 2013). Economic approaches to retirement age suggest that, when they have a choice, workers will retire at the point when they assess that their accumulated financial resources (considering future economic conditions) allow them to support themselves in retirement (Quinn and Burkhauser, 1990; Guillemard and Rein, 1993; Hatcher, 2003; Wang and Shultz, 2010). Correspondingly, lower household income workers, having had less opportunity to accumulate sufficient financial resources over their lifetime, are less likely to be able to exit the workforce through early retirement (Mein et al., 2000) and may need to work longer to maintain their lifestyle than those on higher income (Post et al., 2013). Moreover, they are also less likely to have engaged in formal and informal financial planning (Taylor and Geldhauser, 2007). Many earlier scholarly studies have supported this line of reasoning, finding that a higher financial status is indeed associated with earlier retirement (Flippen and Tienda, 2000; Kim and Feldman, 2000; De Wind et al., 2015).

Although, previously, researchers have noted that relationships between retirement and its antecedents are likely to vary by occupational status, just a few studies have explicitly examined differences in the relationships between job satisfaction, retirement attitude and intended retirement age for different categories of workers. In comparing self-employed and salaried earners in Finland, Kautonen et al. (2012) found that job satisfaction was only a significant determinant of the intended retirement age of individuals who were less satisfied with other life domains, suggesting that satisfaction with other life domains does influence the relationship between job satisfaction and intended retirement age as well. "*A likely interpretation is that for those who are highly satisfied with their leisure time and family life, these domains of life form salient considerations in the retirement decision while the inherent aspects of the work domain, captured in job satisfaction, are a less relevant concern*" (Kautonen et al., 2012, p. 436).

HYPOTHESES

Human capital theory (Becker, 1975) predicts that individuals with a higher household income will have stronger financial resources (such as life savings or pension benefits), be more highly skilled, occupy higher status jobs, and so enjoy greater autonomy and control. They are also likely to enjoy superior resources such as increased social capital, professional and non-work networks (e.g., civic roles and leisure opportunities) which are invaluable as well in easing the retirement transition (Muratore and Earl, 2015). As such, from this privileged position, higher socio-economic groups will be freer to respond more directly to their positive or negative evaluation of their job. Therefore, for higher household income workers, we hypothesize that the decision-making around intended retirement age will be relatively less complex, and for a direct relationship to be found between job satisfaction and intended retirement age. Lower socio-economic groups, on the contrary, will have less freedom to respond to a positive or negative evaluation of their job. Having

accumulated fewer financial and social resources to draw upon, they face greater risk in the retirement transition, and, as a result, their retirement decision will therefore be more complex. Instead of responding directly to their positive or negative job attitude, they will need to engage in a more complex psychological process of comparing the state of work and the state of retirement.

We therefore hypothesized that the pathways between job satisfaction, retirement attitude and intended retirement age will be moderated by household income, and have formulated the following:

Hypothesis 1: There will be a direct relationship between job satisfaction and intended retirement age for workers with a high household income, but not for those with a low or mean household income.

Hypothesis 2: There will be an indirect relationship between job satisfaction and intended retirement age, via retirement attitude for workers with a low or mean household income, but not for those with a high household income.

METHODOLOGY

Sample and Procedure

Data were obtained through telephone interviews among a sample of 800 people in work over the age of 45 from the United Kingdom. There is no standard definition of 'older worker,' but 50 years or older one is frequently used in scholarly studies to denote older workers (Ekerdt, 1998; Zaniboni, 2015). In line with this approach, 50 years or older was selected for this analysis, yielding a sample of 670. There were 80 non-responses to the question on intended retirement age. To test for possible differences between respondents and non-respondents to the intended retirement age question, the samples were compared on key demographic variables using chi-square test for categorical variables and independent sample analysis of variance for ordinal variables. The demographic characteristics for response and non-response samples are shown in **Table 1**. These procedures did not reveal any evidence that intended retirement age responses were not missing at random and so subsequent analysis was conducted on the resulting sample of 590 responses. The mean age of the included respondents was 57.32 years ($SD = 4.39$), their mean intended retirement age was 65.18 years ($SD = 4.39$), and 50% of the sample was male. Data were collected across a broad range of industry sectors.

The survey was conducted in November 2014, after the Single Equalities Act 2010 implemented both the consolidation of discrimination regulations (including age) and the abolition of the Default Retirement Age which had allowed employers to force employees to retire at 65. The sample was collected using a market research firm and only people with an employment contract were contacted. Sampling stratification was used to guarantee a representative sample according to gender, industry and income.

Measures

Job Satisfaction

Job satisfaction was measured using a six-item scale drawn from the European Social Survey (ESS, 2010). A sample item was: "My job makes me satisfied with what I have accomplished." The responses were coded as follows: 1 = strongly disagree, 5 = strongly agree. The reliability coefficient using Cronbach's alpha was 0.83.

Retirement Attitude

Retirement attitude refers to the positive or negative evaluation of retirement. In this study, it was measured with the following item, with a higher score referring to a positive evaluation: "Are you looking forward to full retirement." The responses were coded as follows: 1 = Not at all, I am dreading it; 2 = Not really, I am apprehensive about it; 3 = I haven't really thought about it; 4 – I'm relaxed about it; and 5 = Yes, I shall be pleased to retire/it will be a relief. This question was drawn from the Global Aging Studies survey (Leason, 2008).

Intended Retirement Age

Intended retirement age was captured by asking respondents to record the age at which they plan to retire. Respondents were given the following option of reporting: "I have no plans to retire." These responses were excluded from the analysis.

Household Income

Respondents were asked to indicate their household weekly income before tax reduction. Response categories were divided into quintiles of the average weekly household income in the United Kingdom (Office for National Statistics, 2015). The modal category (32.5% of respondents) was the middle quintile indicating a weekly income of between £413 and £650 per week.

Controls

Given the extensive research identifying age, gender and health as known predictors of retirement intentions, these variables were included as controls. Age was measured as a numerical response to the question, 'How old are you?' Health was operationalized as a single item, 'How is your health in general.' The responses were coded as follows: 1 = very poor, 2 = rather poor, 3 = Moderate, 4 = Rather good, 5 = Very good. Gender was measured by means of one item differentiating between men (coded 1) and women (coded 2).

Data Analysis

In this study, to test for the hypothesized relationships, contemporary practices of moderation and mediation advocated by Hayes (2013) were adopted. Based on multiple regression methods, a specialized form of moderated mediation, known as conditional process analysis modeling was used which examines and describes the conditional nature (that is, the moderating effect) by which a variable transmits its effect on another one (Hayes, 2013, p. 237). To estimate the conditional indirect effect of the independent variable job satisfaction (X), through the mediator retirement attitude (M), on the outcome variable intended retirement age (Y), with household income included as a moderator (W), the PROCESS macro for SPSS (v. 2.1.3.2) Model 59 was used (Hayes, 2013). This enabled the moderating effect of household income to be tested on all three paths simultaneously (as illustrated in **Figure 1**). In this analysis, age,

TABLE 1 | Sample demographic characteristics for sample responding to intended retirement age question ($n = 590$) and non-respondents to intended retirement age question ($n = 80$).

		Respondents		Non-respondents	
		Frequency ($n = 590$)	**Percent**	**Frequency ($n = 80$)**	**Percent**
Gender	Male	294	0.50	39	0.49
	Female	296	0.50	41	0.51
Sector	Agriculture	2	0.00	0	0.00
	Energy and water	15	0.03	2	0.03
	Manufacturing	46	0.08	4	0.05
	Construction	25	0.04	4	0.05
	Catering (e.g., hotel or restaurant)	13	0.02	0	0.00
	Transport	42	0.07	5	0.06
	Banking and finance	29	0.05	2	0.03
	Public administration	27	0.05	1	0.01
	Education	55	0.09	6	0.08
	Health services	61	0.10	2	0.03
	Charity/voluntary sector	25	0.04	5	0.06
	Retail and wholesale	52	0.09	7	0.09
	Social care and social work	22	0.04	4	0.05
	Business and support services	55	0.09	10	0.13
	Others	121	0.21	28	0.35
Marital Status	Single (never been married or cohabiting)	62	0.11	16	0.20
	Married or cohabiting	411	0.70	46	0.58
	Divorced	99	0.17	17	0.21
	Widowed	18	0.03	1	0.01
Region	East Midlands	37	0.06	6	0.08
	Eastern	41	0.07	6	0.08
	London	55	0.09	11	0.14
	North	37	0.06	4	0.05
	North West	66	0.11	8	0.10
	Northern Ireland	12	0.02	1	0.01
	Scotland	65	0.11	8	0.10
	South East	101	0.17	16	0.20
	South West	50	0.08	6	0.08
	Wales	20	0.03	5	0.06
	West Midlands	56	0.09	3	0.04
	Yorkshire and Humber	50	0.08	6	0.08
Weekly household income	Below £237 per week (Bottom 20% of United Kingdom households)	57	0.10	14	0.18
	Between £238 and £412 per week (20–39%)	176	0.30	28	0.35
	Between £413 and £650 per week (40–59%)	187	0.32	21	0.26
	Between £651 and £1014 per week (60–79%)	119	0.20	10	0.13
	Over £1014 per week (The top 20% of United Kingdom households)	51	0.09	7	0.09
Education level	Higher degree (e.g., Masters or Ph.D.)	46	0.08	6	0.08
	First degree (e.g., BA, BSc)	109	0.18	15	0.19
	Other qualification (e.g., City and Guilds, RSA/OCR, BTEC/Edexcel)	105	0.18	13	0.16
	NVQ at level 4 or equivalent	43	0.07	7	0.09
	At least one A level or equivalent	94	0.16	12	0.15
	At least one O level or equivalent	148	0.25	17	0.21
	No qualifications	45	0.08	10	0.13
Trade union membership	Yes	170	0.29	16	0.20
	No	420	0.71	64	0.80
Caring responsibility	Yes	172	0.29	21	0.26
	No	418	0.71	59	0.74

health, and gender, were included as controls as these have all been found in previous studies to have a direct effect on intended retirement age (see for example Topa et al., 2009). The conditional process model generates (bias-corrected) 95% confidence intervals for the estimated indirect effects at various values of the moderator variable.

Conditional process analysis allowed the results to be probed at various point estimates by generating 5000 bootstrapped samples. Conditional indirect effects are calculated as the product of unstandardized regression weights for the path from the predictor to the mediator, and for the path from the mediator to the outcome variable. That is, the co-efficient for Path $a \times$ Path b were calculated separately for different levels of household income. In this analysis, they were calculated at three levels of household income: 'high' (mean plus one standard deviation), 'mean' household income (mean) and 'low' household income (mean minus one standard deviation).

RESULTS

In preliminary analyses, Average Variance Extracted (AVE), composite reliability and Cronbach's alpha were used to test the independence of the variance for each of the model variables and were found to be satisfactory. Means, standard deviations, and bivariate correlations for the principal variables and controls are presented in **Table 2**. The correlation matrix suggests that there are indeed significant associations in the hypothesized direction between the model variables. The associations between job satisfaction and retirement attitude, on the one hand, appear to be unrelated to intended retirement age, which might indicate that indeed possibly moderators, like household income, are involved.

Conditional Process Analysis

In **Table 3**, we present the results from the conditional process analysis. Using the PROCESS macro, in the first multiple regression, we tested whether household income (W) moderates the path from job satisfaction (X) to retirement attitude (Y) (depicted as path d in **Figure 1**). The outcomes indicated that job satisfaction did not have a significant negative association with retirement attitude ($\beta = -0.02$, CI: −0.04, 0.00). Importantly, the interaction term (computed as the product of household income and job satisfaction) appeared to have a significantly positive relationship to retirement attitude ($\beta = 0.03$, CI: 0.00, 0.05), controlling for age, health, and gender.

In the second regression analysis, we tested whether household income (W) moderates the path from job satisfaction (X) to intended retirement age (Y) (depicted as path *e* in **Figure 1**). As shown in **Table 4**, job satisfaction did not have a significant direct effect on intended retirement age ($\beta = 0.01$, CI: −0.07, 0.09). However, the interaction between job satisfaction and household income appeared to be significantly positive ($\beta = 0.08$, CI: 0.01, 0.15). In the presence of the control variables, i.e., age, health, and gender, a significant association between retirement attitude and intended retirement age was found ($\beta = -0.90$, CI: −1.19, −0.62). It is notable that in the second regression analysis, respondent's age and gender, were significantly associated with intended retirement age, respectively, for age: $\beta = 0.24$, CI: 0.17, 0.31; and for gender: $\beta = -1.09$, CI: −1.76, −0.42. The R^2 for the second regression model was 0.21, indicating that 21% of the variance in intended retirement age could be accounted for by the model.

We hypothesized that different pathways would operate between job satisfaction, retirement attitude and intended retirement age, with varying levels of respondent's household income. Probing the data at three levels of household income, **Table 5** shows, controlling for age, health, and gender, that there was no direct effect between job satisfaction and intended retirement age at any level of household income and so Hypothesis 1 was not supported with our data. However, fully supporting Hypothesis 2, conditional indirect effects were found between job satisfaction and intended retirement age, via retirement attitude for workers with a low- ($\beta = 0.05$, CI: 0.02, 0.09) and mean- ($\beta = 0.02$, CI: 0.01, 0.04) household income (minus one standard deviation and mean household income), but not for those with high household income (plus one standard deviation household income) ($\beta = -0.01$, CI: −0.03, 0.02).

The outcome of the interaction between job satisfaction and household income on retirement attitude is presented in **Figure 2** which illustrates that there is a significantly negative association between job satisfaction and retirement attitude for low-household income groups, but not for mean or high-household income group. The slopes' graph illustrates that the negative effect of job satisfaction on retirement attitude was strongest for the low-household income category of workers.

DISCUSSION

Reflection upon the Outcomes

As the working population ages (Shultz and Adams, 2007; Cridland, 2016) and a greater number of older employees remain in the labor force, understanding the dynamics of the retirement process (Shultz and Wang, 2011) and its relationship with work has assumed a renewed significance. Future workplaces will inevitably consist of older workers who face greater choice as well as greater uncertainty in relation to retirement timing. Therefore, understanding the dynamics of the retirement decision, including the influence of the impact of work-related attitudes on this, is an important theoretical and practical issue. Previous research into the impact of job satisfaction on intended retirement age has yielded contradictory results, suggesting that moderation and mediating effects may be relevant.

The goal of this study was to investigate further explanatory mechanisms in the relationship between job satisfaction and intended retirement age in a sample of 590 United Kingdom workers aged 50+. Drawing on theoretical frameworks which frame retirement decisions in terms of comparison between gains and losses (Anson et al., 1989; Newman et al., 2012; Chevalier et al., 2013), this empirical research examined whether job satisfaction exerts a direct effect on intended retirement age, and/or whether there are indirect effects with retirement attitude

TABLE 2 | Means, standard deviations and correlations between model variables ($n = 590$).

	Mean	*SD*	1	2	3	4	5	6
(1) Job satisfaction	3.87	*(0.69)*						
(2) Retirement attitude	3.72	*(1.18)*	−0.10*					
(3) Intended retirement age	65.18	*4.39*	0.05	−0.28**				
(4) Weekly household income	2.88	*1.11*	0.06	0.12**	−0.20**			
(5) Age	57.32	*4.81*	0.11**	−0.15**	0.33**	−0.12**		
(6) Health	2.21	*0.87*	0.17**	0.00	0.03	0.10*	0.03	
(7) Gender			0.05	−0.11**	−0.08*	−0.24**	−0.08	−0.03

**denotes statistical significance at the 5% significance level. **denotes statistical significance at the 1% significance level.*

TABLE 3 | The moderation effect of household income on retirement attitude.

	β	se	*t*	*p*	LLCI	ULCI
Constant	1.59	0.48	3.30	0.00	0.64	2.53
Job satisfaction	−0.02	0.01	−1.85	0.06	−0.04	0.00
Household Income	0.09	0.04	1.95	0.05	0.00	0.18
Interaction term (job satisfaction × household income)	0.03	0.01	2.43	0.02	0.00	0.05
Age	0.03	0.01	−3.29	0.00	−0.05	−0.01
Health	0.01	0.06	0.13	0.90	−0.10	0.12
Gender	−0.21	0.10	−2.16	0.03	−0.41	−0.02

N = 590 Unstandardized coefficients are reported.

TABLE 4 | The moderation effect of household income on the relationship between retirement attitude and intended retirement age.

	β	se	*t*	*p*	LLCI	ULCI
Constant	56.66	1.67	34.01	0.00	53.38	59.93
Retirement attitude	−0.90	0.14	−6.30	0.00	−1.19	−0.62
Job satisfaction	0.01	0.04	0.30	0.76	−0.07	0.09
Interaction term (retirement attitude × household income	0.01	0.13	0.05	0.96	−0.25	0.26
Household income	−0.67	0.15	−4.34	0.00	−0.98	−0.37
Interaction term (job satisfaction × household income)	0.08	0.04	2.12	0.03	0.01	0.15
Age	0.24	0.03	6.97	0.00	0.17	0.31
Health	0.16	0.19	0.82	0.41	−0.22	0.53
Gender	−1.09	0.34	−3.21	0.00	−1.76	−0.42

N = 590 Unstandardized coefficients are reported.

TABLE 5 | Conditional process analysis showing direct and indirect effects at three levels of household income.

	Direct effect Job satisfaction -> intended retirement age *N* = 590	**Indirect effect Job satisfaction -> retirement attitude -> intended retirement age (a × b) *N* = 590**
Low household income (mean minus one standard deviation)	−0.07 (0.06)	**0.05** (0.02)
(Ci)	(−0.18, 0.04)	(0.02, 0.09)
Mean household income (mean)	0.01 (0.04)	**0.02** (0.01)
(Ci)	(−0.07, 0.09)	(0.01, 0.04)
High household income (mean plus one standard deviation)	0.10 (0.06)	−0.01 (0.01)
(Ci)	(−0.02, 0.21)	(−0.03, 0.02)

CI = 95% confidence interval for indirect effect: if CI does not include zero, the indirect effect is considered statistically significant and is displayed in bold.

included as a possible mediator. In addition, we examined the possible moderating role of socio-economic status (household income) in the above-mentioned relationships.

With our outcomes, we found both some support for our hypothesized relationships and some unexpected results as well. First, we found that job satisfaction does not exert a direct effect on intended retirement age at any level of household income category and so Hypothesis 1 was not supported with our data. This finding is consistent with the insignificant results found in a number of other studies (McCune and Schmitt, 1981; Taylor

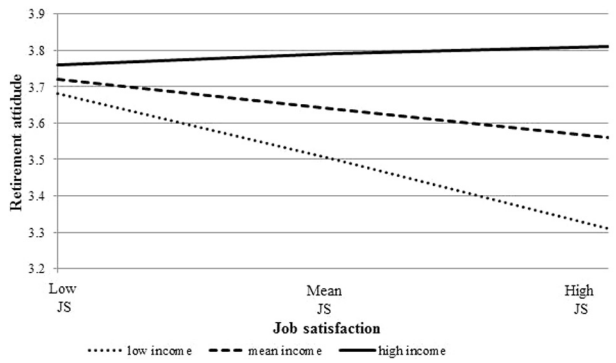

FIGURE 2 | Interaction effect for job satisfaction and household income on retirement attitude.

and Shore, 1995; Adams and Beehr, 1998; Adams, 1999; Beehr et al., 2000; Davies and Cartwright, 2011; Smith et al., 2011; Post et al., 2013). It seems that we may cautiously conclude that a higher household income does not relax the individual's complex decision-making process around intended retirement age. Possibly, the decision to retire is related to a broader concept than the job itself such as the meaning of work for the individual employee. That is to say, for most people work is more than securing income; work is a prominent element in one's life that provides highly valued psychological and social aspects (Chalofsky, 2003; Cartwright and Holmes, 2006; Fasbender et al., 2016). It might be that once one's basic needs are fulfilled, which applies to many people in the Western world, meaning of work becomes an even stronger factor in comparison with employees from less developed countries.

As regards Hypothesis 2, our results confirmed the mediating role of retirement attitude in the relationship between job satisfaction and intended retirement age at specific levels of socio-economic status: the mediation effect was found for low- and mean-level household income individuals, yet not for the high-income group (thereby fully supporting Hypothesis 2).

These findings reveal a critical insight into the role of retirement attitude in the light of intended retirement age, and also shed more light on the mechanism through which job satisfaction influences intended retirement age. For workers from all three categories of socio-economic status, a significant main effect of retirement attitude on intended retirement age was found: older workers who positively look forward to retirement report an earlier intended retirement age. These findings are consistent with others studies which have examined the role of retirement attitude on intended behavior (Zappala et al., 2008; Davies and Cartwright, 2011; Cochran et al., 2012).

By examining retirement attitude as a possible mediator between job satisfaction and intended retirement age, we have been able to reveal greater depth of insight into the underlying relationships. Although job satisfaction appears not to have any direct effect on intended retirement age, by investigating the moderating effects of socio-economic status, we show that job satisfaction does in fact exert an indirect effect on intended retirement age for specific categories of older workers by modifying their assessment of retirement attitude. The slope analysis shows that when job satisfaction was low, all socio-economic groups held a broadly positive attitude to retirement, in turn, leading to earlier intended retirement age. However, at mean-and high-levels of job satisfaction, different patterns were observed between socio-economic groups. In the high household income group, there was no relationship between level of job satisfaction and retirement attitude. However, for mean-and low-household income older workers, lower levels of job satisfaction are associated with progressively poorer evaluations of retirement. This suggests that a highly satisfied/low household income older worker will hold a negative evaluation of retirement. It is likely that for such a person, retirement would entail the loss of the job as a rewarding and fulfilling life sphere that might not be substituted easily by other retirement benefits, such as satisfactory retirement income, future positive social/leisure experiences in retirement. It therefore represents a significant life loss. By contrast, a high household income older worker's evaluation of retirement appears to be unaltered by the level of job satisfaction, be it higher or lower. For higher household income older workers, retirement attitude is likely to be determined by a range of factors such as social status, expected access to leisure resources/activities, and personal relationships arising out of enhanced social capital, and may operate largely independently of their immediate feelings about the job. In addition, as indicated above, it might be that the meaning work has for an individual is a key factor in the decision-making process about retirement, over and above the fulfillment of basic needs such as salary provision or immediate characteristics of the job.

These findings offer important theoretical contributions to the scholarly literature in this field. Previously, researchers have proposed models that conceptualize retirement attitude as a 'balanced' outcome, and a careful evaluation of the respective gains and losses associated with the ending of work and the onset of retirement (Anson et al., 1989; Newman et al., 2012). Our data are consistent with a comparative approach and indicate that job satisfaction does indeed appear to influence a generalized retirement attitude, but only for workers with mean- and low-household incomes. For high household income workers, other factors, such as meaning of work, social status, and relationships stemming from being in employment may compensate or substitute for any loss of higher job satisfaction, and so job satisfaction in itself will have relatively less impact on retirement attitude. This line of reasoning implies that high household income individuals undergo a more complex decision-making process when comparing the pros and cons of the relative merits of the satisfaction they gain from their specific job alongside the other substantial gains and losses in retirement. For lower household income workers with low job satisfaction [arising possibly from work which is physically or psychologically unpleasant, and more often, an immediate danger for their sustainable employability, see Van der Heijden and De Vos (2015)], retirement is likely to be evaluated as a

substantive 'gain,' and so be relatively more attractive, because it is expected to help terminate an undesirable life activity. On the contrary, the finishing of a highly satisfying job in the context of lower household income is likely to be evaluated negatively.

Our outcomes regarding the moderating effect of household income are in line with the argumentation following from the comparison approach to attitudes to retirement (Newman et al., 2012) but only for lower socio-economic status workers. The findings in this study are also consistent with those of Post et al. (2013), who reinforced the importance of financial concerns in influencing retirement intentions, and highlight the importance of context in understanding of socio-economic status in the dynamics of the relationship between work and retirement (Hennekam and Herrbach, 2013).

Limitations and Recommendations for Future Research

The present study has limitations. Firstly, all data have been collected using questionnaires (through telephone interviews), and by using self-reported data only, opening up the possibility of response set consistencies and common-method bias (Podsakoff et al., 2003) and potential effects where responses to one question cognitively cue another. Secondly, all data have been collected at one point in time, that is, the study is cross-sectional. As noted earlier, the cross-sectional designed required focus on intended retirement age instead of actual retirement age. These issues imply that further research, preferably using multi-rater designs (for instance combining employee and supervisor and/or partner ratings) is needed in order to address the issues of causality and research on actual retirement behaviors. Research using multi-wave designs can provide more specific information about the stability and change of the variables, and about cross-lagged (i.e., over time) relationships than our cross-sectional approach (Taris and Kompier, 2003; De Lange, 2005). Although we captured *intended* retirement age and not one's *actual* retirement age, previous scholars have robustly defended the use of intended retirement age as viable sources of information about retirement decisions (Prothero and Beach, 1984; Beehr and Bennett, 2007; Solem et al., 2016). Therefore, we believe that our results are noteworthy and provide good challenges for future research and cross-validation.

Given the current cross-sectional methodology, we cannot of course exclude other explanations for our outcomes. For instance, one possible alternative that forms a good basis for future empirical approaches is that the assumed direction of causality is reversed: the broader attitude to retirement itself might influence an older worker's job satisfaction. However, in our opinion, this appears to be a less probable explanation given that chronologically work precedes retirement, thereby suggesting that attitudes to work precede attitudes to retirement. A further alternative possible explanation, worthy of more explicit future investigation, is that a person's disposition or personality (Newman et al., 2012) might influence these relationships as well. For instance, individuals with higher core self-evaluations may have greater belief in their ability to adjust to retirement than those with lower self-efficacy (Topa and Alcover, 2015; Valero and Topa, 2015). Likewise, individuals predisposed to general satisfaction may expect satisfaction across both job and retirement roles, whereas individuals predisposed to general dissatisfaction are assumed to perceive dissatisfaction across different life spheres (Schmitt and Pulakos, 1985).

Thirdly, further research is needed to investigate the robustness of our findings, and to determine the extent to which our findings generalize to other occupational settings and/or to other countries (Fouad and Arbona, 1994). Fourthly, following up on the reflections given above, we might investigate empirical models wherein the possible influence of factors such as sense-making and meaning of work for the individual in predicting intended retirement age are incorporated as well.

Another possible moderator might be age-related stereotyping, suggesting that the relationship between the model variables might be influenced in case the employee suffers from negative attitudes from important key figures, such as one's direct supervisor, at a later age (Van der Heijden et al., 2009; Karpinska et al., 2013). Future research is needed to empirically investigate the credibility of these lines of reasoning. Moreover, it might be interesting to use the Job Demands-Resources (JD-R) model (Bakker and Demerouti, 2007) that has proven to be applicable to many occupational and organizational settings as a guiding framework in future research on retirement decisions.

Practical Implications

Our findings have important implications for practice, both for employers and employees. In the context of an aging workforce, and the current, highly prevalent imperative on older workers to extend their working life and to delay retirement, it is important to be aware of the complex nature of the interaction between one's job, retirement evaluations and socio-economic status. Older workers with a higher socio-economic status are able to directly respond to a lack of job satisfaction, by means of earlier retirement, however, it seems that in many occasions they do not do so by means of considering early retirement. We believe that this might be due to the many other aspects that work may provide, such as sense-making and meaning in life, social networks, and structure, to mention but a few.

Both quantitative and qualitative previous studies highlight the relationship between agency and income/wealth in later life (McNair et al., 2004; Flynn, 2010). In fact, there is a view that government and employers should focus public and HR policies, respectively, on low income workers so as to enhance their agency and to give them more choice over when and how to retire (Lain, 2012).

From the perspective of the levers for action available to employers, it follows that actions taken to increase job satisfaction should be the main focus of attention (see Alegre et al., 2016 for an overview of the antecedents of job satisfaction). However, our outcomes also highlight a potential dilemma for increasing the job satisfaction for lower household older workers. In particular, increases in job satisfaction for lower household income workers are likely to make the prospect of retirement less attractive, and therefore utmost care must be taken around the circumstances and conditions under which lower income employees will

continue their work when getting older. Both direct supervisors and HR managers are very important in this regard as they are key figures in protecting and enhancing workers sustainable employability throughout their career (Van der Heijden and De Vos, 2015).

ETHICS STATEMENT

This study was carried out in accordance with the recommendations of Middlesex University Business School Ethics Committee with written informed consent from all subjects. All subjects gave written informed consent in accordance with the Declaration of Helsinki. The protocol was approved by Middlesex University Business School. All participation was voluntary. No participants were minor or vulnerable people.

AUTHOR CONTRIBUTIONS

MF performed the data collection. ED and BH were responsible for the study design. ED performed the data analysis. ED and BH were responsible drafting of the manuscript. BH, ED, and MF made critical revisions to the paper for important intellectual content. ED and BH provided statistical expertise. MF obtained funding.

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Psychological Health in the Retirement Transition: Rationale and First Findings in the HEalth, Ageing and Retirement Transitions in Sweden (HEARTS) Study

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From an aging research and life-course perspective, the transition to retirement marks a significant life-event and provides a unique opportunity to study psychological health and coping during a period of substantial change in everyday life. The aim of the present paper is to: (a) outline the rationale of the HEalth, Ageing and Retirement Transitions in Sweden (HEARTS) study, (b) describe the study sample, and (c) to present some initial results from the two first waves regarding the association between retirement status and psychological health. The HEARTS study is designed to annually study psychological health in the years before and following retirement, and to examine change and stability patterns related to the retirement event. Among a representative Swedish population-based sample of 14,990 individuals aged 60–66 years, 5,913 completed the baseline questionnaire in 2015. The majority of the participants (69%) completed a web-based survey, and the rest (31%) completed a paper version. The baseline HEARTS sample represents the general population well in terms of gender and age, but is more highly educated. Cross-sectional findings from the first wave showed that retired individuals demonstrated better psychological health compared to those who were still working. Longitudinal results from the first and second waves showed that individuals who retired between waves showed more positive changes in psychological health compared with those still working or previously retired.

Keywords: aging, retirement, longitudinal study, cohort study, transition

INTRODUCTION

The retirement event signals the entry into the third age (Laslett, 1991). The period of transition into retirement offers a unique time window that allows researchers to study adaption and coping over a period characterized by substantial everyday-life changes that may affect overall psychological health. Early research on the retirement transition has largely focused on financial conditions and physical health and less on psychological aspects, but this trend has changed in recent years as more interest in psychological factors has been noted (Shultz and Wang, 2011). However, there are still substantial gaps in the current literature on how individuals experience

and cope with the retirement transition (Shultz and Wang, 2011; Wang et al., 2011). As emphasized by Shultz and Wang (2011) and Löckenhoff (2012), we need to know more about continuity and change in psychological health before, during, and following retirement. The aim of the present paper is threefold: (a) to outline the rationale of the HEalth, Ageing and Retirement Transitions in Sweden (HEARTS) study; (b) to describe the study sample, and (c) to present some initial results from the two first waves in terms of the association of retirement status and psychological health.

The rationale of the HEARTS study is rooted in several challenges linked to retirement research that have been identified in previous work, along with recent societal trends that potentially call into question results from previous studies. For example, recent changes and predictions of population dynamics, including the increased longevity and changes in perceptions and expectations of aging, (OECD, 2006; Christensen et al., 2009) call for a more comprehensive theoretical model and an updated empirical platform when it comes to aging and retirement patterns. Aging characteristics in later born cohorts differ substantially from previous generations, and the detection of life-course influences requires more detailed information about pre-aging conditions of relevance for adaptive processes related to late life outcomes. Such information is often less detailed, or even lacking, in many studies. For example, women in cohorts now entering the third age have been more engaged in the workforce which may contribute to new social patterns that need to be considered in order to understand gender differences related to the retirement transition. New cohorts also challenge previous findings due to other life-course experiences in terms of differences in education, overall lifestyle, and health-related behavior (Qi, 2016). Compared with previous generations, current cohorts of older adults face different challenges related to retirement and post-retirement life, including other experiences, expectations, and perspectives. Retirement, however, still represents a major life event. Additionally, the transition into this new period of life signals aging, both at the individual and societal level. Previously rigid regulations for a certain retirement age are gradually being replaced by more flexible systems that allow employees to withdraw pensions before or after the previous statutory retirement age of 65. Therefore, effective retirement age is increasing after the implementation of the new old-age pension system.

Previous research on the retirement transition demonstrates that continuity is the default expectation in the sense that people are "doing things to manage their transition to create continuity, contentment, or reconciliation with their new status" (see Ekerdt, 2010). At the same time, retirement requires coping and adaptation in which psychological health is challenged. Notably, the retirement transition highlights the fundamental definition of psychological aging, defined as the capacity to adapt, not only to inner biological changes but also to changes in the external environment, which can affect psychological health. There are reasons to believe that the effects of retirement transition on psychological health will vary considerably across individuals, dependent on many moderating variables. In a recent literature review (Henning et al., 2016), we show that while most retirees maintain their level of well-being over the transition, there is a substantial heterogeneity in change patterns, particularly within certain subgroups (Wang, 2007) affected by greater loss of resources that tend to compromise well-being (Pinquart and Schindler, 2007). A general finding in the review was that most previous studies failed to address change in the transition, leaving a number of critical questions unresolved.

Studies of the retirement transition face numerous methodological challenges. Labor market circumstances, type of work and job-satisfaction, personal preferences and selection issues related to health, work circumstances, socioeconomic conditions, household/family and priorities for "a good life" and life style as retiree, are only some of the internal validity factors to consider (e.g., Agahi et al., 2006; Nordenmark and Stattin, 2009). Many studies are also limited by only including men or few women. Furthermore, as proposed by Ekerdt (2010), retired life may be experienced less as an arrival but more as a personal frontier. A general observation related to psychological adaptation following retirement, is that retrospective reports tend to be more positive compared with actual pre-post ratings of health and well-being, which is a strong argument for a longitudinal design (Wells et al., 2009). This highlights the need to gather detailed pre-retirement information for an improved understanding of the retirement transition. Another challenge deals with how to conceptualize change. A temporal perspective has been called for (Shultz and Wang, 2011), which allows researchers to characterize each individual transition and examine within-person change and fluctuations on a finer scale. Previous studies have typically used data with bi-annual (e.g., Health and Retirement Study, HRS; Wang, 2007; Calvo et al., 2009), or bi-annual to less frequent (Survey of Health, Aging and Retirement Transitions in Europe, SHARE; Clark and Fawaz, 2009) measurements, resulting in large windows of time that prevent the detection of fluctuations and short-term changes around the retirement event. Studies that have included more frequent than bi-annual measurements are typically small, non-population based, and case-studies (Reitzes et al., 1996; Kim and Moen, 2002). The design, structure, and content of existing studies provide a less than optimal platform for studying the complex and rapidly changing patterns of within-person change and associations of change in different variables linked to psychological health. Thus, designs with more frequent and repeated measurements are needed.

Moreover, in most existing research on retirement, data is reported from studies (e.g., HRS or German Socio-Economic Panel) including participants who retired in the 1990s or in the 2000s, that is, between 10 and 20 years ago (the SHARE study being an exception with recent data collections 2013 and 2015). With the recent changes in retirement patterns and changing macro-conditions (Hofäcker et al., 2016), collecting updated data on retirement behavior, experiences, and the perceptions of individuals retiring today is highly relevant, both from a research perspective as well as a policy perspective.

A third challenge concerns the targeted domains of psychological health. Most previous studies have used data from: (a) large population-based studies originally designed

for other research purposes than retirement; or (b) studies designed for retirement research, but with a heavy emphasis on other domains than psychological health; or a combination of (a) and (b). As a consequence, psychological health is typically measured only by single-item measures or through one concept (e.g., well-being), rather than investigated using a broader spectrum of reliable, theoretically derived multi-item variables. For example, the large and population-based German Socio-economic panel with annual measurements only includes a single-item measure of life-satisfaction (Pinquart and Schindler, 2007; Wetzel et al., 2016). As the retirement transition may have different effects on different dimensions of psychological health, a study should ideally include a variety of theoretically driven, multiple item-based, measures of psychological health. A firm consolidation and validation of findings across studies require comparisons of outcome measures in the same study (Wang et al., 2011; Muratore et al., 2014).

Finally, an important challenge for retirement researchers is how to define the concept of retirement status, and how to best measure it. While this may seem quite straightforward, it is by no means a simple task as retirement includes many different facets, can carry different meanings between individuals, and can thus be measured in different ways (Denton and Spencer, 2009). For instance, retirement is no longer viewed as a one-step permanent career exit (Wang and Shultz, 2010; Zhan and Wang, 2015). Many retirees choose to continue their work engagement in the form of bridge employments as an intermediate step toward a complete labor force withdrawal (Shultz, 2003), and today it is relatively common among older workers to retire, "un-retire," and "re-retire" several times (Shultz and Wang, 2011; Beehr and Bennett, 2015). It is therefore important to be able to distinguish between different types of retirement statuses and transitions when studying its influence on various psychological outcomes. Thus, the very definition of retirement is far from simple and measuring an individual's retirement status can be a complicated issue (Ekerdt and DeViney, 1990; Denton and Spencer, 2009). Retirement may look very differently, and be perceived very differently, for different individuals, and the definition can be very arbitrary (Beehr and Bowling, 2013; Cahill et al., 2013). In the end, the appropriate definition of retirement, and the answer to the question of how to best measure it, likely depends on the research question. As the HEARTS study mainly targets the retirement transition and process from a psychosocial health perspective, measuring retirement status in a way that also captures the individual's own psychological definition and perception of retirement status is warranted.

To summarize, the requirements of studies to accurately analyze, understand and draw conclusions about the dynamics of experiences and changes in well-being across the retirement event, in combination with the lack of existing studies and data-bases (at least those reported in previous published work) meeting these requirements, calls for a new study in which the retirement transition is investigated using: (a) a design with more frequent measurements before and after the retirement event; (b) a large population-based sample for whom retirement is anticipated in the near future and likely to be of concern and on the "mental agenda"; (c) a study sample followed across multiple waves with high between-wave adherence; (d) a broad range of theoretically derived and robust multi-item-based measures related to psychological health; (d) supplement data-bases for linkage to register information on life-course information and factors such as socioeconomics, living, and workforce conditions.

The launch of the HEARTS study constitutes an attempt to adhere to such a call, potentially bridging some of the present gaps in the literature on psychological health in the retirement transition. The overall aim of HEARTS is to study psychological health in the years before and following retirement with a focus on continuity and change over the transition. The main research questions of the HEARTS study are: How does the retirement transition affect psychological health in the early phases of the third age? What contributes to continuity and changes in psychological health after retirement? Which factors moderate and mediate the effect of retirement on psychological health?

MATERIALS AND METHODS

Design and Empirical Model

The HEARTS study is a longitudinal cohort study, following individuals annually before, during, and after the retirement event. The first data collection (baseline/first wave) was conducted in spring 2015 and the first follow-up (second wave) was conducted in spring 2016. The second follow-up (third wave) is ongoing in spring 2017. The study is scheduled to provide annual follow-up data until at least the year 2019, resulting in five measurement occasions (waves) of within-person data.

A crucial assumption in the HEARTS design is that the retirement process cannot be properly characterized in terms of universal trends and statistical main effects. Instead, the retirement process is proposed to be constituted of multiple interaction effects in which different variables moderate the effect of retirement on psychological health. Following this line of reasoning, the empirical model of the HEARTS study (see **Figure 1**), highlights the role of potential moderating factors, such as gender, socioeconomic status, reason for retirement, job-satisfaction and engagement, self-perceptions and perceptions of aging, attitudes related to retirement, and physical fitness. Moreover, mediating variables are also included in the empirical model, guiding us to study the underlying mechanisms of change in psychological health across retirement. Key mediating variables in the model are overall lifestyle and activity patterns, including engagement in physical, cognitive, and social activities.

Measurements

The HEARTS survey is divided into six parts/modules with the following themes: (i) background information (marital status, family situation, relationships, living situation); (ii) questions related to work (present or last job before retirement), retirement plans and retirement experience; (iii) health, leisure activities and health-behavior; (iv) psychological health and well-being; (v) social relations and network; (vi) personality, self-esteem and future-perspective. A more detailed description of domains,

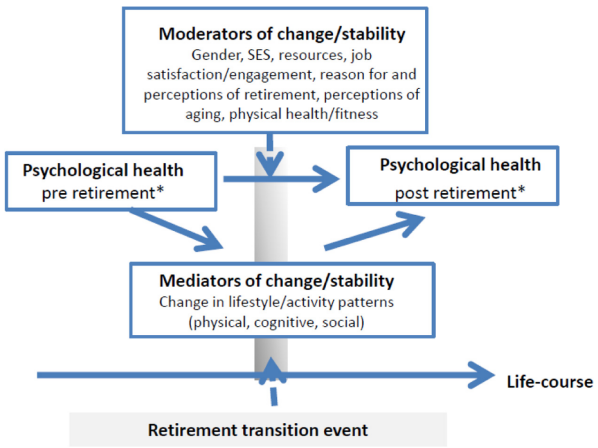

FIGURE 1 | The empirical model of the HEARTS study, showing possible moderators and mediators of the effects of retirement on psychological health

variables, and instruments used in the HEARTS study is provided in **Table 1**.

In addition to the questionnaire, cognitive tests were included in the web-based survey. Different domains of cognitive performance were assessed. In both waves, memory was assessed with the original Thurstone picture memory test (Thurstone and Thurstone, 1949). Twenty pictures were subsequently presented to the participants, each one for 5 s. Then, participants were asked to identify each of the 20 previously viewed pictures when shown together with three other related, but not previously shown, pictures. In wave 1, verbal abilities were assessed using 20 questions on word knowledge, and numeracy was assessed using 12 questions. There was a 40 s time limit for each answer. An example item for assessing numeracy was: "If the chance of getting a disease is 10%, how many people would be expected to get the disease out of 1000?" (Answer alternatives: 100 people, 50 people, 10 people, 5 people, 1 person, I do not know). In wave 2, logical reasoning was measured by 12 diagrammatic puzzles, each with a missing part that the participant attempted to identify from eight options (Arthur and Day, 1994). Participants had 3 min to find all correct answers. Spatial ability was assessed in wave 2 using a test of spatial rotation (Peters and Battista, 2008). The mental rotation test requires participants to view two polygons, and judge if they are planar rotations of each other (as opposed to its mirror image).

To better capture the heterogeneity of retirement status and gradual retirement, retirement status was measured using the question "Are you retired (i.e., have started to receive old age pension)?" This question has four possible response alternatives: (a) No, (b), Yes, but still work and do not consider myself a retiree; (c) Yes, still work but consider myself a retiree; and (d) Yes, "full time retiree". Consequently, response (a) represents individuals still working or who are unemployed whereas (b), (c) and (d) reflects retirement on a gradual scale from partial retirement/bridge retirement to full retirement, where the perception and identity of the individual linked to retirement status is most important.

Data from the HEARTS cohort will be linked to Swedish national registers containing information on mortality, disease and sociodemographic information as well as life-course information, such as cognitive status and fitness at 18 years of age for men (using the Swedish conscription data base). Our intention is to later integrate the HEARTS cohort into other ongoing Swedish longitudinal studies, creating opportunities to have more measurement points and more extended longitudinal within-person information.

Participants

A nationally representative population-based sample of 14,990 individuals between the ages 60 and 66 was recruited in April 2015 through the register, Statens personadressregister (SPAR) in April 2015. SPAR includes all persons registered as residents in Sweden and the register is updated each day with data from the Swedish Population Register. The sample was stratified by age, but no other restrictions were made.

Procedure

Invitations for participation in the study were sent out to 14,990 individuals. In addition to general information about the study, the invitation letter also included information on how to take part in the study through a web-based survey, administered through the Qualtrics service (web-link, individual study code and password). Non-responders received a first reminder 3 weeks later with the same information on how to answer via the web-based survey. Three weeks later a second and final reminder was sent out together with a paper-version of the survey (in addition to information that the web-link was still valid). The rationale for using a computer-based platform for annual surveys is based on the knowledge of wide internet access and computer use in Sweden, including among older adults (Findahl, 2012). However, those who prefer a paper-based questionnaire are offered this option throughout the study.

Cognitive tests were only included in the web-based survey and represent different aspects of cognitive function. We did not include reaction-time based measures, because different electronic devices and differences in internet connection speed could distort the results. The selected tests could be performed on all devices. These tests were not intended to be diagnostic, but as indicators of cognitive performance in different domains.

The HEARTS study was carried out in accordance with the recommendations of the regional ethical approval board of the University of Gothenburg with written informed consent from all subjects. All subjects gave written informed consent in accordance with the Declaration of Helsinki. Ethical approval was granted from the ethical approval board of the University of Gothenburg (Dnr: 970-14).

SOME EMPIRICAL HIGHLIGHTS OF THE HEARTS STUDY

In addition to describing the theoretical rationale and background of the HEARTS study, in the present paper we present some empirical highlights of the two first waves of the

TABLE 1 | Description of domains, variables, and instruments covered in the HEARTS study.

Domain	Variables	Instruments	Reference
Sociodemographic background	Gender, civil status, living context, nr of children and grand-children.	Single items	
Work life	Work demand	The Copenhagen Psychosocial Questionnaire	Pejtersen et al., 2010
	Work motivation	Multidimensional work motivation scale	Gagné et al., 2015
	Importance of performance to self-esteem	IPES	Ferris et al., 2010
Retirement	Reasons for retirement, retirement experiences and expectations	The Reasons for Retirement Questionnaire The Retirement Experiences Questionnaire	Robinson et al., 2010
Health, activities, health behaviour/ lifestyle	Self-reported health, leisure activities, psychical activity, smoking, alcohol	Single items, IPAQ, AUDIT	Saltin and Grimby, 1968; Ekelund et al., 2006
Psychological well-being	Depression	CES-D	Radloff, 1977
	Perceived stress	Perceived stress scale	Cohen and Williamson, 1988
	Life satisfaction	Satisfaction with life scale	Diener et al., 1985
	Basic psychological needs satisfaction	Basic psychological needs satisfaction	Chen et al., 2015
	Quality of life	CASP-12	von dem Knesebeck et al., 2005
	Perceived stress	Perceived stress scale	Cohen and Williamson, 1988
	Loneliness	UCLA-6	Neto, 2014
Cognitive function	Verbal abilities	Verbal scale	Based on Wechsler, 1981
	Numeracy abilities	Numeracy scale	Based on Weller et al., 2013
	Memory abilities	Memory scale	Based on Thurstone and Thurstone, 1949
	Logical thinking	Short Logical Matrices Test	Arthur and Day, 1994
	Visuo-spatial memory*	Corsi Block Task	Corsi, 1972
	Executive functioning*	Wisconsin Card Sorting Test	Berg, 1948
Social network	Social contacts	Lubben social network scale	Lubben, 1988
	Social support	Multidimensional scale of perceived social support	Zimet et al., 1988
Personality and attitudes	Big Five	Mini-IPIP	Donnellan et al., 2006
	Future time perspective	Future Orientation Scale	Carstensen and Lang, 1996, Unpublished
	Self-esteem	Rosenberg self-esteem scale	Rosenberg, 1965

Only administered to a subsample in wave 1 (n = 382).

study. These include findings concerning (a) cross-sectional differences in psychological health between individuals with different retirement status (working, partially retired or fully retired) at baseline, and (b) changes in psychological health across 1 year for different retirement status groups (working both waves, retired both waves, and retiring between waves).

Measures Included in the Empirical Analysis

For the analyses presented in the present paper, we selected four variables representing psychological health as outcome variables: stress, depression, quality of life, and autonomy. Stress was analyzed using the Perceived Stress Scale (Cohen and Williamson, 1988). This scale includes 10 items. Participants reported how often they experienced different feelings in the last week, using a 5-point Likert-type scale. One item was: "In the last week, how often have you felt nervous and stressed?" Depression was assessed using a 10-item version of the CES-D scale (Radloff, 1977). Participants reported on a 4-point Likert-type scale (ranging from "rarely/none of the time" to "most/all of the time") how often they experienced specific depressive symptoms in the last week. An example of an item is: "I felt depressed." Quality of life was assessed using the CASP-12 scale (von dem Knesebeck et al., 2005). The CASP-12 includes 12 items targeting autonomy, pleasure, control, and self-realization, using a 4 point Likert-type scale. An example of an item is: "I look forward to each day." A sum score was used instead of scoring the separate sub-dimensions. Autonomy was assessed using a sub-scale of the Basic Psychological Needs Satisfaction and Frustration Scale (Chen et al., 2015). Three items assessed autonomy on a 5-point Likert-type scale. An example of an item used is: "I feel a sense of choice and freedom in the things I undertake."

Analysis

In the first step, we conducted descriptive analyses to describe the HEARTS sample at baseline (wave 1) and first follow-up (wave 2) a year later. In the second step, we first used bivariate correlation analysis to test associations between the four psychological variables in wave 1 and 2 along with a reliability analysis

(Cronbach's alpha). For the main analyses, we compared the four retirement groups (described in the Measures section) in measurements of depression, stress, autonomy and quality of life, using ANOVAs, followed by Games-Howell *post hoc* tests, in SPSS. Secondly, we compared change between wave 1 and 2 in these variables, between those who were retired in both waves (still retired), those who retired between waves (retirees), and those who stayed working between waves (still working), using repeated-measure ANOVAs.

Survey Response and Study Sample Description

In total 5,913 persons completed the first wave survey, resulting in a response rate of 39.4%. Among the participants, 4,068 (68.8%) persons responded to the web-based survey and 1,845 (31.2%) responded using the paper version (see **Table 2**). The cohort consists of slightly more women (53.0%) than men (45.4%), slightly more older individuals (aged 65–66 years), and a majority of Swedish born individuals (84.7%). The majority reported being married or having a partner (71.0%), having one or several children (88.8%), and having one or several grandchildren (65.4%). In terms of education, the cohort is better educated compared to the general population, with the largest group (31.3%) reporting having a university degree. In total, 49.6% reported completing some tertiary education level (post-secondary level).

In terms of retirement status, the majority of the sample (64.1%, $n = 3793$) reported not being retired at baseline (i.e., still working or unemployed). Of the remaining individuals, 7.5% ($n = 443$) reported being retired but working and not considering themselves a retiree, 4.4% ($n = 260$) reported being retired and working, but considering themselves a retiree, and 21.4% ($n = 1263$) reported being "full time retired."

Of those who reported not being retired, 63.7% ($n = 2451$) were working full-time, 19.2% ($n = 725$) were working part-time, 3.9% ($n = 149$) were unemployed, 2.4% ($n = 90$) were on sick leave, 6.4% ($n = 242$) received disability pensions, and 3.5% ($n = 131$) said that they were fully retired, even though they had not started to take out pensions. Information on work status was missing for 41 participants.

In the first annual follow-up in 2016 (the second wave measurement), 4,651 individuals completed the survey again, representing 78.7% of the baseline sample. Among those, 3,612 (77.7%) completed the web-survey and 1,039 (22.3%) completed the paper version. Compared to responders at follow-up, those who declined or for other reasons were non-responders at the follow-up ($n = 1262$, 21.3%) consisted of a greater proportion of men, participants in the lower age range, individuals not born in Sweden, unmarried and divorced, and participants still working. Also, individuals missing at follow-up reported lower education levels, higher scores on depression and stress, lower life-satisfaction and also scored lower in all cognitive domains (verbal, memory, and numeracy) at baseline.

In terms of change in retirement status, 12% of the baseline sample changed from working full time to being fully retired (i.e., changed from response [a] to [d]). Another 10% reported that they had changed from working full-time to receiving pension but continued working (i.e., change from [a] to [b] or [c]). Only 2% of the baseline full retirees changed back to full-time work, and another 6% had started working again to some extent while receiving pension (partial retirement).

Retirement Status, and Psychological Health at Baseline

Correlations and reliability estimates (Cronbach's alphas) for the four psychological health variables in wave 1 and 2 are described in **Table 3**. The reliability estimates for all measures were over.70 in both wave 1 and 2. There were moderately strong positive correlations between stress and depression and between quality of life and autonomy at both wave 1 and 2. There were also negative correlations between stress and depression with quality of life and autonomy at both waves. The longitudinal associations found between T1 and T2 were similar to those cross-sectional associations found at T1, albeit slightly weaker.

Baseline differences in psychological health across the four retirement groups are described in **Table 4**. Individuals not yet retired and still working reported higher levels of stress compared with fully retired individuals and those still working but considering themselves retirees. Additionally, the non-retired group reported more depressive symptoms compared with all three retired groups. Individuals in the three retired groups reported higher quality of life and autonomy compared to non-retired individuals. No differences were found at baseline between the three retired groups.

Retirement Status Change and Change in Psychological Health between the First and Second Waves

Patterns of change and continuity in psychological health over the 1 year period between wave 1 and wave 2 are described in **Table 5**. Across the three retirement status groups (working at both waves, retired at both waves, or retiring between waves) there were significant Time effects for all variables. Compared to the baseline, participants at wave 2 generally reported lower stress and depression and higher quality of life and autonomy. Significant Time × Group interactions were found for all variables except for stress. The interactions are illustrated in **Figures 2A–D**. The general pattern was similar for all of these interactions (i.e., differences in retirement status change groups in change patterns). Participants working at both waves (blue lines in figures) displayed stability or a marginal increase in quality of life and autonomy, and stability or a marginal decrease in stress and depression. Participants fully retired at both waves (green lines in figures) also demonstrated a general pattern of stability in these variables. In contrast to the working group, the small change demonstrated in this group was in the opposite direction, showing small decreases in quality of life and autonomy and a small increase in depression. Participants retiring between waves (i.e., moving from retirement status categories [a] or[b] to [c] or [d]), illustrated with red lines in the figures, demonstrated a quite different overall pattern of change,

TABLE 2 | Description of the HEARTS cohort at baseline and at follow-up one year later.

Characteristics	HEARTS baseline total sample (*N* = 5913)	HEARTS baseline web-based sample (*n* = 4068)	HEARTS baseline paper sample (*n* = 1845)	HEARTS follow-up total sample (*N* = 4651)
	Frequency *n* (%)	Frequency *n* (%)	Frequency *n* (%)	Frequency *n* (%)
Demographics				
Gender				
Men	2683 (45.4%)	1943 (47.8%)	740 (40.1%)	2080 (44.7%)
Women	3132 (53.0%)	2055 (50.5%)	1077 (58.4%)	2507 (53.9%)
Other	1 (0.02%)	–	1 (0.1)%	1 (0.0%)
Birth year				
1955	804 (13.6%)	569 (14.0%)	235 (12.7%)	595 (12.8%)
1954	772 (13.1%)	540 (13.3%)	232 (12.6%)	602 (12.9%)
1953	814 (13.8%)	576 (14.2%)	238 (12.9%)	634 (13.6%)
1952	855 (14.5%)	588 (14.5%)	267 (14.5%)	670 (14.4%)
1951	817 (13.8%)	550 (13.5%)	267 (14.5%)	645 (13.9%)
1950	870 (14.7%)	583 (14.3%)	287 (15.6%)	711 (15.3%)
1949	912 (15.4%)	624 (15.3%)	288 (15.6%)	748 (16.1%)
Highest level of Education				
Did not finish primary education or shorter primary than 9 years	140 (2.4%)	72 (1.8%)	68 (3.7%)	91 (2.0%)
Finished primary education	771 (13.0%)	412 (10.1%)	359 (19.7%)	552 (11.9%)
Secondary education (Gymnasium)	1987 (33.6%)	1311 (32.2%)	676 (36.6%)	1536 (33.0%)
Community college or 2 Year College	1081 (18.3%)	799 (19.7%)	282(15.3%)	889 (19.1%)
College or University Graduate	1853 (31.3%)	1419 (34.9%)	434 (23.5%)	1533 (33.0%)
Country of birth				
Sweden	5006 (84.7%)	3598 (88.4%)	1408 (76.3%)	4035 (86.8%)
Other	647 (10.9%)	433 (10.6%)	214 (11.6%)	448 (9.6%)
Marital status				
Married/Partner	4199 (71.0%)	3011 (74.0%)	1188 (64.4%)	3380 (74.5%)
Unmarried (never been married)	488 (8.3%)	288 (7.1%)	200 (10.8%)	343 (7.6%)
Divorced/separated	836 (14.1%)	566 (13.9%)	270 (14.6%)	611 (13.5%)
Widow/Widower	225 (3.8%)	145 (3.6%)	80 (4.3%)	197 (4.3%)
Retirement status				
Not retired	3793 (64.1%)	2674 (65.7%)	1119 (60.7%)	2248 (48.3%)
Retired and working, consider myself a worker	443 (7.5%)	321 (7.9%)	122 (6.6%)	490 (10.5%)
Retired and working, consider myself a retiree	260 (4.4%)	188 (4.6%)	72 (3.9%	340 (7.3%)
Retired "full time," not working	1263 (21.4%)	818 (20.1%)	445 (24.1%)	1522 (32.7%)

TABLE 3 | Reliability estimates (Cronbach's alpha, [α]) and correlations between the psychological health variables used in the current study at wave 1 (W1) and wave 2 (W2).

Variables	α	1.	2.	3.	4.	5.	6.	7.	8.
(1) Stress W1	0.79	–							
(2) Depression W1	0.79	0.58	–						
(3) Quality of life W1	0.85	−0.59	−0.66	–					
(4) Autonomy W1	0.74	−0.47	−0.51	0.67	–				
(5) Stress W2	0.79	0.54	0.43	−0.45	−0.39	–			
(6) Depression W2	0.80	0.45	0.64	−0.54	−0.40	0.54	–		
(7) Quality of life W2	0.86	−0.43	−0.55	0.66	0.50	−0.49	−0.56	–	
(8) Autonomy W2	0.73	−0.41	−0.44	0.57	0.63	−0.40	−0.37	0.51	–

with increases in quality of life and autonomy and decreases in depression between waves.

DISCUSSION

The HEARTS study represents an attempt to close some of the gaps identified in previous research and to provide a better insight into the dynamics of retirement transitions, in particular linked to psychological health. A key notion highlighted in the literature on retirement (e.g., Shultz and Wang, 2011; Wang et al., 2011; Löckenhoff, 2012) is that retirement needs to be viewed as a transition process, not as a simple binary outcome. Thus, we need to consider both time-to, as well as time-from, the retirement event, which requires a longitudinal design to more accurately map and better understand the adaptive mechanisms engaged before, during, and after the retirement event. As pointed out in previous work (e.g., Shultz and Wang, 2011; Löckenhoff, 2012), little is known about the dynamics of the retirement transition when it comes to individuals' psychological health and adaptation, and there is a gap in the understanding of what mechanisms shape individual retirement trajectories. Although there are examples of previous work in which the issue of dynamics of retirement transitions have been highlighted (e.g., Pinquart and Schindler, 2007; Wang, 2007), via large samples and sophisticated analyses, systematic knowledge on how individuals' psychological health (using multiple indicators) are affected over the retirement transition is still lacking.

Retirement is likely accompanied by both losses and gains (Wang et al., 2011; Henning et al., 2016). Analyses therefore need to consider the negative and positive effects of the transition by accounting for the multiple factors that can modify the effects of retirement and identify the filters and lenses that act to shape post-retirement transitions. The preliminary findings from the two first waves of the HEARTS study presented in the present paper depict retirement as a generally positive experience for most individuals. Compared to working individuals, retired individuals scored higher on several of the psychological health variables (e.g., life-satisfaction, quality of life, autonomy) in addition to reporting lower stress and depression at baseline.

Our analyses on the baseline data showed that individuals who are in the middle of the retirement transition (i.e., receive old age pension but are still engaged in the workforce to some extent), reported better psychological health. These results are in line with the previously demonstrated positive effect of bridge jobs (Kim and Feldman, 2000; Zhan et al., 2009; Dingemans and Henkens, 2014; Lux and Scherger, 2017) and

TABLE 4 | Differences in psychological health across the four retirement status groups at baseline.

Variables	Not retired (n = 3793)	Retired and working, consider myself a worker (n = 443)	Retired and working, consider myself a retiree (n = 260)	Retired "full time", not working (n = 1263)	F-value
	M (SD)	M (SD)	M (SD)	M (SD)	
Stress[1]	22.2^{a} (5.9)	21.5^{ab}(6.0)	20.8^{b} (5.5)	21.5^{b}(6.1)	7.92**
Depression[2]	4.3^{a}(4.1)	3.6^{b}(3.7)	3.5^{b}(3.5)	3.7^{b}(4.2)	11.76**
Quality of life[3]	37.8^{b}(6.2)	39.0^{a}(6.0)	39.3^{a}(5.3)	38.8^{a}(6.3)	12.95**
Autonomy[4]	11.2^{b}(2.3)	11.9^{a}(2.2)	12.1^{a}(2.0)	12.1^{a}(2.2)	60.98**

[1]*Based on Perceived stress scale, scores ranging from 10 to 50;* [2]*Based on the 10 item version of the CESD-D scale, scores ranging from 0 to 30;* [3]*Based on CASPI-12, scores ranging from 12 to 48;* [4]*Based on Basic Psychological Need Scale, scores ranging from 3 to 15; Values in the same row that do not share a common subscript (e.g.,* ^{a,b,c}*) are significantly different at* $p < 0.05$ *level according to the Games-Howell post hoc test.* $^{*}p < 0.05$, $^{**}p < 0.01$.

TABLE 5 | Change in psychological health across baseline (first wave) and second wave for different retirement status change groups.

Variables	Full sample (n = 4523)	Still working (n = 2694)	Still retired (n = 1169)	Retirees (n = 660)	F-values Time effect/ Time × Retirement status effect
	M (SD)	M (SD)	M (SD)	M (SD)	
Stress T1	21.7 (5.9)	22.1 (5.9)	21.0 (5.9)	21.6 (5.6)	
Stress T2	21.5 (5.9)	22.0 (6.1)	20.7 (5.6)	21.2 (5.8)	6.93*/0.94
Depression T1	4.0 (4.0)	4.3 (4.1)	3.4 (3.8)	4.0 (3.7)	
Depression T2	3.9 (4.0)	4.2 (4.1)	3.5 (3.7)	3.4 (3.8)	6.80*/8.28*
Quality of life T1	38.4 (6.1)	38.0 (6.1)	39.2 (6.0)	38.7 (6.1)	
Quality of life T2	38.5 (6.8)	38.0 (6.8)	39.1 (5.9)	39.9 (8.1)	9.34*/11.58*
Autonomy T1	11.6 (2.2)	11.3 (2.2)	12.2 (2.0)	11.6 (2.2)	52.20*/35.62
Autonomy T2	11.7 (2.2)	11.3 (2.3)	12.2 (2.0)	12.3 (2.1)	

Still working, Working both at first and second wave; Still retired, Retired in both first and second wave; Retirees, moved into retirement between wave 1 and wave 2. W1, baseline measure (first wave); W2, second wave measure (1 year post baseline). Main effects of time for full sample: Stress, $F(1,3738) = 6.93$, $p < 0.01$; *Depression,* $F(1,3921) = 6.80$, $p < 0.01$; *Quality of life,* $F(1,3658) = 9.34$, $p < 0.01$; *Autonomy,* $F(1,4015) = 52.20$, $p < 0.001$.

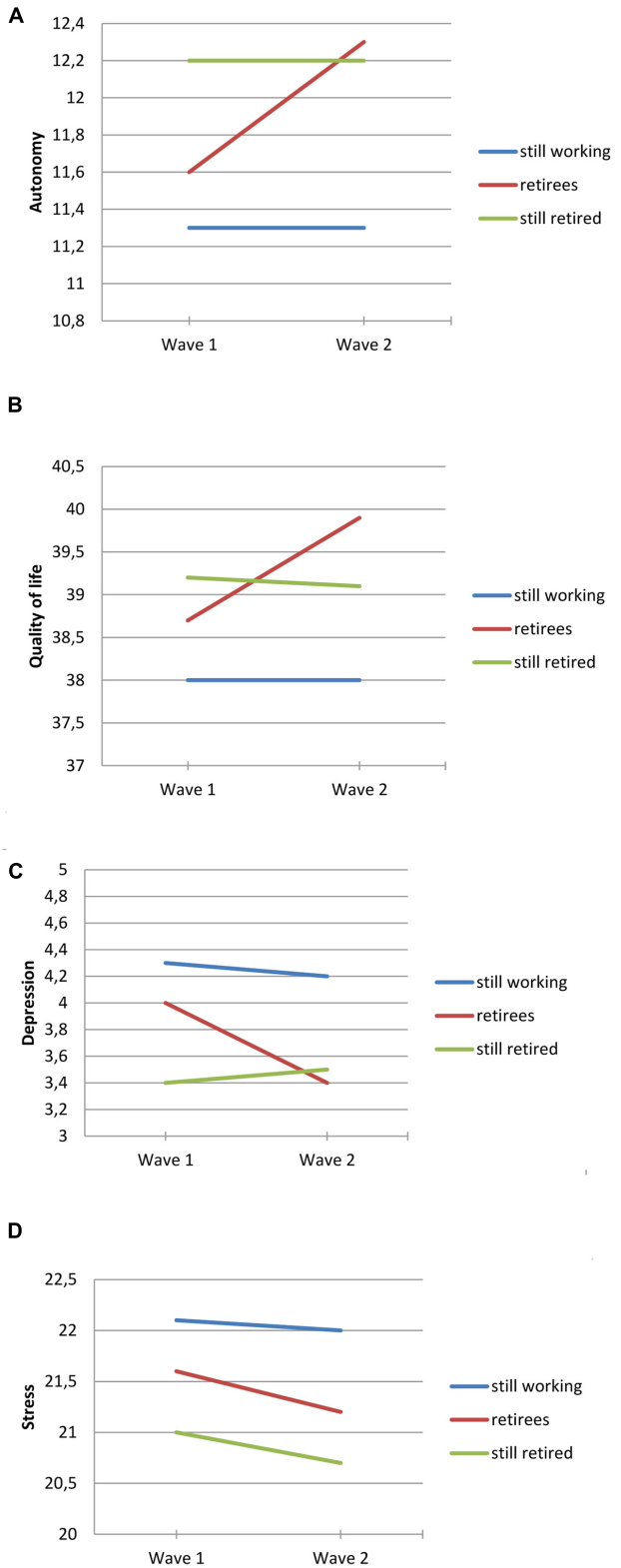

FIGURE 2 | (A–D) Change in psychological health variables [autonomy in figure **(A)**, quality of life in figure **(B)**, depression in figure **(C)**, stress in figure **(D)**], across wave 1 and 2, comparing participants still working across waves, still being retired across waves, and retiring between waves.

partial retirement (Nikolova and Graham, 2014) on health and life-satisfaction. However, the associations between bridge jobs, working in retirement, psychological health and life-satisfaction are likely more complex and influenced by a number of moderating variables, such as voluntariness and sense of control, (Calvo et al., 2009; Dingemans and Henkens, 2014; Nikolova and Graham, 2014) and satisfaction with household income (Lux and Scherger, 2017). In general, however, as noted in previous review papers (Wang and Shultz, 2010; Beehr and Bennett, 2015), very little is known about the actual outcomes of bridge employment.

Given the cross-sectional nature of the baseline data, it is also possible that the association between retirement status and psychological health mirrors the effects of the retirement position, or, selection effects into earlier retirement, or a combination of both. For example, it is possible that bridge employment engagement is partly determined by individual resources and capability (Beehr and Bennett, 2007, 2015). Having more resources, and consequently likely better psychological health, could thus increase chances to engage in bridge employment, which in turn could be beneficial for psychological health, creating a positive spiral effect (virtuous cycle effect). As such, bridge employment and working in retirement may be viewed as outcomes of individual resources and psychological health, rather than predictors of such. The more positive psychological health of the partially retired groups therefore also provides preliminary evidence for the notion of a healthy-worker effect, further highlighting the need to tease apart the directionality of the association between health and retirement behavior (Zhan et al., 2009; Burdorf, 2010; van der Heide et al., 2013).

The question of the potential positive and negative effects of retirement also taps into the basic questions of why people work, continue to work, and what functions work serves (Beehr and Bennett, 2015). Jahoda (1997), for example, describes a number of latent functions of work (aside from the manifest financial function), which are time structure, social contact, collective purpose, activity, and identity or status. All of these factors could potentially moderate the effects of retirement, or partial retirement and bridge jobs, on both levels of post-retirement health and psychological well-being, as well as changes and trajectories in these outcomes over the retirement transition. It should also be noted that retirement, that is the absence of a job, could potentially lead to some of the same functions as described above, for example a chance for increased activity and social contacts. As the HEARTS study includes a broad spectrum of measurements linked to these proposed functions, data from future waves will afford the possibility to examine these assumptions more rigorously, using change-analyses on both between- and within-person levels, as well as a combination of variable and person-centered analyses.

The way of defining and measuring retirement status in the HEARTS study, using two categories to capture partial retirement, targeting primarily the individual perception of partial retirement (identifying oneself as a worker or retiree

when working after retirement), will hopefully better account for the variance in retirement behavior, compared with the traditional dichotomous definitions typically used in previous work (i.e., only distinguishing between workers and retirees). We believe that the differentiation between various types of retirement status and transitions may be an important step forward in understanding its influence on psychological outcomes. For instance, although it is generally believed that a more gradual transition is beneficial for the retirement adjustment process (Cahill et al., 2013), we still lack in our understanding of the underlying mechanisms of how and why retirees may or may not benefit from different types of retirement transition (Zhan and Wang, 2015). The emphasis on individual perception (to what degree do I see myself as a retiree?) when measuring retirement status in HEARTS is also naturally related to the heavy focus on psychosocial outcomes, forming a logic link between independent and dependent variables in the study. By including a more subjective component, it is possible to investigate to what extent changes in psychological health can be understood as an effect of "subjective" or "objective" retirement. As this specific way of targeting retirement has not, to our knowledge, been used in previous studies, it is not possible at this stage to draw any firm conclusions in terms of how the measurement and definition of retirement itself has affected the results presented in the present paper.

The longitudinal findings confirm the notion that retirement has a positive impact on psychological health. Individuals retiring between waves demonstrated a positive change in psychological health, such as increase in life-satisfaction, quality of life and autonomy and a decrease in depression. Participants still working or still retired showed a more stable trend. Although only two measurement points across 2 years provide a limited platform for drawing conclusions about patterns of long-term post-retirement trajectories, these results may mirror the "honeymoon" effect documented in previous studies (e.g., Wetzel et al., 2016). Interestingly, this effect does not seem to be limited to single variables (Wang, 2007; Dingemans and Henkens, 2014) or even one-item based single variables of psychological well-being (Pinquart and Schindler, 2007; Wetzel et al., 2016) as has been documented in previous work, but is evidently valid for a number of the conceptually different variables of psychological health included in HEARTS. Our demonstration of such broad effects on various concepts of psychological well-being contributes with novel insights into the very nature of retirement and how broadly the retirement transition affects individuals The stability patterns of already retired individuals may reflect a "disenchantment" phase in Atchley's model of stages of retirement, following the honeymoon (see Atchley, 1976; Reitzes and Mutran, 2004), further pointing to the notion that retirement patterns and processes may follow a complex non-linear change trend for many individuals.

The overall aim of the HEARTS study is to investigate psychological health in the years before and following retirement with a focus on continuity and change over the transition. The major research questions that will guide future analyses are: How does the retirement transition affect psychological health in the early phases of the third age? Is lifestyle affected and do changes in adaptive processes, such as lifestyle, "travel together" with changes in psychological health from the pre- to the post-retirement period? What contributes to continuity and changes in psychological health after retirement? Which factors moderate and mediate the effect of retirement on psychological health? How do factors such as gender, education, personality, personal control, social embeddedness, and physical health interact with adaptive and coping strategies related to psychological health after retirement? What are the effects of more distal life course factors, for example health, cognition and fitness earlier in life? Can we identify individuals, prior to their retirement, who are at risk for compromised psychological health post-retirement? What characterizes those individuals who exhibit a positive transition (i.e., maintained or increased levels of psychological health) into retirement compared to those who show more negative patterns?

Future waves of the HEARTS study will enable thorough testing of these research questions and the assumptions in the theoretical model. Such analyses include longitudinal mediation models (Selig and Preacher, 2009), addressing mechanisms underlying the effect of retirement on psychological health. For example, in the model, lifestyle (physical, social and intellectual activity) constitutes a key variable of interest, presumably mediating part of the effect of retirement on psychological health. Additionally, a number of moderating variables are described in the model, such as gender, socioeconomic status, work status prior to retirement, reason for retirement, and health, to name a few. Therefore, moderation analyses and conditional process analyses will be used, in which questions about moderation and moderated mediation can be tested (Hayes, 2013; Hayes and Preacher, 2013). Furthermore, in order to address heterogeneity in the population, to identify and understand subpopulations, and to highlight the effect of within-person interactions between multiple variables (e.g., personality, work motivation and lifestyle) on retirement adaptations, we will use person-centered analyses, such as latent profile analyses and growth mixture analyses (for an overview, see Wang and Hanges, 2011).

The design and data collected in the HEARTS study comprise both strengths and limitations. Using a web-based survey design can be considered a strength of the study and has produced a number of benefits. For example, data is quickly available for analyses and the data collection is less expensive compared to other alternatives. Additionally, the HEARTS cohort consists of a narrow age-span (age interval 60–66) sample that will be followed frequently (annually), which increases the ability to detect within-person changes and complex associations of within-person change before and after the retirement transition. The response rate at the first annual follow-up was almost 80%, which coupled with the annual follow-up design, should also be considered a strength of the study. Moreover, compared to existing large longitudinal studies from which data are drawn for studies on retirement transition, HEARTS comprises a wide range of theoretically driven, robust and validated measurements of psychological and psychosocial health, lifestyle and activities. Finally, the planned link between HEARTS-data and other registers and ongoing studies can be seen as a unique asset given the possibility to link later life data to unique

life-course information[1]. Our planned annual longitudinal data collection will provide opportunities to examine within-person change and cross-lagged effects more carefully and grant a more stable platform for an even more detailed picture of the losses and gains in the transition, as well as the selection mechanisms that operate in the retirement context. In terms of weaknesses, as in most cohort studies, despite efforts to recruit a nationally representative sample, the HEARTS cohort is more highly educated compared to the general population, which will affect how results can be generalized. Furthermore, we found systematic differences between responders and non-responders (i.e., individuals that dropped out before wave 1 and 2) at wave 2. This pattern is not uncommon for longitudinal studies on aging (van Beijsterveldt et al., 2002; Rabbitt et al., 2004; Chatfield et al., 2005), and might lead to distorted effects. This problem will need to be addressed in future publications, using appropriate methods (Hogan et al., 2004; Ghisletta and Spini, 2004). Another weakness is that only web-based survey participants were able to perform the cognitive measures. Additionally, data collected thus far mainly consists of self-reports, aside from the cognitive tests. However, future analyses will allow us to supplement and merge this information with register data, and thereby further increase the value of the HEARTS study.

[1] The HEARTS data will be available for sharing and collaboration starting in the spring of 2018. Information about the study and cohort, along with a file containing the complete list of existing variables, can be found on the HEARTS-homepage: www.psy.gu.se/hearts. An abstract of intent can be also downloaded on the homepage. Before receiving access to the data, interested collaborators need to complete this abstract, describing the purpose of their planned analyses and which HEARTS variables will be used, and send it to hearts@psy.gu.se. This can be done even before the data is available. More specific questions concerning the HEARTS study and the available data can be sent to magnus.lindwall@gu.se.

AUTHOR CONTRIBUTIONS

ML and BJ proposed the study. ML drafted the first draft of the paper, was main responsible for the paper and conducted the analyses. ML, BJ, AIB, PB, SB, IH, LH, GH, MK, SK, and VT were responsible for the study setup and data collection and gave input to the paper throughout the process.

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Does More Respect from Leaders Postpone the Desire to Retire? Understanding the Mechanisms of Retirement Decision-Making

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The demographic trends (i.e., low birth rates and increasing longevity) pose challenges with regard to the increase of the average employee age along with a lack of skilled personnel on the labor market. Society, organizations, and individuals are confronted with the question on how to prolong working lives in the future. Based on socioemotional selectivity theory, the purpose of this study was to investigate the relationship between respectful leadership and older workers' desired retirement age. In particular, we took a closer look at job satisfaction, subjective health, and work-to-private life conflict as underlying mechanisms. Further, we tested for the moderating role of occupational self-efficacy as an auxiliary condition for the assumed relationships of respectful leadership. We tested our hypothesized model using data from 1,130 blue- and white-collar workers aged 45–65 years. The results of structural equation modeling indicated that respectful leadership was positively related to older workers' desired retirement age and that this relationship was mediated by subjective health and work-to-private life conflict but not by job satisfaction. The findings add to the literature on resources in retirement decision-making; notably, they highlight the importance of leadership behavior for older workers' motivation and socioemotional needs.

Keywords: desired retirement age, job satisfaction, occupational self-efficacy, respectful leadership, subjective health, work-to-private life conflict

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INTRODUCTION

Demographic trends such as low birth rates and increasing longevity pose challenges with regard to the increase of the average employee age along with a lack of skilled personnel on the labor market. Society, organizations, and individuals are confronted with the question of how to develop conditions to prolong working lives in the future. As jobs often include demands that have negative impacts on older workers' health or conflict with their changing abilities and non-work obligations, many of them aspire to retire early (Topa et al., 2009). Scholars have emphasized that pressuring people to continue working for financial reasons only may result in negative consequences such as lower levels of well-being (Frins et al., 2016). Maintaining older people's ability and motivation to work is therefore an essential condition for the extension of working lives.

Many theories (e.g., rational choice theory, role theory, theory of planned behavior, and expectancy theory) refer to retirement decision-making as a highly rational process in a way that long-term goals are maximized, while costs are minimized (Jex and Grosch, 2012; Wang and Shi, 2014). However, those theories often neglect that as people age their motivation changes. According to socioemotional selectivity theory (SST; Carstensen, 1992, 2006) with increasing age, people perceive time as more limited and therefore, place greater importance on short-term goals from which they derive emotional meaning. Following this, positive interpersonal relationships at work are meaningful in allowing older workers to maximize their emotional and social gains while limiting emotional and social risks at work. The desire to retire as opposed to remain in work is therefore evaluated against its potential for offering a positive balance of socioemotional gains and risks.

This and other changes in motivations as people age call for the need to develop and implement age sensitive human resource practices (e.g., Kooij et al., 2008; Wöhrmann et al., 2016). Older workers tend to favor working conditions that allow them to experience meaningfulness and recognition at work (Zacher, 2015; Hertel and Zacher, 2016). A leader who shows recognition and respect toward his or her subordinates may enhance older workers' social and emotional gains in the workplace. In this study, we therefore take a closer look at respectful leadership as a potential age sensitive leadership behavior. Drawing on SST (Carstensen, 1992, 2006), we argue that respectful leadership could be a source to meet socioemotional needs of workers and thus act as a contextual resource that affects older workers' desired retirement age by enhancing subjective health, job satisfaction, and lowering work-to-private life conflict.

In addition, we investigate the moderating role of occupational self-efficacy to understand whether this personal resource can support the goal-directed use, acquisition, and maintenance of other personal resources. As a result, our findings contribute to the understanding of the interplay between contextual and personal resources in the retirement decision-making process. Regarding organizational practice, we contribute to the development of human resource management strategies that support the extension of working lives. The conceptual model is presented in **Figure 1**.

RESPECTFUL LEADERSHIP AND OLDER WORKERS' DESIRED RETIREMENT AGE

Retirement decision-making is a process, in which the desired retirement age is an expression of the intention or the preference to retire at a certain age in the future. The desired retirement age as an early step in the retirement decision-making process has been described as the most proximal predictor of the actual act of retirement (Beehr, 1986), which leads to the search for predictors of desired retirement age.

In their resource-based dynamic model for retirement adjustment, Wang et al. (2011) propose that retirement-related outcomes are the result of access to and interplay between different resources. Resources – as supportive factors that people value – can be categorized into contextual and personal resources (ten Brummelhuis and Bakker, 2012). Drawing on SST, appreciation and respect in the workplace represent important contextual resources in the retirement decision-making process, which help to meet socioemotional needs of older workers. This is supported by research showing that being respected and recognized at work is a relatively important aspect to continue working (e.g., Armstrong-Stassen, 2008; Pundt et al., 2015; Zhan et al., 2015; Fasbender et al., 2016). Thus, experienced respectful treatment by the leader may act as a contextual resource in the retirement decision-making process.

The construct of respectful leadership was introduced by van Quaquebeke and Eckloff (2010) based on the definition of respect as "a person's attitude towards other people, in whom he/she sees a reason that, in itself, justifies a degree of attention and a type of behavior that in return engenders in the target a feeling of being appreciated in importance and worth as a person" (p. 344). Respectful leadership reflects leader behaviors and attitudes that give employees the feeling of being respected. Examples of respectful leadership behaviors include the recognition of the employees and their work, interest in their opinions, polite and fair treatment of the employees, open and honest interaction, support, as well as the recognition of the individual situation of the employees.

That respectful leadership may play an important role for retirement decisions is supported by leader–member exchange theory (LMX; Graen et al., 1982) highlighting the quality of the dyadic relationship between leader and follower. According to LMX, the relationship quality develops through the exchange of resources of leader and subordinate with a high-quality relationship being characterized by mutual trust and respect (Bauer and Green, 1996). Thus, professional respect as one dimension of LMX constitutes a central element in the quality of the relationship between leader and follower (Liden and Maslyn, 1998). Research suggests LMX to be related to withdrawal intentions (e.g., Gerstner and Day, 1997). Therefore, it is not unlikely that respectful leadership (as one aspect of LMX) may influence older workers' retirement decisions.

Respectful Leadership and Its Relationship to Job Satisfaction, Subjective Health, and Work-to-Private Life Conflict

Contextual resources can facilitate the acquisition of personal resources. Having a respectful leader may trigger the gain of other resources that could be relevant for older workers. Against the framework of SST, that due to limited time horizons older people increasingly value positive emotional experiences and are less likely to accept emotional burdens at work, thus, job satisfaction can constitute a relevant resource. Another important resource that becomes more evident with age is health. Moreover, as people age they increasingly value emotionally meaningful relationships and may therefore be inclined to spend more quality time with significant others. Therefore, in the following the potential role

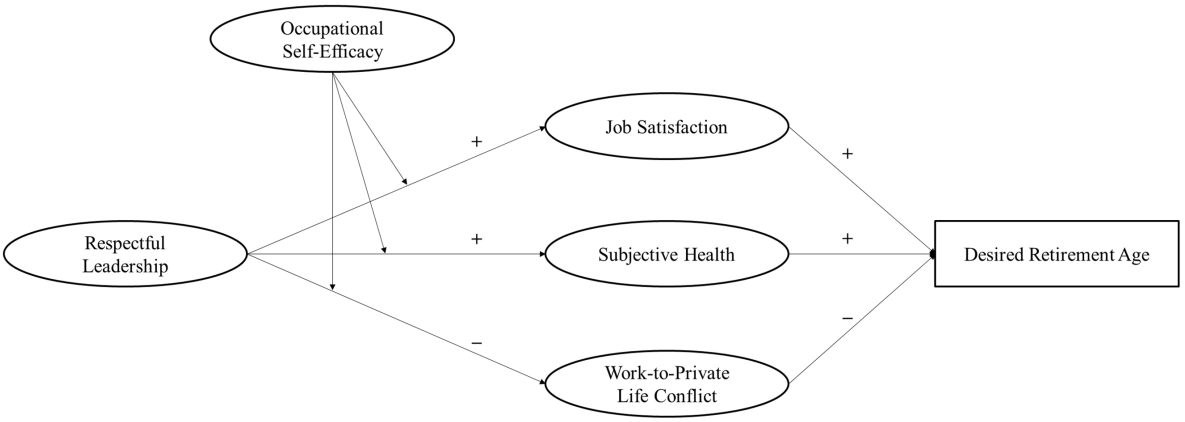

FIGURE 1 | Conceptual model indicating the hypothesized relationships between respectful leadership, job satisfaction, subjective health, work-to-private life conflict, occupational self-efficacy, and desired retirement age.

of respectful leadership for job satisfaction, health, and work-to-private life conflict is outlined.

Being treated with respect may enhance social and emotional gains and consequently contribute to older workers' job satisfaction. Thus, the experienced behavior *per se* that creates a feeling of being respected for one's work may lead to a gain in resources, for example related to the individuals' mood, by creating positive feelings toward the job. This assumption is supported by the importance of affective events at work (Weiss and Cropanzano, 1996). Emotional reactions to events in the work environment can affect individuals' attitudes and behaviors. Respectful leadership behavior may provoke such affective events that are followed by a positive cognitive appraisal by the subordinate resulting in a positive affective reaction. Also, respectful behavior of the leader may lead to favorable working conditions which are related to favorable workplace outcomes such as job satisfaction as has been shown by previous research (van Quaquebeke and Eckloff, 2010). We therefore expect that respectful leadership is positively related to older workers' job satisfaction.

Further, the contextual resource of feeling respected by the leader can have beneficial effects on the personal resource employee health by reducing strain. Respectful leader behavior includes trust and protection which can help preventing stress reactions linked to employee health. For example, effectively using a person's potential and best abilities instead of focusing on declining abilities is likely to reduce strain on the individual. The positive relationship of respectful leadership and health is supported by a recent study by Montano (2016), who found respectful leader behavior to be linked to better work designs, and hence to employees' self-assessed general health. Respectful leader behavior has also been suggested to promote employees' health in jobs with a poor work design (Winkler et al., 2014). It is therefore plausible to assume that respectful leadership is positively related to older workers' subjective health.

Furthermore, spending valuable time with family and friends can provide an important personal resource for older workers. Also, older workers increasingly need to meet care demands – for their grandchildren, children, parents, or other relatives (Szinovacz and Davey, 2005). Conflicts between work and private life result from scarce time resources, strain (e.g., fatigue), or contradictory expectations regarding behavior related to different roles (Greenhaus and Beutell, 1985). Bearing in mind that individuals have other obligations and interests in their private life apart from their family, the construct of work–family conflict can be expanded to work-to-private life conflict to capture these as well.

Even though respectful leadership is unlikely to affect older workers' private commitments, a leader who treats the subordinates with respect can be beneficial for reducing their job strain. As noted by Bakker and Demerouti (2007): "leaders' appreciation and support puts demands in another perspective" (Bakker and Demerouti, 2007, p. 315) not least because a respectful leader may help enhance social and emotional gains in the workplace. A respectful leader, who is interested in the employees and understands their demands, may help minimize conflicts between work and private life by giving the employees working time control. Also, the feeling of being treated respectfully may result in less negative spillovers from work to private life, for example in terms that the employees do not feel as stressed or fatigued because they derive positive feelings from feeling being trusted, appreciated, and fairly treated.

Based on the considerations on resource gains and maintenance through respectful leadership, we propose the following hypothesis:

Hypothesis 1: Respectful leadership is positively related to (a) job satisfaction and (b) subjective health, but negatively related to (c) work-to-private life conflict.

Job Satisfaction, Subjective Health, Work-to-Private Life Conflict, and Their Relationship to Desired Retirement Age

In the face of loss or threat of personal or contextual resources individuals reduce their investment or invest in behaviors that are more strategic in their use of resources (Halbesleben et al.,

2014). Thus, in the case of older workers this investment decision may impact their planned retirement age. A satisfying job provides a valuable resource (Wright and Bonett, 2007), which in turn can facilitate the creation and preservation of other personal resources. On the one hand, continued employment can help to preserve these personal resources. On the other hand, older workers who are not satisfied with their job may experience loss of these personal resources and thus intent to change the situation by intending to retire early. Furthermore, according to SST older people are less likely to accept emotional burdens at work. Therefore, it is likely that older workers' desired retirement age depends on their job satisfaction. Previous research supports this contention as job satisfaction has been found to be associated with the ability to remain working until the retirement age (Maurits et al., 2015).

Moreover, subjective health has been found to be an important factor for remaining in the workforce (e.g., Fasbender et al., 2014; Zaniboni, 2015). Subjective health (also self-reported health) refers to one's overall evaluation of physical well-being, which is strongly related to physical, functional, and mental health (Pinquart, 2001). Health is a personal resource *per se* and if employees experience their health to worsen they feel a resource loss. If they feel this resource loss to be due to their work, early retirement intentions become likely. For example, losses in subjective health positively predict limited future time perspective (Kooij and van de Voorde, 2011) and work engagement (Kooij et al., 2013). Also, as good health is a necessary condition to continue working, it is likely that subjective health is positively related to older workers' desired retirement age.

Balancing work with one's private life is a challenge every employee has to face. Several resources, such as mood, time, and the social network, may be threatened if older workers experience work-to-private life conflict. Depending on how much the affected resources are valued by the employee, this may result in early retirement plans. According to SST as individuals age and perceive time as more limited, they place greater importance on emotionally meaningful relationships, and therefore family often becomes more important relative to work. This is in line with assumptions of Baltes and Baltes (1990) model of successful aging drawing on regulation processes of selection, optimization, compensation (SOC) with regard to ones goals: Due to limited resources older workers have to carefully select their goals and roles to age successfully. Thus, work-to-private life conflict is likely to reduce older workers' desired retirement age. A recent longitudinal study by Nohe and Sonntag (2014) reported that work–family conflicts may increase turnover intentions. With regard to older workers, research suggests that care responsibilities lead to early retirement, especially among women (Lumsdaine and Vermeer, 2014). For older workers (early) retirement can be an option to lower work demands, which helps to deal with arising private commitments and thus, alleviate the anticipated role pressure between work and private life. It is therefore likely that work-to-private life conflict is negatively related to desired retirement age.

To summarize, our second hypothesis reads:

Hypothesis 2: (a) Job satisfaction and (b) subjective health are positively related to desired retirement age, but (c) work-to-private life conflict is negatively related to desired retirement age.

Respectful Leadership and Its Indirect Relationship to Desired Retirement Age

Having introduced job satisfaction, subjective health, and work-to-private life conflict as underlying mechanisms we now draw the link between respectful leadership and desired retirement age. In particular, we argue that there is a positive but indirect relationship between respectful leadership and desired retirement age, which is expected to be explained by resource gains or losses, respectively, due to increased or reduced levels of job satisfaction, subjective health, and work-to-private life conflict. This is emphasized by the notion that every individual is "a proactive agent for his or her career development" (Fasbender and Deller, 2017, p. 729), indicating that older workers do not directly react to certain external factors (e.g., respectful leadership). Rather, they respond through the internal process of evaluating their level of resources such as their job satisfaction, health, and role conflicts that materialize as a consequence of simultaneously occurring work demands and private commitments. This in turn may influence older workers' desired retirement age. Among others, these assumptions are supported by research on LMX that shows that the effect of quality of the relationship between leader and follower on turnover intentions is mediated by job satisfaction (Han and Jekel, 2011). Therefore, it is plausible to assume that a positive relationship between respectful leadership and desired retirement age can be explained by higher levels of job satisfaction and subjective health but lower levels of work-to-private life conflict; hence, our third hypothesis reads:

Hypothesis 3: There is a positive indirect relationship between respectful leadership and desired retirement age via (a) job satisfaction, (b) subjective health, and (c) work-to-private life conflict.

The Moderating Role of Occupational Self-Efficacy

Occupational Self-Efficacy has been derived from the general construct of self-efficacy reflecting the beliefs individuals hold about their capabilities to manage situations and produce designated levels of performance to reach their goals with regard to their job (Rigotti et al., 2008). It has been found to be associated with several outcomes among which are job satisfaction (Schyns and Collani, 2002; Rigotti et al., 2008) and burnout (Guglielmi et al., 2012). Despite much research on self-efficacy, to date, little is known about the role that occupational self-efficacy plays for older workers (Paggi and Jopp, 2015).

We argue that occupational self-efficacy can support the goal-directed use, acquisition, and maintenance of other personal resources, which helps explain why some individuals are better or more effective, respectively, at building and using resources. During their working life, people gain expertise and trust in their own abilities which should contribute to strong occupational self-efficacy beliefs. However, due to differences in the work

design, possibilities, and abilities, this is not true for every individual. Older workers with high occupational self-efficacy beliefs are convinced that they have the ability to perform well in their work tasks. Higher levels of occupational self-efficacy lead people taking an active role in interpreting external factors (Lent et al., 1994; Fasbender and Deller, 2017). Older workers with high occupational self-efficacy beliefs possess a resource that helps them use respectful leadership as a contextual resource to maintain and gain other resources, in particular job satisfaction, health, and work–life balance. Therefore, older workers with high occupational self-efficacy beliefs are more likely to benefit from respectful leadership compared to older workers with low occupational self-efficacy beliefs; finally, our fourth hypothesis reads:

> Hypothesis 4: Occupational self-efficacy moderates the relationships of respectful leadership with (a) job satisfaction, (b) subjective health, and (c) work-to-private life conflict in a way that the relationships are stronger when occupational self-efficacy is high (vs. low).

MATERIALS AND METHODS

Sample and Procedure

As part of a larger project on aging and work, data were collected from a large logistics company with several sites in Germany. All of the employees aged 45–65 years in the company were invited to participate in the study. Half of them (50%) voluntarily agreed to participate, resulting in a sample of 1,130 employees. Participants from operative departments, such as incoming returns, commissioning, or product testing, without a computer work-space (i.e., blue-collar workers) completed paper–pencil questionnaires (n = 830; 73.5%), and participants with a computer work-space from administrative departments (i.e., white-collar workers) completed online questionnaires (n = 300; 26.5%). Of the participants, the majority (68.8%) were female. Their age ranged from 45 to 65 years, with a mean age of 51.43 years (SD = 4.29). About a fifth of participants (22.0%) had obtained higher education entrance qualifications and/or graduated from college or university.

Measures

Respectful Leadership

Respectful leadership was measured with the Respectful Leadership Scale developed by van Quaquebeke and Eckloff (2010). The scale contains 12 items, an example item is "My leader takes me and my work seriously." The participants responded on a five-point Likert scale from 1 (*does not apply at all*) to 5 (*applies completely*). In the current study, the scale showed a high internal consistency (Cronbach's α = 0.94). Furthermore, results of a confirmatory factor analysis supported the construct validity of the one-factor solution [$\chi^2(54) = 376.90$, $p < 0.01$, comparative fix index (CFI) = 0.94, root mean square error of approximation (RMSEA) = 0.07, standardized root mean square residual (SRMR) = 0.03].

Job Satisfaction

Job satisfaction was measured with the general work satisfaction subscale of the German version of the Job Diagnostic Survey (Schmidt et al., 1985). This subscale consists of five items. An example item is "Generally speaking, I am very satisfied with my work." The participants responded on a five-point Likert scale from 1 (*does not apply at all*) to 5 (*applies completely*). In this study, the subscale showed an acceptable internal consistency (Cronbach's $\alpha = 0.73$) and overall an acceptable model fit in the confirmatory factor analysis ($\chi^2(5) = 73.99$, $p < 0.01$, CFI = 0.94, RMSEA = 0.11, SRMR = 0.05).

Subjective Health

Subjective health was measured with three items regarding self-rated general health, health in comparison with others, and today's health. The response format was a five-point Likert scale from 1 (*very bad/much worse*) to 5 (*very good/much better*). The measure showed a good internal consistency (Cronbach's $\alpha = 0.83$) in this study.

Work-to-Private Life Conflict

Work-to-private life conflict was measured with the five items Work–Family Conflict Scale developed by Netemeyer et al. (1996). As not every person has a family we changed "family" to "private." An example item is "The demands of my work interfere with my home and private life." The participants responded on a five-point Likert scale from 1 (*does not apply at all*) to 5 (*applies completely*). Internal consistency was high (Cronbach's α = 0.91) and construct validity was supported by the results of a confirmatory factor analysis ($\chi^2(5)$ = 33.46, $p < 0.01$, CFI = 0.99, RMSEA = 0.07, SRMR = 0.02) in this study.

Occupational Self-Efficacy

The Occupational Self-Efficacy Short Scale in German (Rigotti et al., 2008) was applied to measure occupational self-efficacy. The scale consisted of six items. An example item is "Whatever comes my way in my job, I can usually handle it." The participants responded on a five-point Likert scale from 1 (*does not apply at all*) to 5 (*applies completely*). The short scale showed a good internal consistency (Cronbach's α = 0.85) and an acceptable model fit in a confirmatory factor analysis ($\chi^2(9)$ = 90.45, $p < 0.01$, CFI = 0.93, RMSEA = 0.09, SRMR = 0.04).

Desired Retirement Age

Participants were asked to state their desired retirement age in years, which is common practice in research on retirement decision-making (e.g., HILDA Survey; Zaniboni, 2015). While the desired retirement age ranged from 48 to 80 years (M = 60.78, SD = 2.73), it was noticeable that more than half of the participants (55.1%) stated 60 years to be their desired retirement age, indicating limited variance.

Control Variables

As the retirement decision-making process may be affected by individuals' age, gender, and education (e.g., Zaniboni, 2015; Fasbender et al., 2016), these variables were included in the

analyses. Similarly, because previous research on blue-collar workers (Szubert and Sobala, 2005) indicated that certain work conditions (e.g., heavy lifting at work) were related to early workforce exit, we also controlled for participants' function (blue- vs. white-collar workers) in the company.

RESULTS

Preliminary Analysis

Means, standard deviations, and correlations of the study variables are presented in **Table 1**. Among the control variables, participants' age and gender (0 = *female*, 1 = *male*) were positively correlated with desired retirement age but not education and function. With regard to the predictor variables, respectful leadership, job satisfaction, subjective health, and occupational self-efficacy were positively correlated with desired retirement age, whereas work-to-private life conflict was negatively correlated with desired retirement age.

Testing Direct and Indirect Main Effects

Structural equation modeling (SEM) was used to investigate the hypothesized relationships between respectful leadership, work-to-private life conflict, occupational self-efficacy, job satisfaction, subjective health, and desired retirement age, using Mplus 7.31 (Muthén and Muthén, 2015). Within the structural part of SEM, we used maximum likelihood (ML) estimation with bootstrapping (10,000 draws) to account for deviations from normality (Preacher and Hayes, 2008). To assess whether the hypothesized model fits the data, we have used different goodness-of-fit indices. In addition to the traditional chi-square value as an index of absolute (lack of) fit, which, however, is sensitive to sample size (Bentler and Bonnet, 1980), we also report the CFI (Bentler, 1990), the SRMR, and the RMSEA (Steiger, 1990). As none of these goodness-of-fit indices is perfectly informative on its own, combining them is instructive to evaluate the model fit. To gauge the model fit in the present study, we have included participants' age, gender, and function as control variables in the SEM. Job satisfaction, subjective health, work-to-private life conflict, and desired retirement age were regressed on these variables. Participants' education has not been included as control variable because the preliminary analysis indicated that it was not correlated to any of the outcome variables. Overall, our hypothesized model including control variables showed a fairly good model fit ($\chi^2(569) = 2454.02$, $p < 0.01$, CFI = 0.91, RMSEA = 0.06, SRMR = 0.09).

In the following, we refer to the standardized estimates of our hypothesized model as can be seen in **Figure 2**. Together, the predictor variables explained substantial variance in older workers' desired retirement age. Among the control variables, structural coefficients suggested that age ($\beta = 0.17$, $p < 0.01$) and gender ($\beta = 0.10$, $p < 0.01$) were positively related to desired retirement age, while function did not significantly predict older workers' desired retirement age. Furthermore, gender ($\beta = -0.07$, $p < 0.05$) and participants' function (i.e., white collar) ($\beta = -0.10$, $p < 0.01$) were negatively associated with work-to-private life conflict, whereas age did not significantly predict work-to-private life conflict. Also, none of the control variables significantly predicted job satisfaction or subjective health.

Hypotheses 1–3 addressed the direct and indirect relationships between respectful leadership and desired retirement age. The structural coefficients suggested that respectful leadership was positively related to job satisfaction ($\beta = 0.43$, $p < 0.01$) and subjective health ($\beta = 0.16$, $p < 0.01$), but negatively related to work-to-private life conflict ($\beta = -0.14$, $p < 0.01$). Together, these results support Hypotheses 1a–c and indicate that older workers, who experience higher levels of respectful leadership, are more likely to be satisfied with their job, show higher levels of subjective health, and report lower levels of work-to-private life conflict compared to older workers, who experience lower levels of respectful leadership. In turn, the structural coefficients suggested that job satisfaction ($\beta = 0.06$, n.s.) was not related to desired retirement age. Thus, Hypothesis 2a was not supported. Subjective health ($\beta = 0.23$, $p < 0.01$) was positively related to desired retirement age and work-to-private life conflict ($\beta = -0.07$, $p < 0.05$) was negatively related to desired retirement age, supporting Hypotheses 2b and 2c. This indicates that higher levels of subjective health are likely to increase older workers' desired retirement age, whereas

TABLE 1 | Means, standard deviations, and correlations of study variables (N = 1,046–1,130).

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9
(1) Age	51.43	4.29	–								
(2) Gender (0 = female, 1 = male)	0.31	0.46	−0.03	–							
(3) Education (0 = low, 1 = high)	0.22	0.41	0.04	0.14**	–						
(4) Function (0 = blue, 1 = white)	0.27	0.44	−0.07*	0.11**	0.34**	–					
(5) Respectful leadership	3.93	0.88	−0.01	−0.09**	−0.04	0.09**	–				
(6) Job satisfaction	3.63	0.77	0.03	0.04	−0.03	0.16**	0.45**	–			
(7) Subjective health	3.56	0.85	−0.02	0.05	0.05	0.09**	0.25**	0.37**	–		
(8) Work-to-private life conflict	3.29	1.15	−0.03	−0.08**	0.01	−0.11**	−0.19**	−0.34**	−0.36**	–	
(9) Occupational self-efficacy	3.88	0.74	0.01	0.07*	−0.00	0.08**	0.38**	0.38**	0.35**	−0.20**	–
(10) Desired retirement age	60.78	2.73	0.17**	0.12**	0.06	0.00	0.11**	0.17**	0.25**	−0.17**	0.12**

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

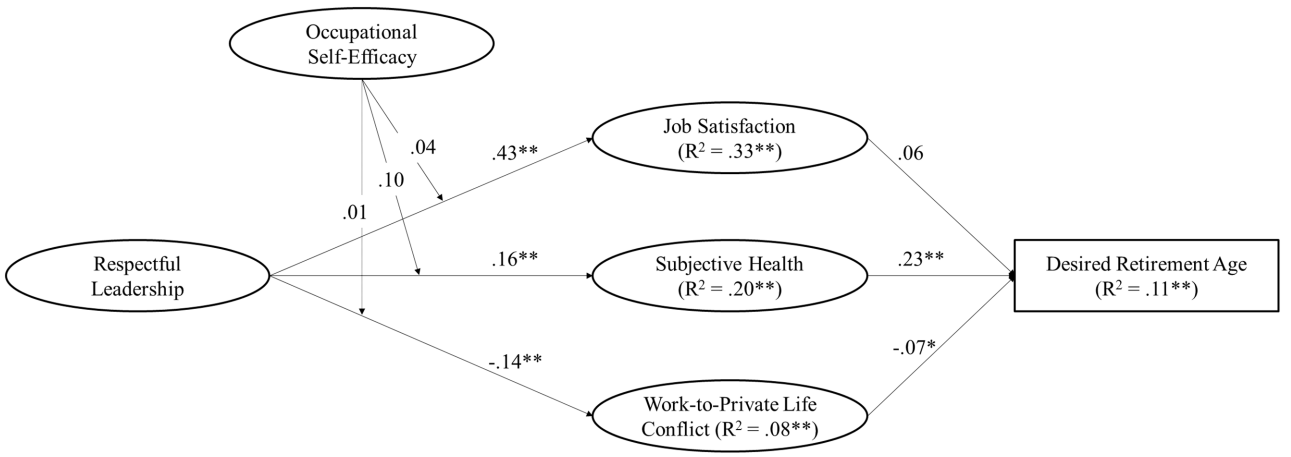

FIGURE 2 | Structural equation model showing relationships between respectful leadership, work-to-private life conflict, occupational self-efficacy, job satisfaction, subjective health, and desired retirement age with standardized coefficients (N = 1,088). For the stake of clarity, only structural relationships are shown. *$p < 0.05$, **$p < 0.01$.

higher levels of work-to-private life conflict decrease older workers' desired retirement age. With regard to the relationship between respectful leadership and desired retirement age, we quantified the indirect effects with the product of coefficients method (Preacher, 2015). We found positive indirect effects of respectful leadership via subjective health ($\beta = 0.04$, $p < 0.01$) and via work-to-private life conflict ($\beta = 0.01$, $p < 0.05$) but not via job satisfaction ($\beta = 0.03$, n.s.), on desired retirement age. **Table 2** indicates the indirect effects of respectful leadership on desired retirement age with bootstrapped confidence intervals.

To test whether these variables partially or fully explain the positive relationship between respectful leadership and desired retirement age, we ran an alternative model, including a direct path from respectful leadership to desired retirement age. The direct path was, however, not significant ($\beta = 0.02$, n.s.), while the indirect relationships remained fairly stable. Furthermore, we found no significant differences between partial and full mediation models using chi-square difference testing ($\Delta\chi^2(1) = 0.19$); thus, we kept the more parsimonious, fully mediated model. Together, these results support Hypothesis 3b and 3c, and indicate that there is a positive relationship between respectful leadership and older workers' desired retirement age, which can be explained by subjective health and work-to-private life conflict.

TABLE 2 | Indirect effects of respectful leadership on desired retirement age with bootstrapped confidence intervals.

	Coefficient	SE	CI LL	CI UL
Job satisfaction	0.12 (0.03)	0.08 (0.02)	−0.02	0.28
Subjective health	0.17 (0.04)	0.05 (0.01)	0.10	0.25
Work-to-private life conflict	0.04 (0.01)	0.03 (0.01)	0.00	0.11

N = 1,088. CI = 95% confidence interval, LL = lower level, UL = upper level. Standardized coefficients in brackets.

Testing Moderation Effects

Hypothesis 4 addressed the moderating role of occupational self-efficacy. To test this hypothesis, we regressed job satisfaction, subjective health, and work-to-private life conflict on occupational self-efficacy in the SEM. The estimated coefficients showed that occupational self-efficacy was positively related to job satisfaction ($\beta = 0.37$, $p < 0.01$) and subjective health ($\beta = 0.40$, $p < 0.01$) but negatively related to work-to-private life conflict ($\beta = -0.21$, $p < 0.01$). To test the interaction we included a single indicator in the SEM that was computed as the product of the mean centered scale scores of respectful leadership and self-efficacy following the approach from Jöreskog and Yang (1996). Job satisfaction, subjective health, and work-to-private life conflict were then regressed on this indicator in the SEM. However, occupational self-efficacy did not significantly moderate the relationships between respectful leadership and job satisfaction, subjective health, and work-to-private life conflict, thus, Hypothesis 4 was not supported.

DISCUSSION

As demographic trends such as low birth rates and increasing longevity pose challenges with regard to the increase of the average employee age along with a lack of skilled personnel on the labor market, organizations are increasingly confronted with the question on how to facilitate successful (i.e., active, healthy, and productive) aging at work, and thus to prolong working lives in the future. Therefore, the aim of the present study was to investigate the relationship between respectful leadership and older workers' desired retirement age and its underlying mechanisms. In essence, we found that respectful leadership was positively related to older workers' job satisfaction and subjective health but negatively related to their work-to-private life conflict. Consistent with the recent literature on retirement planning and decision-making (e.g., Fasbender et al., 2014; Pundt et al., 2015;

Zhan et al., 2015), this supports the important role of respect and recognition for older people in the workplace.

In addition, the present study highlighted that respectful leadership provides a contextual resource in the retirement decision-making process as it was positively related to desired retirement age. Furthermore, this relationship could be explained by subjective health and work-to-private life conflict. Although the identified relationships are rather small referring to Cohen's (1992) classification of effect sizes, they can be regarded as quite substantial given the limited variance of desired retirement age (i.e., 55.1% of participants reported their desired retirement age to be 60 years). Job satisfaction, however, although strongly related to respectful leadership, does not seem to play an important role in explaining the relationship of respectful leadership and desired retirement age. The findings add to the literature on the importance of work relationships for older workers, in particular with their leader. In line with SST, older workers are willing to postpone their retirement when experiencing higher levels of subjective health and lower levels of work-to-private life conflict, which are related to the respectful behavior of their leader at work. The desire to retire as opposed to remaining in the workforce reflects the inner process of evaluating one's resources such as health and potential role conflicts between work and private life and its related socioemotional (resource) gains versus risks reflected by resource threats or losses.

Furthermore, in line with previous research (e.g., Schyns and Collani, 2002; Rigotti et al., 2008), the present study revealed that occupational self-efficacy was positively related to older workers' job satisfaction and subjective health, and negatively related to their work-to-private life conflict, thus emphasizing the importance of personal resources. However, we found that occupational self-efficacy did not significantly moderate the relationships between respectful leadership and job satisfaction, subjective health, and work-to-private life conflict. Even though we expected that higher levels of occupational self-efficacy would lead people to take an active role in interpreting external factors at work and help them to make better use of existing contextual resources (Lent et al., 1994; Fasbender and Deller, 2017), the present study did not find support for the moderating role of occupational self-efficacy. Future research should continue to investigate occupational self-efficacy and its role in the retirement decision-making process.

Theoretical and Practical Implications

The findings of the present study extend previous research on retirement decision-making. This study offers relevant theoretical and practical implications. With regard to theory, the present study is among the first to investigate how respectful leadership as a leadership style is linked to older workers' desired retirement age. While previous studies have already addressed the importance of being treated with respect (e.g., Armstrong-Stassen, 2008), we highlight the role of the leader in the retirement decision-making process as a person with great social influence, who acts according to organizational values of treating older workers with respect and recognition. Thus, respectful leadership as a set of certain behaviors and attitudes (e.g., interest in employees' opinions, fair treatment, and honest interaction at work) gives employees the feeling of being respected (van Quaquebeke and Eckloff, 2010). Our findings reveal that respectful leadership is a relevant resource for older workers, who, because they perceive time as limited, place greater importance on short-term goals from which they derive socioemotional meaning (SST; Carstensen, 1992, 2006). However, as our sample consisted of older workers, no conclusions can be drawn regarding the relative importance of respectful leadership as a resource for older compared to younger workers. Furthermore, the current findings can inform LMX theory as they show that respect as a central element of high-quality leader–follower relationships is related to retirement intentions. Also, the results support previous findings on the underlying mechanisms in the link between LMX and withdrawal intentions (e.g., Han and Jekel, 2011).

Furthermore, our findings shed light on the role of job satisfaction, subjective health, and work-to-private life conflict in the relationship of respectful leadership and older workers' desired retirement age. While in our study subjective health and work-to-private life conflict represent relevant resources in this relationship, job satisfaction does not. Although others have found job satisfaction to be related to the intention to remain in the workforce until retirement age (Maurits et al., 2015), in an earlier study Zappalà et al. (2008) also did not find a significant effect of job satisfaction on early versus late retirement intentions. Thus, moderating factors in this relationships as well as effects of measurement should be investigated in future studies. However, in line with SST our findings indicate how important socioemotional gains are for older workers' retirement decision-making. Future research should continue exploring socioemotional gains and risks or resource gains and losses, respectively, for older workers to understand retirement planning and decision-making in its entirety.

Moreover, our study extends the scarce literature on the interaction of leadership behavior and individual self-efficacy. Although occupational self-efficacy did not moderate the relationship between respectful leadership and several mediators in our study, bivariate correlations have shown that occupational self-efficacy was significantly related to all study variables. Personal resources such as the belief in one's capabilities therefore seem to be important for the understanding of successful aging at work. Additional research is needed to understand the role of occupational self-efficacy in the relationships between respectful leadership and other organizational factors related to older workers' desired retirement age. For example, future research could explore the role of autonomy at work as a boundary condition for when occupational self-efficacy facilitates positive work outcomes. It could be assumed that higher levels of autonomy at work enable older workers with high occupational self-efficacy to benefit from respectful leadership behavior in terms of higher job satisfaction, subjective health, but lower work-to-private life conflict, whereas lower levels of autonomy at work may hinder these beneficial effects of occupational self-efficacy. Future research could therefore investigate potential three-way interactions addressing the complex contingency in which retirement decisions are made.

With regard to practice, respectful leadership behavior can help keep older workers in the workforce longer. The study offers insights for potential interventions. Referring to professional development activities, providing trainings for leaders on any level of hierarchy on how to lead their staff respectfully could strengthen this leadership style. Moreover, as older workers elect to engage in activities and relationships at work that facilitate socioemotional meaning to them, they are more likely to benefit from a positive work climate than from new career opportunities or a pay raise. Thus, organizations should facilitate an organizational culture that is driven by respect and recognition toward people of all ages to ensure equally fair treatment for both younger and older workers and avoid potentially arising intergroup conflicts due to positive or negative discrimination. In addition, organizations can offer professional development activities to their employees. An intervention study has shown that through coaching employees' work ability could be improved (McGonagle et al., 2014). Although the authors failed to find a significant improvement in occupational self-efficacy, it points to the trainable nature of beliefs regarding own capabilities. For example, strengthening the older workers' occupational self-efficacy through work specific training, such as allowing workers to sense achievements in their job, may help reinforce their subjective health and motivational outcomes. Together, these interventions may support the voluntary extension of working lives.

Limitations and Directions for Future Research

Notwithstanding the theoretical contribution of our findings, we acknowledge some limitations of this research and refer to directions for future research. First, the cross-sectional nature of the data does not allow drawing causal inferences. It is possible that the relationship between respectful leadership and desired retirement age is reversed as other influences, such as socioeconomic factors (e.g., financial dependency) may determine older workers' desired retirement age, which, in turn, could lead them to evaluate their leaders more favorably (i.e., to reduce cognitive dissonance; Festinger, 1957). Therefore, future research should use longitudinal data to allow for a more precise inference about causality and/or reciprocal relationships, in particular with regard to the understanding of older workers' retirement planning and decision-making.

Second, the current study relies on self-report measures which are thought to have shortcomings (Podsakoff et al., 2003). However, older workers' indication of their desired retirement age was measured as open text response (not via scale). In this case, it is rather unlikely that self-report produces inaccurate or systematically biased answers, which partly alleviates the concern for common-method bias (Spector, 1994; Zhan et al., 2015; Fasbender et al., 2016). Furthermore, procedural means were used to control for common method variance (Zaniboni, 2015); ensuring participants' anonymity was protected with regard to their employer. Participants were recommended to answer questions honestly, and they were advised that there were no right or wrong answers. Moreover, a moderation variable was considered to increase complexity, diminishing the threat of participants' "theory-in-use" (Chang et al., 2010). Nevertheless, future research should additionally consider data from other sources than older workers' themselves, for example, by involving the perspective from leaders on their behaviors, attitudes, and leadership style. Furthermore, in this study we focused on the desired retirement age as part of the retirement decision-making process. Including the actual retirement age in future research would enhance the knowledge on the impact of the investigated processes on actual behavior.

The present study also leaves some issues unaddressed, suggesting areas for further investigation. Because this study was tailored toward the legal and economic environment of Germany, future research should replicate our findings in other countries. In particular, it is relevant to understand whether the desired retirement age may differ across cultures due to varying insurance and pension systems. In addition, research could address how respectful leadership is related to organizational culture and individuals' work ethics, and how this relates to retirement decision-making. Also, it would be illuminating to explore how different personality traits interact with this leadership style, and how this, in turn, may impact the desire to retire.

ETHICS STATEMENT

This study was carried out in accordance with the ethical guidelines of the Leuphana University, Lüneburg with an informed consent from all study participants. Full review and approval of the study was not required according to the local and national regulations and guidelines.

AUTHOR CONTRIBUTIONS

AW did the research design, data collection, data analyzing, theorizing, and writing. UF did the data analyzing, theorizing, and writing. JD did the research designing, data collecting, and critical revising.

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Planning for Retirement: Longitudinal Effect on Retirement Resources and Post-retirement Well-being

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Retirement is a major life event, and a positive adjustment to retirement is essential for maintaining physical and psychological well-being in later life. Previous research demonstrates that pre-retirement planning predicts post-retirement well-being. This study further explores the underlying mechanism between planning activities and post-retirement well-being. By applying the resource-based dynamic model (Wang et al., 2011), the present longitudinal study examines whether pre-retirement planning activities can increase the total resources of retirees, including tangible, mental and social resources, and consequently contribute to better psychological and physical well-being 1 year after actual retirement. A total of 118 Hong Kong Chinese retirees completed three assessments: Time 1 assessment was conducted 6 months before retirement, and Times 2 and 3 assessments were carried out 6 and 12 months, respectively, after retirement. Latent growth models were employed to examine changes in retirement resources and post-retirement well-being over time. Consistent with the proposition of the resource-based dynamic model, positive changes in well-being were observed in the retirees with increases in retirement resources between pre- and post-retirement phases. The results of the latent growth mediation models also support our prediction: retirees with more preparatory activities before retirement acquire greater resources at the initial stage, which contribute to positive changes in post-retirement well-being over time.

Keywords: pre-retirement planning, retirement resources, psychological well-being, physical well-being, Chinese retirees

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INTRODUCTION

Similar to other developed countries, the labor force of Hong Kong is rapidly aging. Over 70,000 civil servants are estimated to be retiring from their jobs in the coming decade (Hong Kong Government News, 2012). Retirement is a major life event, and a positive adjustment is essential for maintaining physical and psychological well-being in later life (Wang, 2007; Wong and Earl, 2009). The Health and Retirement Survey conducted in the United States revealed that roughly one in four retirees experiences a decline in psychological well-being 1-year after retirement (Wang, 2007; Wang and Bodner, 2007). However, majority of them do not report significant psychological changes over an 8-year period, and approximately 5% of them even showed improvement in psychological well-being. Identifying the protective factors of positive adjustment to this critical life transition is becoming increasingly important. Previous research

demonstrates that pre-retirement planning is associated with post-retirement well-being (Reitzes and Mutran, 2004; Noone et al., 2013; Yeung, 2013), but the underlying mechanism between pre-retirement planning and successful adjustment remains largely unclear (Shultz and Wang, 2011). Therefore, the present study aims to fill this gap. Using the resource-based dynamic model (Wang et al., 2011) as the theoretical basis, retirees who perform more preparatory activities before retirement are hypothesized to possess greater amounts of resources, which contribute to better psychological and physical well-being after retirement.

Resource-Based Dynamic Model

Hobfoll (2002) defined resources as the total capability of an individual to accomplish his/her valued needs and goals. Inspired by Hobfoll's conservation of resources theory, retirement resources are broadly defined as various types of resources that are essential for retirement adjustment (Wang, 2007; Wang et al., 2011). Retirement adjustment is defined as "psychological comfort regarding the retirement life" (Wang et al., 2011, p. 204), which is often reflected in changes in the well-being of a retiree between the pre- and post-retirement stages (Gall et al., 1997). Wang et al. (2011) proposed the resource-based dynamic model to understand the quality of retirement adjustment over time. According to this model, retirement adjustment is a function of total resources during the transition. The amount of total resources influences the capabilities of retirees to meet the challenges during transition, which affect their physical and psychological well-being after retirement. There are three possible patterns of well-being outcomes: (i) Retirees will maintain their well-being if their total resources do not change significantly after retirement; (ii) Retirees will experience negative changes in well-being if their resources decline (e.g., loss of financial resources or connection with former colleagues); and (iii) Retirees will show an improvement in well-being if they acquire additional resources after retirement (e.g., making new friends or developing a new hobby). Therefore, every retiree features a unique pattern of retirement adjustment, depending on how the amount of total resources changes during transition.

In light of the theoretical framework of the resource-based dynamic model (Wang et al., 2011), Leung and Earl (2012) developed an assessment tool called the Retirement Resources Inventory (RRI) to measure various domains of individual resources. These resources include physical, financial, social, emotional, cognitive, and motivational resources discussed in the paper of Wang et al. (2011). The results of Leung and Earl's (2012) factor analysis demonstrate that the six domains of resources can be categorized into three major groups: (1) Tangible resources include physical (e.g., perceived health and physical strength and illness) and financial resources (e.g., savings, investment, and perceived income adequacy); (2) Mental resources refer to resources that contribute to one's mental capacity, including emotional (e.g., positive affect and emotional stability), cognitive (e.g., perceived control and memory capabilities), and motivational resources (e.g., perceived adaptability and flexibility in goal pursuit); and (3) Social resources pertain to types of social support and quality of social interaction.

Past studies focus mainly on a narrow set of retirement resources, particularly the physical and financial resources of retirees and their relationship with their spouse (e.g., Gall et al., 1997; Kim and Moen, 2002; Wang, 2007; van Solinge and Henkens, 2008). Other types of resources, such as mental resources, and other forms of social resources apart from spousal support, are given limited attention. Evidence indicate the beneficial effects of mental and social resources on post-retirement well-being. For example, perceived control and goal clarity (as mental resources) are positively correlated with post-retirement well-being and adjustment (Noone et al., 2009; Muratore and Earl, 2015). In addition to spousal support, support from family members and friends also predicts the well-being of retirees (Chou and Chi, 2003). To obtain a comprehensive assessment of the retirement resources possessed by the retirees, this study uses Leung and Earl's (2012) RRI to measure the resource availability of retirees in various domains and examine the changes before and after retirement.

The amount of resources is expected to decrease after retirement. As retirees no longer have regular income after retirement (Atchley and Robinson, 1982), their financial security is reduced. They also lose social identity and self-worth derived from work and reduce their frequency of contact with former coworkers (Lo and Brown, 1999; Wong and Earl, 2009). Moreover, retirees face a number of challenges, such as age-related changes in physical health (Wang, 2007) and ways to spend spare time meaningfully and adapt to a new family role (Nuttman-Shwartz, 2004). Accordingly, this study hypothesizes that the total amount of retirement resources, including tangible, mental, and social resources, declines after retirement (H1).

To empirically test the propositions of the resource-based dynamic model (Wang et al., 2011), the present study investigates the relationships between changes in retirement resources and post-retirement well-being during transition. According to Wang et al.'s (2011) definition, successful adjustment occurs when a retiree experiences psychological comfort during transition. Indicators of psychological comfort include subjective well-being, as well as the physical, social, and mental aspects of well-being, and mental health. In the present research, post-retirement well-being is indicated by the levels of physical well-being, life satisfaction, and psychological well-being, as well as absence of psychological distress. It is hypothesized that changes in total retirement resources are positively associated with changes in post-retirement well-being (H2). Specifically, a decline in post-retirement well-being is observed among retirees with decreases in retirement resources, whereas an increase in post-retirement well-being is found among retirees with gains in resources.

Pre-retirement Planning Activities

Pre-retirement planning is a goal-oriented behavior in which individuals devote effort to prepare for their retirement life. This behavior enables retirees to develop a realistic expectation of the changes to be experienced during transition (Peeters et al., 2008) and to set up a clear long-term goal for post-retirement life (Topa et al., 2009). Pre-retirement planning is often measured

by a general term, such as self-perceived preparedness for retirement (Spiegel and Shultz, 2003). A few studies measuring specific domains of planning behaviors focus mainly on financial planning (e.g., Petkoska and Earl, 2009; Muratore and Earl, 2015). In addition to financial aspects, Law et al. (2006) identified four domains of retirement preparatory activities, namely, financial, health, social life, and psychological planning. Financial planning aids individuals to achieve financial security in later life, such as regular savings or property ownership. Health planning focuses on the maintenance of physical health, such as regular body check-up and physical exercises. Social life planning helps individuals to maintain and establish a supportive social network and to develop new and enjoyable hobbies for their post-retirement life. Psychological planning aims to promote psychological preparation for adjusting to potential changes after retirement, for example, attending pre-retirement preparation workshop or reading books on physical and psychological changes during retirement transition.

Empirical studies demonstrate that individuals who make retirement plans exhibit better retirement adjustment and post-retirement well-being. Specifically, the findings of both cross-sectional and longitudinal studies indicate that more pre-retirement planning activities are associated with better physical and psychological health (Wang, 2007; Yeung, 2013), positive attitudes and adjustment to retirement (Reitzes and Mutran, 2004; Muratore and Earl, 2015), and higher life satisfaction (Topa et al., 2009; Noone et al., 2013). However, the underlying mechanism between pre-retirement planning and post-retirement well-being remains largely unclear. Different types of preparatory activities may increase the levels of resources in the tangible, mental, and social domains; consequently, the quality of the retirees' well-being over time may be improved (Wang and Shultz, 2010). For example, financial planning activities, such as savings or investment, contribute to the maintenance of financial resources (van Rooij et al., 2012). Health planning activities, such as regular exercises or physical check-up, may improve physical resources. Social life planning, such as development of a supportive social network, helps to increase social resources in post-retirement life.

Preparation for one domain may potentially encompass other domains of planning activities (Noone et al., 2009). For example, spousal discussion on retirement (as a form of psychological planning) facilitates the thoughts and planning of couples for financial and social domains, which consequently affects the financial, social, emotional, and motivational resources of retirees. Quick and Moen (1998) found that the individuals who performed more planning activities for retirement (regardless of the domain of planning) reported greater satisfaction with their retirement than those who planned less, because planning helps the retirees to develop realistic expectations about retirement (Pinquart and Schindler, 2007; Topa et al., 2009) and increase their preparedness in different domains (Hershey et al., 2003). These findings suggest that pre-retirement planning activities, regardless of domains of preparation, can help increase the amount of retirement resources in various domains. Therefore, this study also hypothesizes that more pre-retirement planning activities predict higher initial levels of retirement resources before retirement (H3a). This study also explores whether greater planning can help retirees to maintain their resources after retirement, and thus the rate of decline in resources may be smaller over time. Specifically, it is anticipated that more pre-retirement planning activities predict positive changes in resources over time (H3b).

The past findings reviewed above clearly demonstrate that pre-retirement planning positively contributes to retirement adjustment and post-retirement well-being. The present study takes a step forward in unveiling the underlying mechanism. By integrating the past literature on pre-retirement planning and the theoretical framework of the resource-based dynamic model, this study hypothesizes that the positive effect of pre-retirement planning on changes in post-retirement well-being is mediated by the amount of retirement resources possessed by retirees. Specifically, pre-retirement planning activities predict a higher initial level of retirement resources held by the retirees, which consequently affect the changes in post-retirement well-being over time (H4).

Objectives and Design of the Study

Majority of past studies on retirement adjustment are largely conducted in the Western countries, such as the United States and Australia. These findings may not be fully applicable to Chinese retirees given the differences in retirement, pension, and social welfare systems between Hong Kong and other countries. For example, most of the working adults in Hong Kong are employed under a mandatory retirement scheme, which requires them to leave their job after a certain age, regardless of their job performance level. The typical retirement age in Hong Kong varies across sectors: 55 years for disciplinary forces (e.g., police officers or firefighters), 60 years for the public sector, and 65 years for private sectors. With a growing number of retirees in Hong Kong, their well-being after retirement should be investigated, and the factors influencing the level of post-retirement well-being should be identified. To the best of our knowledge, no local longitudinal study has systematically investigated the change trajectory in retirement resources and post-retirement well-being of Chinese retirees or explored the underlying mechanism between pre-retirement planning and post-retirement well-being. Therefore, this study intends to fill these knowledge gaps.

This study adopts the longitudinal design to measure intra-individual changes in resources and physical and psychological well-being of retirees during their transition to retirement. The transition to retirement refers to the period from being employed to completely leaving the job market. With reference to previous longitudinal studies on retirement (Richardson and Kilty, 1991; Reitzes and Mutran, 2004; Yeung, 2013), three waves of assessments were used in order to capture the change trajectory in retirement resources and post-retirement well-being over time. Time 1 assessment was conducted 6 months before the older workers retired from their full-time job, and Times 2 and 3 assessments were carried out 6 and 12 months, respectively, after actual retirement. The immediate assessment after actual retirement was excluded because it is usually the "honeymoon" period in which retirees enjoy their freedom of

time and opportunities (Atchley, 1976). The intervals for Times 2 and 3 assessments enable us to test the initial and short-term effects of retirement resources on well-being.

With reference to prior literature (e.g., Shultz and Wang, 2011; Luhman et al., 2012; Yeung, 2013), post-retirement well-being is reflected in the levels of physical well-being, life satisfaction, and psychological well-being, as well as absence of psychological distress. Retirees experience poor adjustment to retirement when they show declines in physical functioning, life satisfaction, and psychological well-being and an increase in psychological distress over the three assessment points (Times 1–3).

Latent growth model (LGM) was used to systematically examine changes in retirement resources and well-being outcomes over the three assessments (Liu et al., 2016). Inspired by Wang et al.'s (2011) resource-based dynamic model, the present study tests four hypotheses. First, the total amount of retirement resources, including tangible, mental, and social resources, are expected to decline after retirement. Second, changes in post-retirement well-being are anticipated to be positively associated with changes in retirement resources across the three assessments. Specifically, retirees with fewer resources after retirement experience a lower level of well-being. Third, total pre-retirement planning is expected to be associated with higher initial levels of retirement resources and positive changes in resources over time. Finally, the positive effect of pre-retirement planning on changes in post-retirement well-being is hypothesized to be mediated by the initial level of retirement resources. According to von Soest and Hagtvet (2011), this proposed mediation relationship via the intercept of resources is known as intercept-only mediation model. **Figure 1** illustrates the proposed latent growth mediation model for testing the fourth hypothesis.

MATERIALS AND METHODS

Participants

This longitudinal study consisted of three phases of assessment: Time 1 was conducted 6 months before older workers retired from their full-time job, and Times 2 and 3 assessments were carried out 6 and 12 months, respectively, after the actual retirement of each participant. In the first assessment, 197 Chinese working adults (mean age = 58.7 years, $SD = 3.59$; 59.4% male) who were expected to retire in the next 6 months joined this research and completed the pre-retirement questionnaire. Among them, 136 participants were successfully contacted and completed the T2 post-retirement questionnaire (mean age = 59.4 years, $SD = 3.36$; 60.3% male). T3 contained 118 participants (mean age = 60.0 years, $SD = 3.40$; 61% male) who completed the follow-up questionnaire 12 months after retirement. The participation rate in T2 and T3 was 69% and 60% respectively. The participants who had completed the three assessments were similar to those who only joined the first assessment in terms of age [$t(195) = 0.802$], gender [$\chi^2(197) = 0.323$], education level [$t(195) = 0.657$], and occupation [$\chi^2(197) = 0.123$], *ns*. Most of the participants in the final sample (73.7%) worked as white-collar employees before retirement. About 62% of them completed secondary education, which is comparable with the average educational attainment of the local working population aged 50–65 years (Hong Kong Census and Statistics Department, 2011).

Procedure

Human ethics approval was obtained from the research ethics committee of the affiliated university. Full-time employees who were expected to retire in the next 6 months were the target participants of this study. Employees who opted for early retirement scheme were excluded because their retirement decision could be affected by health or family issues, which subsequently influence their physical and psychological well-being after retirement.

The target participants were recruited through the human resources department of public and private organizations and through advertisements in a local newspaper. Invitation letters were sent to the head of the human resources department of corporations and companies in Hong Kong. Eleven organizations agreed to participate in this study. Upon their approval, an invitation letter, together with a questionnaire package, was distributed to the target employees. In addition, an advertisement was also posted on a local newspaper, which was freely distributed in public transportation. Eligible participants registered online or by phone to provide their contact information and their expected retirement date with their organization details. The questionnaire package was mailed to these participants after verifying their work status and retirement schedule. The participants who were recruited from different sources did not vary in age [$t(195) = 0.777$, $p = 0.438$], education level [$t(195) = 1.110$, $p = 0.269$], job position [$t(195) = 0.301$, $p = 0.763$], and major constructs measured in the present study. However, more female participants were recruited through the advertisement than those from the companies [$\chi^2(197) = 10.956$, $p = 0.001$].

A written informed consent was sought from each participant in the first assessment (T1). The participants were informed about the longitudinal nature of this study and were requested to provide contact information and the expected retirement date if they were interested in joining the follow-up assessments. The participants were contacted again 6 months (T2) and 12 months (T3) after their actual retirement. In all the three assessments, the participants completed the questionnaire and returned it to the researchers directly by post. Participants received a total sum of HKD400 (approximately USD 52) worth of supermarket vouchers as a token of appreciation for their participation in this longitudinal study.

Measures

All the following measures were included in the three assessments, except pre-retirement planning activities that were measured only in T1. Except those already in Chinese, the measurement scales were translated into Chinese by two bilingual translators through the back-translation procedure. The Cronbach's alphas of the measures of the three assessments are reported in **Table 1**.

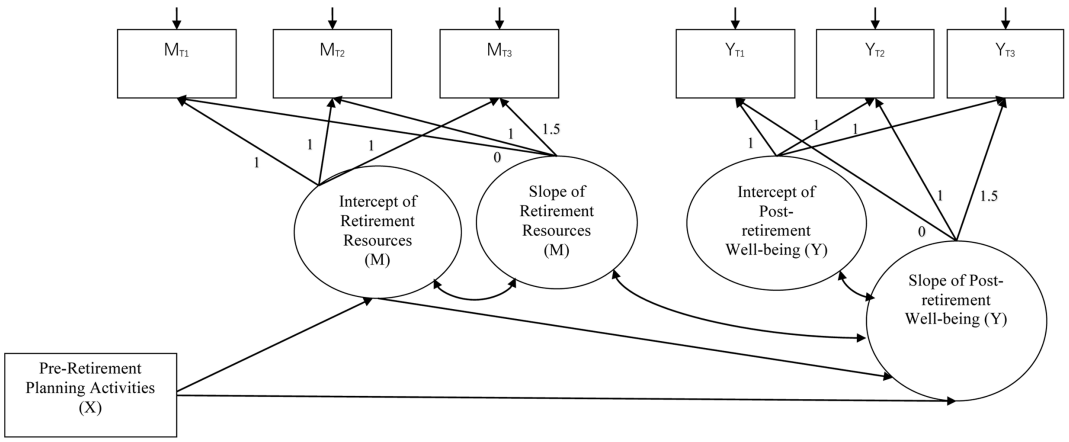

FIGURE 1 | The proposed latent growth mediation model. X denotes the independent variable; M denotes the mediator; and Y denotes the dependent variable. The factor loadings of the intercept of retirement resources and post-retirement well-being were set to 1.0 on the three observed variables of the respective construct in Times 1–3. The factor loadings of the slope of retirement resources and post-retirement well-being were set to [0.0, 1.0, 1.5] on the three observed variables of the respective construct in Times 1–3 to reflect a linear change trajectory over a 1.5-year interval.

Pre-retirement Planning Activities

In T1, participants were asked to report the types of planning activities that they performed for their retirement life. A locally developed measure of pre-retirement planning activities (Law et al., 2006; Yeung, 2013) was used, which covers preparatory behaviors in four domains, including financial (five items), health (four items), social life (four items), and psychological (seven items) planning. Following the rating format of Law et al.'s (2006) measure, a dichotomous rating scale was used (1 = *yes*; 0 = *no*), in which the participants were asked to indicate whether they performed any of the 20 retirement planning activities. Higher scores represent greater preparation for retirement. The dichotomous rating scale clearly reflects whether the participants had undertaken any of these activities shortly before their actual retirement, instead of their intention to perform these activities or not. A confirmatory factor analysis (CFA) was performed using MPlus 7 (Muthén and Muthén, 2012). Results of the CFA indicate that the goodness-of-fit of the one-factor model [AIC = 2580.599; BIC = 2762.738; $\chi^2(170) = 195.570$; CFI = 0.888; RMSEA = 0.042] was better than that of the

TABLE 1 | Descriptive statistics of Pre-retirement planning, retirement resources and Post-retirement well-being in Times 1–3.

	Time 1 (Pre-retirement)		Time 2 (6-month post-retirement)		Time 3 (12-month post-retirement)		Mean of the intercept (*SE*)	Mean of the slope (*SE*)	Variance of the intercept (*SE*)	Variance of the slope (*SE*)
	M (SD)	α	*M (SD)*	α	*M (SD)*	α				
Pre-retirement Planning[a] (0–20)	9.06 (3.84)	0.74	–	–	–	–	–	–	–	–
Retirement Resources										
Total retirement resources (1–5)	3.36 (0.42)	0.92	3.31 (0.45)	0.93	3.33 (0.45)	0.89	3.36*** (0.04)	−0.03† (0.02)	0.18*** (0.03)	0.02 (0.02)
Tangible resources (1–5)	3.47 (0.47)	0.79	3.42 (0.53)	0.81	3.41 (0.54)	0.85	3.47*** (0.04)	−0.05† (0.02)	0.20*** (0.04)	0.04 (0.03)
Mental resources (1–5)	3.46 (0.47)	0.89	3.41 (0.48)	0.90	3.43 (0.49)	0.91	3.46*** (0.04)	−0.02 (0.02)	0.20*** (0.04)	0.03 (0.02)
Social resources (1–5)	2.80 (0.65)	0.85	2.76 (0.59)	0.81	2.77 (0.70)	0.81	2.81*** (0.06)	−0.04 (0.04)	0.33*** (0.47)	0.04 (0.50)
Post-retirement well-being										
Physical well-being (1–3)	2.73 (0.32)	0.87	2.68 (0.35)	0.88	2.71 (0.30)	0.86	2.73*** (0.03)	−0.02 (0.02)	0.11*** (0.02)	0.03** (0.01)
Life satisfaction (1–7)	5.01 (1.10)	0.88	4.83 (1.20)	0.91	4.96 (1.15)	0.91	4.98*** (0.10)	−0.02 (0.06)	0.80*** (0.24)	0.28† (0.15)
Psychological well-being (1–5)	3.64 (0.47)	0.91	3.62 (0.48)	0.91	3.62 (0.46)	0.91	3.34*** (0.04)	−0.01 (0.02)	0.32*** (0.04)	0.03 (0.02)
Psychological distress (1–4)	1.76 (0.45)	0.89	1.79 (0.49)	0.89	1.82 (0.47)	0.87	1.76*** (0.04)	0.04 (0.03)	0.19*** (0.05)	0.07** (0.03)

N = 118. The range of scores for each variable is shown in the parentheses on the first column. [a]*Pre-retirement planning activites were measured only in Time 1.* $^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$; $^\dagger p \leq 0.06$.

four-factor model containing financial, health, social life, and psychological planning [AIC = 2628.810; BIC = 2808.231; $\chi^2(164) = 245.782$; CFI = 0.720; RMSEA = 0.067], $\Delta\chi^2(6) = 50.212$, $p < 0.001$. Therefore, in the present study, the sum of pre-retirement planning activities was computed and used in the following analyses in this study.

Retirement Resources

The RRI (Leung and Earl, 2012) consists of 35 items to measure three types of resources, namely, tangible resources (8 items), mental resources (18 items), and social resources (9 items). A sample item of tangible resources is "financial support from own savings." Examples of mental resources are "experience positive emotions" and "have little control over the things that happen to me." A sample item of social resource is "supportive interaction with friends." Participants rated these items on a 5-point scale (1 = *very little* to 5 = *plenty*). Higher scores represent more resources possessed by the retirees. Results of the CFA showed that the goodness-of-fit of the three-factor model using Time 1 data [AIC = 8289.903; BIC = 8604.791; $\chi^2(515) = 819.722$; CFI = 0.828, RMSEA = 0.071] was better than that of the six-factor model which was originally proposed by Wang et al. (2011) [AIC = 8912.956; BIC = 9252.804; $\chi^2(579) = 1014.160$; CFI = 0.770, RMSEA = 0.080], $\Delta\chi^2(64) = 194.438$, $p < 0.001$; and the one-factor model [AIC = 8533.079; BIC = 8839.680; $\chi^2(518) = 1068.897$; CFI = 0.688, RMSEA = 0.095], $\Delta\chi^2(3) = 249.175$, $p < 0.001$. Therefore, the mean scores of tangible, social, and mental resources were computed. The resource-based dynamic model stresses that the level of post-retirement well-being is predicted by the total amount of resources held by the retirees (Wang et al., 2011). Therefore, the total resources were also calculated by averaging the mean scores of the three types of resources, with the assumption that these resources are equally important to each retiree.

Physical Well-being

Physical well-being was measured by the validated Chinese version of the Physical Functioning subscale of the Short-Form Health Survey (SF-36) (Ware and Sherbourne, 1992; Lam et al., 1998). Permission to use the SF-36 scale was obtained. The participants rated the 10 items on a 3-point scale (1 = *limited a lot* to 3 = *not limited at all)* to reflect whether their daily activities were limited by their health. Higher scores represent better physical well-being.

Life Satisfaction

The Chinese version of the Life Satisfaction Scale was utilized (Diener et al., 1985; Sachs, 2003). This scale consists of five items to assess the retiree's general satisfaction with life. The participants rated each item using a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). Higher scores denote higher satisfaction with life.

Psychological Well-being

The validated Chinese version of Ryff's (1989) psychological well-being was employed in the present study (Cheng and Chan, 2005). A sample item of this scale is "Some people wander aimlessly through life, but I am not one of them." The participants rated the 24 items on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). Higher scores indicate better psychological health.

Psychological Distress

The validated Chinese version of the 12-item General Health Questionnaire (Shek, 1989) was adopted to assess the participants' psychological distress such as depression, social dysfunction, and loss of confidence in the past 4 weeks. The participants rated the items on a 4-point scale, with higher scores representing more severe psychological distress.

Demographic Variables and Covariates

Age, gender, and education level were recorded in T1. The occupation prior to retirement was also recorded, with 1 = *white-collar workers* and 0 = *service-oriented workers or technicians*. Preliminary analyses showed that the education level and occupation before retirement did not significantly correlate with the four well-being variables. Therefore, these two variables were excluded from the following analyses.

Analytical Plan

This study involves changes in retirement resources and post-retirement well-being across the three assessments, therefore, the LGM is employed to examine the changes in the levels of these variables and their relationships over time. The critical information obtained from the LGM is the parameter estimations of two latent factors for each construct: the *mean values* of the intercept and slope factors (which represent the magnitude of the variable's initial level and rate of change over time, respectively) and the *variances* in the intercept and slope factors (which represent the individual variations in the variable's initial level and rate of change, respectively) (Liu et al., 2016). H1 is examined by assessing whether the mean value of the latent slope of retirement resources would be significant. H2 is tested by assessing the slope–slope correlations between the retirement resources and post-retirement well-being. The LGM is also adopted to test H3 regarding the effect of pre-retirement planning on the initial level (i.e., intercept) and rate of change (i.e., slope) in retirement resources over time.

H4, which pertains to the proposed mediating effect of retirement resources on the relationship between pre-retirement planning and post-retirement well-being, is examined by the latent growth mediation model suggested by Selig and Preacher (2009). In particular, the effect of the pre-retirement planning activities on the change in post-retirement well-being through the initial level of retirement resources is investigated.

RESULTS

Descriptive Analyses

Table 1 presents the mean, standard deviations, and Cronbach's alphas of each construct measured in T1–3. **Table 2** shows the correlation coefficients among pre-retirement planning, retirement resources, and post-retirement well-being.

TABLE 2 | Correlation coefficients among major variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
(1) Planning	–																							
(2) T1 TRR	**0.21**	–																						
(3) T1 Tangible	0.05	**0.76**	–																					
(4) T1 mental	**0.19**	**0.91**	**0.53**	–																				
(5) T1 social	**0.30**	**0.69**	**0.32**	**0.51**	–																			
(6) T1 PHY	0.01	**0.31**	**0.38**	**0.32**	0.05	–																		
(7) T1 LS	0.11	**0.57**	**0.50**	**0.47**	**0.36**	0.17	–																	
(8) T1 PWB	**0.25**	**0.76**	**0.52**	**0.71**	**0.54**	**0.24**	**0.64**	–																
(9) T1 GHQ	−0.04	**−0.66**	**−0.56**	**−0.59**	**−0.39**	**−0.24**	**−0.48**	**−0.62**	–															
(10) T2 TRR	**0.24**	**0.86**	**0.70**	**0.76**	**0.58**	**0.31**	**0.53**	**0.68**	**−0.57**	–														
(11) T2 Tangible	0.17	**0.70**	**0.76**	**0.54**	**0.38**	**0.28**	**0.50**	**0.52**	**−0.45**	**0.85**	–													
(12) T2 Mental	0.17	**0.83**	**0.59**	**0.81**	**0.50**	**0.35**	**0.45**	**0.65**	**−0.59**	**0.92**	**0.64**	–												
(13) T2 Social	**0.36**	**0.63**	**0.41**	**0.48**	**0.71**	0.10	**0.41**	**0.52**	**−0.38**	**0.77**	**0.54**	**0.60**	–											
(14) T2 PHY	−0.00	**0.37**	**0.43**	**0.30**	0.08	**0.70**	**0.35**	**0.35**	**−0.21**	**0.46**	**0.49**	**0.43**	**0.22**	–										
(15) T2 LS	**0.21**	**0.52**	**0.41**	**0.43**	**0.39**	**0.20**	**0.58**	**0.52**	**−0.42**	**0.62**	**0.57**	**0.53**	**0.51**	**0.32**	–									
(16) T2 PWB	**0.22**	**0.76**	**0.56**	**0.89**	**0.56**	**0.24**	**0.52**	**0.81**	**−0.59**	**0.76**	**0.56**	**0.77**	**0.59**	**0.36**	**0.68**	–								
(17) T2 GHQ	**−0.19**	**−0.56**	**−0.47**	**−0.49**	**−0.34**	**−0.20**	**−0.43**	**−0.56**	**0.65**	**−0.64**	**−0.53**	**−0.65**	**−0.40**	**−0.39**	**−0.50**	**−0.66**	–							
(18) T3 TRR	**0.21**	**0.80**	**0.64**	**0.71**	**0.55**	**0.28**	**0.52**	**0.66**	**−0.56**	**0.85**	**0.76**	**0.77**	**0.60**	**0.47**	**0.62**	**0.76**	**−0.64**	–						
(19) T3 tangible	0.14	**0.67**	**0.71**	**0.51**	**0.42**	**0.27**	**0.46**	**0.46**	**−0.46**	**0.73**	**0.82**	**0.59**	**0.46**	**0.40**	**0.55**	**0.56**	**−0.53**	**0.86**	–					
(20) T3 mental	0.16	**0.73**	**0.51**	**0.74**	**0.40**	**0.31**	**0.47**	**0.66**	**−0.56**	**0.77**	**0.62**	**0.81**	**0.45**	**0.51**	**0.54**	**0.72**	**−0.64**	**0.90**	**0.67**	–				
(21) T3 social	**0.23**	**0.52**	**0.31**	**0.39**	**0.62**	0.02	**0.31**	**0.40**	**−0.26**	**0.52**	**0.43**	**0.38**	**0.63**	0.13	**0.38**	**0.51**	**−0.31**	**0.64**	**0.42**	**0.37**	–			
(22) T3 PHY	−0.02	**0.36**	**0.41**	**0.31**	0.10	**0.63**	**0.27**	**0.38**	**−0.32**	**0.43**	**0.48**	**0.39**	**0.21**	**0.75**	**0.34**	**0.42**	**−0.45**	**0.51**	**0.78**	**0.53**	0.16	–		
(23) T3 LS	**0.25**	**0.60**	**0.51**	**0.50**	**0.42**	**0.24**	**0.58**	**0.63**	**−0.48**	**0.66**	**0.63**	**0.57**	**0.51**	**0.44**	**0.80**	**0.72**	**−0.58**	**0.75**	**0.68**	**0.67**	**0.43**	**0.52**	–	
(24) T3 PWB	0.15	**0.66**	**0.49**	**0.62**	**0.43**	**0.25**	**0.55**	**0.77**	**−0.53**	**0.70**	**0.59**	**0.66**	**0.52**	**0.43**	**0.63**	**0.82**	**−0.65**	**0.76**	**0.58**	**0.76**	**0.42**	**0.52**	**0.75**	–
(25) T3 GHQ	−0.07	**−0.53**	**−0.52**	**−0.45**	**−0.26**	**−0.32**	**−0.38**	**−0.49**	**0.54**	**−0.59**	**−0.55**	**−0.55**	**−0.34**	**−0.50**	**−0.38**	**−0.52**	**0.73**	**−0.64**	**−0.56**	**−0.65**	**−0.24**	**−0.59**	**−0.54**	**−0.59**

N = 118. T1 = Time 1; T2 = Time 2; T3 = Time 3; Planning = Pre-retirement planning activities; TRR = Total retirement resources; Tangible = Tangible resources; Mental = Mental resources; Social = Social resources; PHY = Physical well-being; LS = Life satisfaction; PWB = Psychological well-being; GHQ = Psychological distress. Correlation displayed in bold are significant at $p < 0.05$.

Pre-retirement planning was significantly correlated with greater total retirement resources in T1–3 ($r = 0.21$–0.24, $p < 0.05$) and several of the post-retirement well-being variables (e.g., psychological well-being and psychological distress in T2 and life satisfaction in T2 and T3). Tangible, mental, and social resources, as well as the total resources in T1, were significantly associated with the four well-being variables in T2 and T3.

Changes in Retirement Resources and Post-retirement Well-being

The LGM was conducted on each of the retirement resources and post-retirement well-being without inclusion of any covariate. Following the steps of Liu et al. (2016), in the following LGM analyses, the factor loadings of the intercept of each construct were set at 1.0 on the three observed variables in T1–3 (e.g., composite scores of psychological distress measured in the three time points). The factor loadings of the slope were set at [0.0, 1.0, 1.5][1] on the three observed variables to reflect a linear change trajectory over a 1.5-year interval. All of these models have satisfactory fit, wherein the CFI ranged from 0.977 to 1.00 and the RMSEA from 0.000 to 0.087.

The last four columns in **Table 1** present the mean values and variances of the intercept and slope factors of retirement resources and post-retirement well-being. LGM was performed to test H1 on whether retirement resources decline over time. Results demonstrate that tangible resources show a marginally significant mean value of the slope factor (slope mean = −0.04, $p = 0.059$; T1–3 means = 3.47, 3.42, and 3.41, respectively), which suggests that the mean level of tangible resources show a decreasing trend over time. The slope of total resources was also marginally significant (slope mean = −0.03, $p = 0.060$; T1–3 means = 3.36, 3.31, and 3.33, respectively), suggesting a trend of fewer overall resources after retirement. The means and variances of the slope of mental and social resources were not statistically significant, which suggest that these two resources remained largely stable during transition. However, the variances in the intercept factor of all the four resource variables were significantly, which indicate that individual differences exist in the retirement resources at T1. Therefore, H1 is partially supported.

The mean values of the slope of the four post-retirement well-being variables were not significant. However, the negative values for the slope of physical well-being, psychological well-being, and life satisfaction, as well as the positive value for the slope of psychological distress imply that there is a general trend of poorer well-being during the retirement transition. The variances in the slope of physical well-being (slope variance = 0.03, $p = 0.004$; T1–3 means = 2.73, 2.68, and 2.71, respectively) and psychological distress (slope variance = 0.07, $p = 0.005$; T1–3 means = 1.76, 1.79, and 1.82, respectively) were significant, whereas that of life satisfaction (slope variance = 0.28, $p = 0.057$; T1–3 means = 5.01, 4.83, and 4.96, respectively) was marginally significant, indicating that there were individual differences in the rate of change in these three well-being variables.

Relationship between Retirement Resources and Post-retirement Well-being

Two sets of LGM were conducted separately on each of the four well-being variables to test H2 whether changes in retirement resources are correlated with changes in post-retirement well-being: (1) The slope of total resources was correlated with the slope of the well-being variable; and (2) The slopes of tangible, social, and mental resources were correlated with the slope of the well-being variable. In these analyses, the initial levels of the resources and well-being variables were also included.

In the LGM with total retirement resources, the slope of total resources was positively correlated with the slopes of physical well-being ($r = 0.01$), life satisfaction ($r = 0.04$), and psychological well-being ($r = 0.02$), and negatively correlated with that of psychological distress ($r = -0.02$), $ps \leq 0.001$. These results suggest that the changes in total retirement resources are positively associated with the change trajectory in post-retirement well-being over time.

In the LGM with all the three types of retirement resources, the slopes of tangible, mental, and social resources were significantly correlated with the slope of psychological well-being ($r = 0.01$, $p = 0.005$; $r = 0.02$, $p < 0.001$, and $r = 0.02$, $p = 0.008$, respectively). The slopes of tangible and mental resources were significantly correlated with the slopes of physical well-being ($r = 0.01$, $p = 0.002$; and $r = 0.02$, $p < 0.001$, respectively), life satisfaction ($r = 0.05$, $p = 0.001$; and $r = 0.04$, $p = 0.004$, respectively), and psychological distress ($r = -0.02$, $p = 0.015$; and $r = -0.02$, $p < 0.001$, respectively). The slope of social resources did not correlate with the slopes of physical well-being ($r = -0.002$, $p = 0.687$), life satisfaction ($r = 0.02$, $p = 0.432$), and psychological distress ($r = -0.02$, $p = 0.101$).

These findings reveal that retirees with increased resources after retirement, especially in the domains of tangible and mental resources, are more likely to experience better physical and psychological well-being, higher life satisfaction, and a lower level of psychological distress during their transition to retirement. Therefore, H2 is largely supported.

The Effect of Pre-retirement Planning on Retirement Resources

H3 concerns the effect of pre-retirement planning on the initial level and slope of retirement resources. Results of the LGM reveal that total pre-retirement planning significantly predicted of the initial levels of the total resources ($B = 0.06$, $SE = 0.02$, $p = 0.019$), and social and mental resources ($B = 0.05$, $SE = 0.02$, $p < 0.001$; and $B = 0.02$, $SE = 0.01$, $p = 0.040$, respectively), but not tangible resources ($B = 0.01$, $SE = 0.01$, $p = 0.509$). Therefore, H3a is largely supported. However, the effect of pre-retirement planning on the slopes of total resources ($B = 0.02$, $SE = 0.03$) and the three resources types (tangible: $B = 0.01$, $SE = 0.01$; mental: $B = -0.00$,

[1] In this study, fixed loadings [0, 1, 1.5] are used to represent the time scores of the latent slope factor (Muthén and Muthén, 2012). Preliminary analyses comparing the result pattern between the linear growth model and the freely-estimated growth model show that the models with fixed slopes are not significantly worse than the models with freely-estimated slope parameters. Therefore, this study reports the results of the fixed slope models.

$SE = 0.01$, and social: $B = -0.00$, $SE = 0.01$) was not significant. Therefore, H3b is not supported.

Mediating Role of Retirement Resources

H4 tests whether the effect of pre-retirement planning activities on the changes in post-retirement well-being is mediated by the initial level of retirement resources. The intercept-only mediation model was executed following the LGM framework of Selig and Preacher (2009) and von Soest and Hagtvet (2011). The effect of X (pre-retirement planning) on the slope of Y (post-retirement well-being) is mediated by the intercept of M (retirement resources) (**Figure 1**). In the mediation model, the paths from X to the intercept of M, from the intercept of M to the slope of Y, and from X to the slope of Y were tested. The covariance between the slopes of M and Y were also included as the the resource-based dynamic model expects the changes in well-being are correlated with the change in resources. Two sets of the latent growth mediation models were performed separately on each post-retirement well-being variable: one contains the total retirement resources as the mediator (M), whereas the other contains the three types of retirement resources as the mediators. Age and gender were controlled as covariates in the model.

The latent growth mediation model with the intercept of total retirement resources as the mediator[2] showed a significant indirect effect of pre-retirement planning on the slopes of life satisfaction ($B = 0.02$, $SE = 0.02$, $p = 0.030$), psychological well-being ($B = 0.01$, $SE = 0.004$, $p = 0.021$), and psychological distress ($B = -0.01$, $SE = 0.003$, $p = 0.024$). The indirect effect on the physical well-being was marginally significant ($B = 0.002$, $SE = 0.001$, $p = 0.063$). **Figures 2–5** show the unstandardized coefficients of the latent growth mediation model on the four well-being variables.

Results of the latent growth mediation model with the intercept of the three retirement resources as the mediators reveal that the total indirect effect of pre-retirement planning on the slopes of psychological well-being ($B = 0.01$, $SE = 0.004$, $p = 0.032$) and life satisfaction ($B = 0.02$, $SE = 0.01$, $p = 0.042$) was significant. In particular, the initial level of social resources mediated the positive effect of pre-retirement planning on the increase in psychological well-being ($B = 0.01$, $SE = 0.003$, $p = 0.010$) and life satisfaction ($B = 0.03$, $SE = 0.01$, $p = 0.005$). The indirect effect through tangible and mental resources was not significant. The latent growth mediation model on physical well-being ($B = 0.003$, $SE = 0.003$, $p = 0.263$) and psychological distress ($B = -0.002$, $SE = 0.01$, $p = 0.662$) through the three types of retirement resources was not significant.

Combining the two sets of mediation analyses together, the results suggest that pre-retirement planning activities are associated with a larger total amount of resources (particularly social resources) possessed by the retirees in T1, which then contribute to positive changes in their psychological well-being and life satisfaction after retirement. Therefore, H4 is partially supported.

[2]Exploratory analyses were performed to test whether the slope of resources is also a significant mediator. In the slope-only mediation model, no significant indirect effect through the slope of total resources was found on the relationship between pre-retirement planning and post-retirement well-being (physical well-being: $B = 0.001$, $SE = 0.002$, $p = 0.625$; life satisfaction: $B = 0.003$, $SE = 0.006$, $p = 0.620$; psychological well-being: $B = 0.002$, $SE = 0.003$, $p = 0.599$; and psychological distress: $B = -0.002$, $SE = 0.003$, $p = 0.589$).

DISCUSSION

This three-wave longitudinal study systematically examined changes in the retirement resources and psychological and physical well-being of Hong Kong Chinese retirees before and after their actual retirement. Consistent with the proposition of the resource-based dynamic model (Wang et al., 2011), the results of the LGMs show that post-retirement well-being depends on the changes in the total resources during the transition. The findings of the latent growth mediation models also reveal that the beneficial effect of pre-retirement planning activities on the changes in post-retirement well-being can be explained by the initial amount of total resources possessed by the retirees.

Changes in Retirement Resources and Post-retirement Well-being and Their Association

Retirement is often perceived as a stressful life event that causes a wide range of negative psychosocial consequences, such as psychological distress, loneliness, and physical health problems (e.g., Dave et al., 2006; Wang, 2007; Wong and Earl, 2009). However, some researchers argue that retirement is not necessarily traumatic and stressful (Kim and Moen, 2002; Fehr, 2012), and not every retiree experiences a decrease in his/her physical and psychological well-being (Wang, 2007). This study provides a more in-depth examination of changes in post-retirement well-being by following the retirees in their transition period. The findings of the present study reveal that the retirees in this sample can maintain their psychological and physical well-being 1 year after their actual retirement. However, the variances in the slope of physical well-being and psychological distress are significant, whereas that of life satisfaction is marginally significant, implying that individual variations exist in the rate of changes in these well-being outcomes over time. For example, comparing the changes in physical well-being 6 and 12 months after retirement shows that over 43% of the retirees first experienced decreases 6 months after retirement (T2). Among these participants, only 16% of them continued to experience decreases in physical functioning but the majority could maintain and even improve their physical health 1 year after retirement (T3). These results support the proposition of the resource-based dynamic model that retirement adjustment takes multiple forms, which can be positive, negative, or neutral, and the pattern of changes varies over time.

The resource-based dynamic model (Wang et al., 2011) emphasizes the importance of the resources possessed by each retiree in determining his/her quality of adjustment and level of well-being after retiring from the full-time job. This study examines the changes in the total retirement resources, including tangible, mental, and social resources, in Times 1–3. A trend of

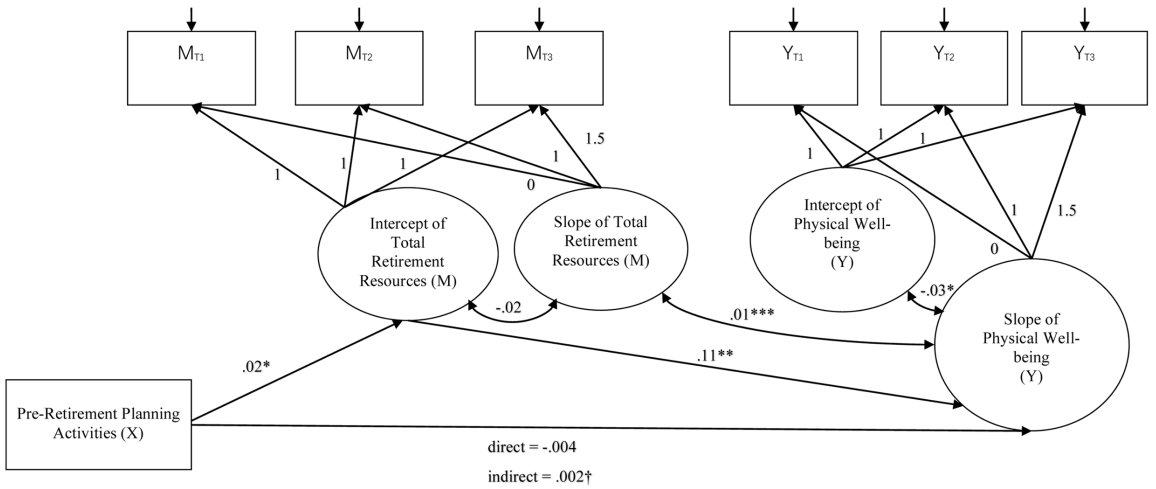

FIGURE 2 | The latent growth mediation model on physical well-being. X denotes the independent variable; M denotes the mediator; and Y denotes the dependent variable. The model fit indices are: CFI = 0.972; RMSEA = 0.083; AIC = 98.075; BIC = 167.342. Age and gender were controlled in the model as covariates. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$; †$p = 0.063$.

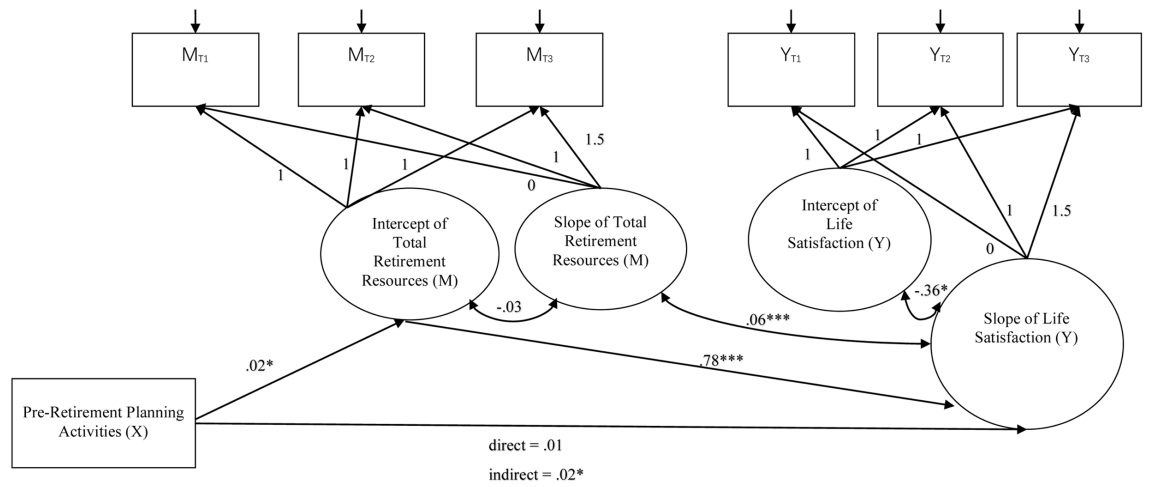

FIGURE 3 | The latent growth mediation model on life satisfaction. X denotes the independent variable; M denotes the mediator; and Y denotes the dependent variable. The model fit indices are: CFI = 0.921; RMSEA = 0.146; AIC = 998.979; BIC = 1072.017. Age and gender were controlled in the model as covariates. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

fewer total resources, which mainly arise from the domain of tangible resources, is observed in the current sample of retirees. After retiring from the full-time employment, the retirees do not have regular income and have to rely on their private savings to support their living and medical expenses. Chou et al. (2015) commented that even the individuals with substantial financial resources continue to worry about their financial adequacy after retirement. The decrease in financial resources is particularly common in Hong Kong because no pension system exists for most retirees (except civil servants), and the government only provides a minimal amount of allowance to the aged population. For resources in the mental and social domains, such as cognitive capabilities, motivation or social support, no significant change is observed in the present sample, suggesting that the retirees can maintain the resources in these two domains after retiring from their jobs. Since this study only assesses the changes in resources 1 year after actual retirement, so the long-term changes remain largely unknown. Future studies should extend the present research to a longer interval (e.g., 5 years) to obtain a clear picture on the changes in retirement resources over time.

This research advances the current literature on retirement adjustment by empirically testing the propositions of the resource-based dynamic model (Wang et al., 2011). In particular, the association between changes in retirement resources and well-being in Times 1–3 was examined. Consistent with the model

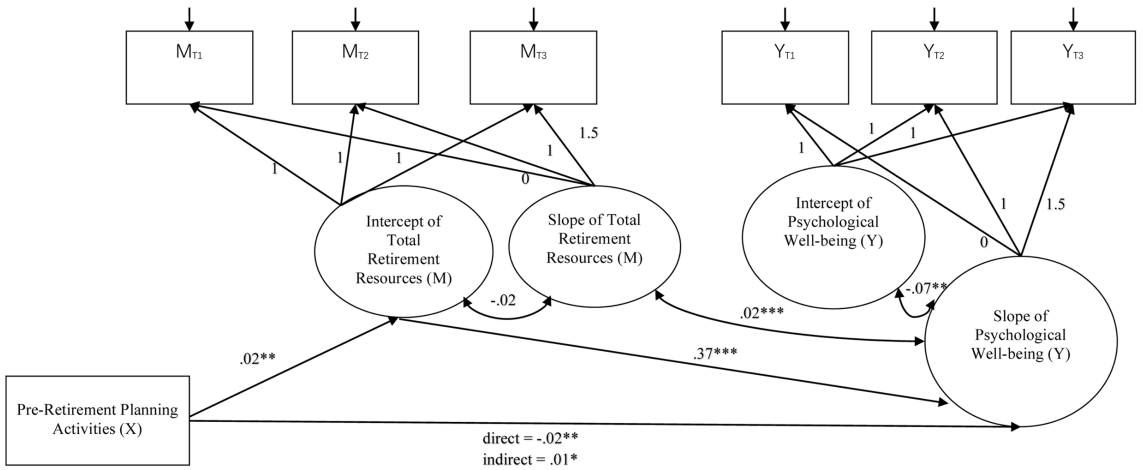

FIGURE 4 | The latent growth mediation model on psychological well-being. X denotes the independent variable; M denotes the mediator; and Y denotes the dependent variable. The model fit indices are: CFI = 0.901; RMSEA = 0.150; AIC = 250.945; BIC = 325.754. Age and gender were controlled in the model as covariates. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

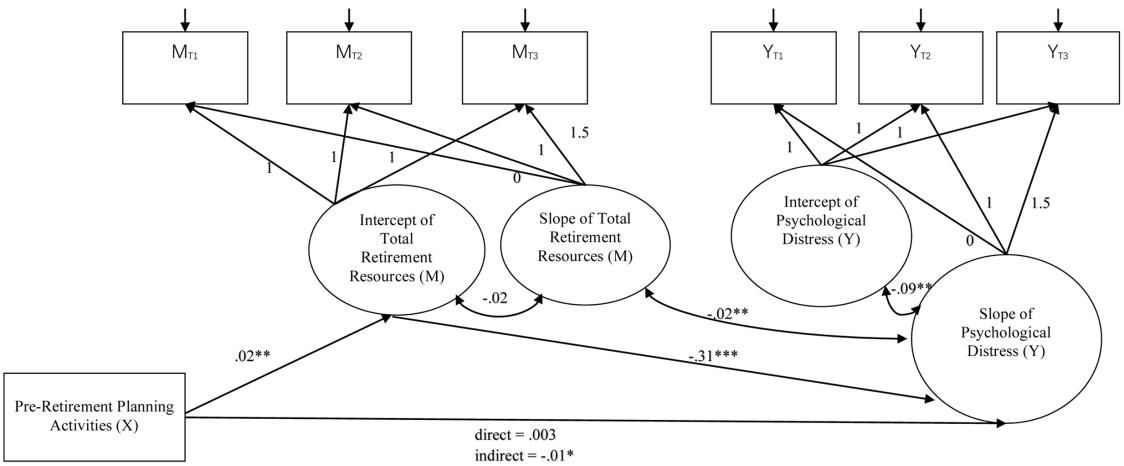

FIGURE 5 | The latent growth mediation model on psychological distress. X denotes the independent variable; M denotes the mediator; and Y denotes the dependent variable. The model fit indices are: CFI = 0.909; RMSEA = 0.154; AIC = 389.006; BIC = 460.823. Age and gender were controlled in the model as covariates. *$p < 0.05$; **$p < 0.01$; *** $p < 0.001$.

prediction, the retirees with increased total resources during the transition reported positive changes in their physical well-being, life satisfaction, and psychological well-being, as well as lower psychological distress across the three assessments. A reverse pattern of relationship is observed when the retirees reported a decrease in the total resources. Past studies that use the RRI demonstrated the effect of retirement resources on the retrospective recall of retirement adjustment and satisfaction in a sample of Australian retirees (Leung and Earl, 2012). The present study took a step further to investigate the longitudinal effect of resource changes on changes in physical and psychological well-being during the transition to retirement. Retirees, who reported gains in retirement resources, particularly tangible and mental resources, can better meet the challenges in the transition period, which consequently contribute to better well-being after retirement. These findings reveal the importance of overall resource availability in determining the well-being of retirees.

The Mediating Effect of Retirement Resources

Pre-retirement planning activities are important to the successful adaptation to this critical life event. Past cross-sectional and longitudinal studies clearly demonstrate the positive effects of planning behaviors on post-retirement well-being, such as life satisfaction and psychological well-being (e.g., Wang, 2007; Donaldson et al., 2010; Yeung, 2013; Muratore and Earl, 2015). The current study investigated the underlying mechanism of such positive relationship between pre-retirement planning and post-retirement well-being. A mediation model was proposed:

preparation for retirement is associated with higher initial levels of retirement resources, which consequently contribute to positive changes in well-being over time. The results of the latent growth mediation models support our prediction. In particular, overall planning activities for retirement contribute to a higher initial level of total resources possessed by the retirees in T1, which enable them to cope with challenges and negative experiences during the transition and consequently maintain and preserve their well-being 1 year after retirement. By examining the three types of retirement resources in the LGM, this study reveals that among various types of resources possessed by the retirees, the initial level of social resources largely accounts for the positive effect of pre-retirement planning on the changes in psychological well-being and life satisfaction. The retirees with more planning activities tend to have more social support from family members and friends, which then facilitate a positive change in their psychological well-being and life satisfaction. These findings help advance the current literature on pre-retirement planning by identifying the paths that lead to better post-retirement well-being.

Retirement planning facilitates a realistic expectation of retirement experiences and promotes goal setting for post-retirement life among retirees. Different types of preparatory behavior, such as psychological preparation for post-retirement changes, seeking for social support, savings and investment, and regular physical exercises, help the retirees to maintain or improve their resources availability. Past research focuses largely on financial and health planning activities, making other aspects of preparation being less emphasized. The findings on the mediating role of social resources in the present research suggest that future pre-retirement planning programs should put more effort to strengthen the amount of social resources of retirees, such as increase their social support network and social participation, to facilitate successful adjustment to retirement.

Limitations and Future Directions

A few limitations should be considered when interpreting the findings reported in this paper. First, this study was conducted with a small sample of Hong Kong Chinese retirees, so the findings may not be generalized to retirees of other countries because of the differences in their retirement and social welfare systems. However, this study reveals the underlying mechanism of pre-retirement planning and post-retirement well-being, thus provides insights on the design of future pre-retirement planning programs. Future studies should examine retirement adjustment in a larger sample, preferably with occupational stratification, to systematically understand the impact of retirement on retired persons. Second, this 18-month longitudinal study could only demonstrate the short-term effects of pre-retirement and total resources on well-being. Their long-term predictive values await further investigation. Third, only the planning activities 6 months before retirement were recorded. Some retirees may possibly perform more preparatory behaviors (e.g., attending a pre-retirement workshop 1 month before their retirement) when the actual retirement date becomes closer, which then affects the accuracy of the amount of total resources before retirement. Future research may include a follow-up assessment around the actual retirement to accurately measure the pre-retirement planning of the retirees. Fourth, this study relied on the self-reported questionnaires. Future studies should include an objective assessment of the retirees' resources and well-being, such as others' rating of social support or an objective measure of physical health.

CONCLUSION

This longitudinal study investigated the changes in retirement resources and post-retirement well-being of Hong Kong Chinese retirees for 18 months. The retirees in the present sample can maintain their physical and psychological well-being after retiring from their jobs, though significant individual variations in the change rate in physical well-being and psychological distress are observed. A trend of decreasing tangible resources after retirement is also noted. The changes in post-retirement well-being are closely related to the changes in the total retirement resources over time. The latent growth mediation analyses also reveal that the beneficial effects of pre-retirement planning activities on the changes in psychological well-being and life satisfaction can be explained by the retirees' initial levels of total resources, particularly resources in the social domain. Future pre-retirement planning programs should therefore strengthen the amount of social resources possessed by the retirees.

ETHICS STATEMENT

This study was carried out in accordance with the recommendations of Human Subjects Ethics Sub-Committee at City University of Hong Kong, with written informed consent from all participants. The protocol was approved by the Human Subjects Ethics Sub-Committee at City University of Hong Kong.

AUTHOR CONTRIBUTIONS

DY is responsible for designed and conducted the study, analyzed the data, and wrote the manuscript. XZ is responsible for conducted the literature review and wrote the manuscript.

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