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Profiles of need frustration in online learning: the links to motivation and attentional control

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Previous studies indicated that online learning environments present motivational challenges that may frustrate students' basic psychological needs for autonomy, competence, and relatedness. Grounded in Self-Determination Theory (SDT) and Expectancy-Value Theory (EVT), this study aimed to identify distinct need frustration profiles among e-learners and to examine how motivation-related factors (task value, self-efficacy, goal orientation, self-directed learning, collaborative learning) and attentional control predict profile membership. A sample of 541 adult (Mage = 26.37, SD = 8.61) e-learners completed a survey which consisted of Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS), Motivated Self-Directed Learning and Collaborative Learning Questionnaire (MSDLCL), and Attentional Control Scale. Latent profile analysis (LPA) based on the three (autonomy, competence, relatedness) need frustration indicators identified two profiles: a High Need Frustration profile (≈44%) and a Low Need Frustration profile (≈56%). Logistic regression analysis showed that learners with higher extrinsic goal orientation and attentional control were significantly more likely to belong to the high-frustration profile, whereas task value, self-efficacy, and self-directed or collaborative learning tendencies did not significantly predict profile membership.

KEYWORDS

attentional control, basic psychological needs, extrinsic goal orientation, latent profile analysis, online learning, self-determination theory

Introduction

Online learning has become a widespread mode of higher education delivery, bringing both opportunities and challenges for learner motivation (Ferrer et al., 2022). While online learning offers flexibility and access, it also places substantial demands on learners' self-regulation and can magnify motivational challenges, including feelings of isolation, confusion, and frustration (Cho and Shen, 2013; Phuong, 2023; Wong, 2020). E-learning contexts often require learners to regulate their own behaviors amid reduced face-to-face interaction and increased distractions (Vezne et al., 2023; Wang et al., 2019). Understanding how students adapt motivationally to these conditions, and why some perform better than others, remains an issue for both theory and practice, and is critical for improving online education outcomes (Hu and Xiao, 2025).

Two major theoretical frameworks offer insights into e-learners' motivation and experiences. Self-Determination Theory (SDT) emphasizes the role of basic psychological needs in motivation and non-directly suggests that learning environments can support or thwart learners' basic psychological needs for autonomy, competence, and relatedness (Chiu, 2022; Ryan and Deci, 2017, 2020; Achuthan, 2025). Expectancy-Value Theory (EVT) focuses on learners' beliefs about their capability and the value of tasks as drivers of engagement (Eccles and Wigfield, 2002, 2020, 2023; Wigfield and Eccles, 2000).

Most research on e-learning motivation has relied on variable-centered approaches that examine relations among constructs (Wang et al., 2019; Hu and Xiao, 2025). Yet learners are not a homogeneous group, their experiences of basic psychological needs frustration and motivational beliefs likely cluster into distinct configurations. Person-centered approaches such as Latent Profile Analysis (LPA) can reveal qualitatively different subgroups of learners (Hodis et al., 2023; Krijgsman et al., 2025; Pastor et al., 2007), offering a deeper view of who is struggling in online contexts.

Integrating SDT and EVT perspectives, the present study aims to examine whether e-learners exhibit distinct profiles of basic need (autonomy, competence, and relatedness) frustration, and how motivation-related factors (such as task value, self-efficacy, goal orientation, self-directed learning, collaborative learning) and attentional control are related to the profile membership.

Self-determination theory and need frustration in e-learning

According to SDT, humans have three basic psychological needs: autonomy (experiencing one's actions as volitional and self-endorsed), competence (feeling effective and capable), and relatedness (feeling connected and cared for in important relationships) (Deci and Ryan, 2000; Ryan and Deci, 2000, 2020; Rosli et al., 2022). When these needs are satisfied, learners tend to display autonomous motivation, deeper engagement, and better psychological functioning (Müller et al., 2021; Shelton-Strong, 2022). A systematic review by Hu and Xiao (2025) found that fulfilling students' autonomy, competence, and relatedness needs significantly boosts their engagement in online courses: learners who feel in control of their learning (autonomy), capable of mastering the material (competence), and connected to instructors or peers (relatedness) tend to participate more actively and persist in e-learning (Hu and Xiao, 2025).

However, besides need satisfaction, other internal motives (e.g., curiosity, interest) and external incentives both play a role in online learner engagement, underscoring the importance of addressing why students learn online (their regulated motives) in addition to how their needs are met (Hu and Xiao, 2025). Rosli et al. (2022) reviewed SDT studies in university online learning and noted that online learners may also be driven by identified goals or external rewards, or experience amotivation if needs are thwarted (Rosli et al., 2022). In a comprehensive review of Internet-supported learning, Bekele (2010) found that technology attributes (e.g., user-friendly platforms, reliable tools) and support services (technical help, tutoring) were consistently linked to higher student motivation and satisfaction (Bekele, 2010). A literature review by Nortvig et al. (2018) found that instructor presence and rich interactions (student-instructor, student-student, and student-content interaction) are dominant factors affecting learning outcomes and student satisfaction in e-learning (Nortvig et al., 2018). Therefore, previous studies suggest that an online course that provides

timely instructor feedback, peer discussion opportunities, and engaging content interactions is more likely to satisfy students' needs and keep them motivated: such interactions can fulfill relatedness (through teacher and peer support) and even competence (through interactive content and feedback).

Conversely, the frustration of basic psychological needs of autonomy, competence, and relatedness, and feeling controlled, incompetent, or rejected, constitutes a qualitatively negative experience associated with ill-being, disengagement, and maladaptive outcomes (De Naeghel et al., 2012; Kiltz et al., 2024; Krijgsman et al., 2025; Liu et al., 2024; Vansteenkiste et al., 2004). Recent work has emphasized that need frustration is not simply the absence of need satisfaction, but a distinct construct with its own nomological network. High levels of autonomy frustration (e.g., feeling coerced or controlled), competence frustration (e.g., feeling like a failure), and relatedness frustration (e.g., feeling rejected) are associated with controlled forms of motivation, defensive patterns of self-regulation, a heightened risk for depression and anxiety, a tendency to adopt extrinsic goals (such as grade-focused striving) rather than more self-endorsed, mastery-oriented goals (Krijgsman et al., 2025).

Thus, need frustration is not merely the absence of need satisfaction, but a distinct experience with unique negative consequences (Chen et al., 2015; Liu et al., 2024). High autonomy frustration (e.g., feeling pressured), competence frustration (feeling incapable), and relatedness frustration (feeling excluded) have been linked to decline in motivation and self-efficacy (Janke, 2022; Müller et al., 2021; Wang and Tsai, 2020), and increased risk for psychopathology (Liu et al., 2024; Tindall and Curtis, 2019; van der Kaap-Deeder, 2023; Van der Kaap-Deeder et al., 2020). Moreover, prolonged need frustration can give rise to controlled motivation (e.g., external pressure or obligations) and even amotivation and is also associated with lower engagement or higher anxiety (Krijgsman et al., 2025). E-learning can easily become a breeding ground for need frustration when it is poorly designed or unsupported: for example, a controlling online course that offers no choices can frustrate autonomy; poorly designed tasks that lead to repeated failures can frustrate competence; and isolation in a virtual class can frustrate relatedness (Bowers and Kumar, 2015; Kiltz et al., 2024; Piccoli et al., 2001).

Comparisons of online and face-to-face learning suggest that online learners often report higher levels of basic need frustration and lower need satisfaction (Müller et al., 2021; Wang et al., 2019; Wong, 2020). For instance, Wang et al. (2019) found that learners in online courses reported greater frustration of all three needs relative to those in face-to-face classes, likely reflecting reduced instructor support and peer interaction. Need frustration is not just unpleasant; it predicts lower intrinsic motivation, reduced vitality, and higher intentions to drop out (Müller et al., 2021; Rovai and Wighting, 2005).

At the same time, online learning can support needs when educational and technological design are thoughtful, and systematic reviews emphasize that instructor presence, meaningful interaction, and well-designed balance between online and offline activities are key to student satisfaction and motivation (Bekele, 2010; Fuentes and Labad, 2025; Nortvig et al., 2018). Furthermore, need-supportive practices, including autonomy support, competence-supportive feedback, and social relatedness, reliably predict engagement and persistence (Hu and Xiao, 2025). Thus, online environments can either thwart or support needs, depending on how they are designed and enacted.

However, research shows there is heterogeneity in need frustration experiences. Rather than assuming all online students suffer

equally, recent studies have used Latent Profile Analysis (LPA) to uncover subpopulations with different need satisfaction/frustration patterns. For example, [Krijgsman et al. \(2025\)](#) identified multiple need profiles among students, including groups with highly fulfilled needs and others with unfulfilled or frustrated needs, each associated with distinct motivational outcomes. However, such person-centered analyses have mostly focused on face-to-face education settings ([Krijgsman et al., 2025](#)) and less so on fully online learning contexts. There remains a gap in understanding need frustration profiles in e-learning: do some online learners experience universally high frustration across all needs, while others feel relatively little frustration? How prevalent are these profiles, and what characterizes the learners within them? Addressing this gap, our first aim is to conduct an LPA on e-learners' autonomy, competence, and relatedness frustration to determine whether distinct profiles (e.g., "high frustration" vs. "low frustration" groups) exist in an online learning sample. Therefore, it can be assumed that at least two distinct profiles ("high frustration" vs. "low frustration" groups) would emerge in an online learning sample.

Expectancy–value theory: task value, self-efficacy, and goal orientation

EVT proposes that learners' achievement behaviors are jointly determined by their expectancy beliefs (e.g., self-efficacy) and the value they place on tasks ([Eccles and Wigfield, 2002, 2023](#); [Wigfield and Eccles, 2000](#)). Learners are more likely to engage and persist when they believe they can succeed and see tasks as valuable, interesting, or important ([Lee and Song, 2022](#); [Wang and Xue, 2022](#)). In other words, EVT suggests that students' achievement behaviors are driven by their expectancy of success (self-efficacy beliefs about their capabilities) and the value they attach to the task. Therefore, key constructs include self-efficacy, which can include confidence in one's ability to learn or perform well, to master online course demands, and task value, which can encompass the perceived importance, usefulness, or interest of the learning task, course content and activities. Previous studies found that students who strongly believe they can succeed (high expectancy) and who find the learning task valuable or interesting (high value) are more likely to engage persistently and perform better ([Eccles and Wigfield, 2020, 2023](#); [Lee and Song, 2022](#); [Rachmatullah et al., 2021](#); [Wang and Xue, 2022](#); [Wigfield and Eccles, 2000](#)). Yet online environments can undermine these beliefs: reduced feedback, ambiguous expectations, and technological hurdles may erode efficacy and perceived value over time ([Xu, 2022](#)). The absence of immediate feedback or richer communication cues may undermine students' sense of efficacy (if they are unsure how to gauge their progress) and may diminish perceived task value or interest over time ([Hartnett, 2015](#); [Hartnett et al., 2023](#)). At the same time, there is considerable individual variability: some e-learners maintain high self-efficacy and value for their online coursework, whereas others struggle ([Hartnett et al., 2023](#); [Noour and Hubbard, 2015](#)). Theoretically, learners with high self-efficacy and interest might better cope with challenges, potentially buffering against subjectively perceived incompetence or disconnection (i.e., less need frustration), and learners with low confidence or low task value might be more prone to frustration, as they struggle to see progress or purpose in the online tasks, but these questions still are under-researched.

Goal orientation, especially extrinsic goal orientation, is another motivational dimension linked to EVT and SDT. Extrinsic goal

orientation refers to the extent to which learners engage in learning for external reasons, primarily to obtain external outcomes (grades, rewards, approval, recognition) rather than for inherent interest or mastery ([Patrick et al., 1999](#); [Wolters et al., 1996](#); [Zhou and Zhang, 2024](#)). In the context of EVT, an extrinsically oriented student may value a task mainly as a means to an end (e.g., a high grade), not for the task itself. This construct also intersects with SDT: extrinsic goal orientation can be seen as a form of controlled motivation, often associated with external regulation or introjected pressure that tend to undermine autonomy satisfaction ([Ryan and Deci, 2000](#); [Zhou and Zhang, 2024](#)). Students with more intrinsic or mastery-oriented goals (focusing on learning and personal growth) might better fulfill their needs even online, as they engage out of genuine interest and seek understanding. In contrast, extrinsic goal orientation is related to surface learning strategies, anxiety, and lower engagement: e-learners who are strongly extrinsically oriented could experience greater frustration of autonomy and competence, for example, feeling pressured to achieve (undermining autonomy) and fearing failure (undermining competence), especially in an online setting where they have less guidance ([Abdolrezapour et al., 2023](#); [Wolters et al., 1996](#); [Xu, 2022](#); [Zhou and Zhang, 2024](#)).

Contemporary views of learning emphasize online learners' active role in directing and co-constructing knowledge ([Bayly-Castaneda et al., 2024](#); [Chou and Liu, 2005](#); [Forbes et al., 2023](#); [Huang and Wang, 2023](#); [Salikhova et al., 2020](#); [Schneider, 2024](#)). Self-directed learning involves setting one's own goals, monitoring progress, and regulating strategies ([Geng et al., 2019](#); [Karatas and Arpaci, 2021](#); [Rini et al., 2022](#); [Tekkol and Demirel, 2018](#); [Timothy et al., 2010](#)). Collaborative learning involves working with peers to share perspectives and solve problems, and in ICT-rich environments, these processes may occur via digital tools (e.g., forums, collaborative documents, video conferencing) ([Loes, 2022](#); [Makransky and Petersen, 2023](#); [Qureshi et al., 2023](#); [Yang, 2023](#)). Engaging in self-directed and collaborative learning may help learners constructively navigate online tasks, potentially buffering against need frustration ([Geng et al., 2019](#); [Karatas and Arpaci, 2021](#); [Wang et al., 2023](#)). However, despite research on intrinsic and extrinsic motivation in online education ([Zhou and Zhang, 2024](#)), it is unclear how task value and goal orientation are related to basic psychological needs. Based on previous research, it can be presumed that basic needs' frustration is related to lower task value and self-efficacy, higher extrinsic goal orientation, lower self-directed and collaborative learning tendencies.

Attentional control as a self-regulatory resource

E-learning environments overrun learners with potential distractions: multiple browser tabs, notifications, and home-based interruptions. In this context, attentional control is an important self-regulatory resource ([Derryberry and Reed, 2002](#); [Eysenck et al., 2007](#); [Eysenck and Derakshan, 2011](#); [Green and Bavelier, 2012](#); [Blanco et al., 2023](#)). In addition to motivational beliefs and goals, attentional control is a self-regulatory capacity to focus and sustain attention on relevant tasks and to shift attention flexibly that may impact e-learning experiences ([Clement and Anderson, 2023](#); [Green and Bavelier, 2012](#)). Attentional control refers to an individual's ability to focus and sustain attention on relevant tasks and to shift attention effectively when needed, and in a traditional classroom, external structure and cues from instructors can help

students maintain attention. Online, however, learners often face a multitude of distractions (e.g., other browser tabs, notifications, home environment disturbances) and must exert greater conscious control to stay focused (Bavelier and Green, 2019; Khasawneh et al., 2025). Learners with strong attentional control can maintain focus, resist distractions, and keep up with online demands, and those with poor attentional control are more prone to mind-wandering, multitasking, and procrastination (Blanco et al., 2023; Daniel et al., 2020; du Rocher, 2020; Filičková et al., 2015; Green and Bavelier, 2012; Ínal et al., 2023; Meinhardt and Grabbe, 2002; Turoman et al., 2021).

Presumably, attentional control has an indirect but significant relationship with need frustration: low attentional control could intensify feelings of incompetence (as the learner struggles to absorb content or finish tasks, undermining competence need) and even relatedness (if distraction leads to missed communications, deadlines or a sense of disconnection). Additionally, an unfocused learner might feel less autonomy, as they cannot manage their learning time effectively and feel controlled by distractions or deadlines. Empirical evidence in online education suggests that students who report difficulty concentrating indeed have lower satisfaction and higher stress in virtual courses (Staller et al., 2021; Wong, 2020; Blanco et al., 2023). Conversely, those with good attentional regulation skills tend to achieve better learning outcomes online (Hodis et al., 2023) and may navigate the online environment with less frustration (Bavelier and Green, 2019; Eysenck et al., 2007; Green and Bavelier, 2012; Henriksen et al., 2023). Therefore, it can be assumed that difficulties in attentional control are linked to basic psychological needs frustration.

Hypotheses

Based on SDT and prior research (Krijgsman et al., 2025; Xu, 2022), we presumed (H1) there are at least two groups of online learners: a “High Need Frustration” profile and a “Low Need Frustration” profile. We also hypothesized that (H2) basic needs’ frustration is related to lower task value and self-efficacy, higher extrinsic goal orientation, lower self-directed and collaborative learning tendencies, and that (H3) difficulties in attentional control are linked to basic psychological needs frustration. In the binominal logistic regression model, we expected extrinsic goal orientation and attentional control to emerge as especially strong predictors of profile membership.

The present study

The present study integrates SDT and EVT perspectives with the purpose to identify latent profiles of basic psychological need frustration (autonomy, competence, relatedness) in online learning contexts using latent profile analysis and to examine which motivational beliefs and self-regulatory variables, including task value, self-efficacy, extrinsic goal orientation, self-directed learning (with and without ICT), collaborative learning (with and without ICT), and attentional control, predict profile membership when considered simultaneously in a binomial logistic regression model. The overall aim of the study is to contribute to better understanding of online learners’ psychological need frustration in learning settings, by integrating the self-determination theory, expectancy - value theory, contemporary perspectives on self-directed and collaborative learning, and research on attentional control into a unified framework.

Method

Participants

Participants were university learners enrolled in online or blended courses at large higher education institutions in Vilnius, Lithuania. Initially, 749 learners completed at least part of the survey. After screening careless and invalid responses (e.g., excessive missing data, invariant responding), cases were removed, resulting in an analytic sample of $n = 541$. Age of the learners ranged from 18 to 64 years ($M = 26.37$, $SD = 8.61$), with a positively skewed distribution (skewness = 1.19, kurtosis = 0.72), reflecting a predominance of younger adults but with some older learners as well. Students were drawn from a variety of academic majors and were taking at least one course delivered fully online at the time of the study. The ethnic composition was not formally recorded, but the sample was predominantly European (Baltic) with no representation of other groups.

Procedure

The study was approved by the Institutional Review Board of Klaipėda University (Approval No. STIMC-BMTEK-P03, April 12, 2021). Data collection ended in November 2024. Participants were recruited via announcements in online class forums and email invitations and voluntarily provided their consent. Following informed consent, interested learners were directed to a web-based survey. To encourage honest responding, participants were assured that their answers were confidential, that participation was voluntary, and that data would be used only for research. Questionnaire sections were presented in randomized order (except for demographics, which appeared last) to reduce order effects.

Measures

Basic psychological need frustration, motivated approaches to learning, and attentional control were assessed with established self-report questionnaires.

Need frustration was assessed using the BPNSFS (Basic Psychological Need Satisfaction and Frustration Scale (BPNSNF), 2022; Chen et al., 2015), developed within self-determination theory. We utilized the frustration subscales of the BPNSFS, which contain 4 items per need (12 items total) that capture experiences of need thwarting: autonomy frustration—experiencing pressure, coercion, or a sense of being forced to behave in certain ways; competence frustration—feeling ineffective, incapable, or overwhelmed by demands; relatedness frustration—feeling rejected, excluded, or disconnected from significant others. Items are answered on a 5-point agreement scale (1–5), with higher scores indicating stronger agreement with the statement, or greater frustration of the respective need. Previous research reported good internal consistencies for subscales (α commonly around 0.70–0.88). In this study, each subscale showed good internal consistency ($\alpha \approx 0.80$ –0.85).

Motivational beliefs were measured using Motivated Self-Directed Learning and Collaborative Learning Questionnaire (MSDLCL) (Choy et al., 2016; Wang et al., 2023), which measures task value (perceived importance and usefulness of the learning activities), self-efficacy (confidence in one’s ability to succeed in the learning tasks), extrinsic goal orientation (emphasis on external outcomes such as grades, rewards, or approval), self-directed learning (SDL) (tendency

to plan, monitor, and regulate one's learning), self-directed learning with ICT (SDL-ICT) (using digital tools, e.g., online resources, learning platforms, to self-direct learning), collaborative learning (CL) (working with peers to understand course content), and collaborative learning with ICT (CL-ICT) (using ICT, e.g., discussion boards, video calls, collaborative documents for teamwork). The MSDLCL is a 28-item questionnaire organized into seven subscales, each comprising four items, rated on a 5-point Likert scale (1–5), with higher scores indicating stronger endorsement of the relevant motivational belief or learning behavior. Reliability estimates for the subscales in previous research typically ranged from $\alpha \approx 0.78$ to 0.85, indicating adequate internal consistency across the dimensions (Choy et al., 2016; Wang et al., 2023). In this study, each subscale also showed good reliability ($\alpha \approx 0.75$ –0.91).

Attentional control in the academic context was measured with items adapted from attentional control frameworks (Derryberry and Reed, 2002; Hodis and Hodis, 2025). The attentional control scale (ACS) comprises 20 items, rated on a 4-point Likert-type scale ranging from 1 to 4, with the original anchors typically described as almost never (1) to always (4). The scale assesses two components of attentional control: focusing and shifting. The ACS is most often used as a single composite score, representing overall self-regulatory control of attention. In their original work, Derryberry and Reed (2002) reported satisfactory internal consistency for the total scale and demonstrated that ACS scores moderated anxiety-related attentional biases in experimental cueing paradigms, supporting the construct and predictive validity of the measure. In the present study, the ACS was used as an indicator of students' perceived capacity to maintain and flexibly shift attention during academic activities, with higher scores interpreted as reflecting more effective voluntary attentional control. Internal consistency was good ($\alpha = 0.88$). Reliability results for the scales/subscales are presented in Table 1.

Data analysis

Data was screened for outliers and missingness and were handled using listwise deletion. For the LPA, the three need frustration variables were z-standardized to place them on a common metric. For logistic regression, continuous predictors (task value, self-efficacy, extrinsic goal orientation, SDL, SDL-ICT, CL, CL-ICT, attentional control) were standardized to aid interpretation of coefficients.

Statistical analyses were conducted in JAMOVI 2.6. LPA used the tidyLPA package, with some model comparisons aided by the snowRMM module for JAMOVI (Bauer, 2022; Sequeira and Borges, 2024; Rosenberg et al., 2021). We conducted LPA on the three need frustration indicators (autonomy, competence, relatedness) to identify latent subgroups of learners with similar frustration patterns. Models specifying 1 to 4 latent classes were estimated, and we compared models using multiple indices: Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), sample-size adjusted BIC (SABIC), entropy, and the Bootstrap Likelihood Ratio Test (BLRT). Lower AIC/BIC and significant BLRT *p*-values indicate better fit.

After selecting the optimal profile solution and assigning each student to the profile with highest posterior probability, we used binomial logistic regression to predict profile membership (High vs. Low Need Frustration). The dependent variable was coded such that 1 = High Need Frustration and 2 = Low Need Frustration (for interpretability, we report results where positive coefficients indicate greater odds of being in the low-frustration profile). Predictors were

TABLE 1 Reliability (Cronbach's α) for study variables.

Variable	Example item	α
Attentional control	"I can quickly switch from one task to another."	0.88
Autonomy frustration	"I feel forced to do many things I would not choose to do."	0.82
Competence frustration	"I feel discouraged about my abilities in my studies."	0.85
Relatedness frustration	"I feel excluded from the group I want to belong to."	0.80
Collaborative learning (CL)	"I enjoy working with classmates on course tasks."	0.80
Collaborative learning with ICT	"I use online tools to work with classmates on assignments."	0.84
Extrinsic goal orientation	"Getting a good grade is the most satisfying thing for me."	0.75
Self-directed learning (SDL)	"I set my own study goals for this course."	0.79
Self-directed learning with ICT	"I use online resources to plan my own learning."	0.81
Self-efficacy	"I'm confident I can understand the most complex material."	0.91
Task value	"I find the course material useful for me to learn."	0.87

Higher scores indicate greater levels of the construct.

task value, self-efficacy, extrinsic goal orientation, SDL, SDL-ICT, CL, CL-ICT, and attentional control. All predictors were entered simultaneously to estimate unique effects. Multicollinearity was evaluated via VIFs and tolerance; all VIFs were below 3 (tolerances ≥ 0.34), indicating acceptable levels of predictor overlap. Residual and influence diagnostics showed no problematic outliers or high-leverage cases.

Results

Descriptive statistics for the study variables (Table 2) shows that, on average, learners reported comparatively low to moderate levels of need frustration: autonomy frustration $M \approx 2.7$ ($SD \approx 0.9$), competence frustration $M \approx 2.6$ ($SD \approx 1.0$), and relatedness frustration $M \approx 2.1$ ($SD \approx 0.9$) on 1–5 scales, all below the midpoint. The results suggest that, in general, relatedness needs were less thwarted than autonomy or competence in the online context, though there was considerable variability ($SDs \sim 0.9$). In addition, motivational beliefs were generally positive: mean task value was high (3.29/5), indicating that learners typically perceived their online coursework as useful and important. Self-efficacy was above the scale midpoint (3.61/5), suggesting moderate to high confidence in managing online demands. Extrinsic goal orientation was also relatively high (3.2/5), reflecting a

TABLE 2 Descriptive statistics for the study variables.

Variable	Mean	SD	Skewness	Kurtosis
Attentional control	2.60	0.45	0.03	-0.08
Autonomy frustration	2.64	0.87	0.24	-0.43
Competence frustration	2.60	1.01	0.26	-0.78
Relatedness frustration	2.15	0.87	0.70	0.06
Collaborative learning	3.33	0.95	-0.36	-0.21
Collaborative learning with ICT	3.12	0.97	-0.22	-0.38
Extrinsic goal orientation	3.20	0.92	-0.15	-0.26
Self-directed learning	3.57	0.80	-0.44	0.27
Self-directed learning with ICT	3.91	0.73	-0.71	0.92
Self-efficacy	3.61	0.78	-0.40	0.30
Task value	3.29	0.75	-0.39	0.46

strong emphasis on grades and external outcomes for many learners. Self-directed and collaborative learning tendencies were in the mid-to-high range (means in the mid-3 s), with somewhat higher endorsement of self-directed learning with ICT than without. Attentional control had a mean in the mid-range (2.6/5). Skewness values for the variables mostly fell within ± 1 , and kurtosis values were close to zero, supporting the use of parametric analyses.

The descriptive results set the stage for profile analysis: we expected that students who cluster in a high need frustration profile might be those with lower task motivation and more attention problems, whereas those in a low frustration profile might be more confident and focused.

To test H1, which presumed that at least two groups would emerge (a “High Need Frustration” profile and a “Low Need Frustration” profile) based on three continuous indicators of autonomy, competence, and relatedness frustration, a Latent Profile Analysis (LPA) was performed using the tidyLPA. Across the four estimated models, fit indices indicated that Model 6 (two-class solution with the most flexible parameterization) showed the most favorable fit. Specifically, Model 6 yielded the lowest AIC (4,678.00), AWE (4,944.00), BIC (4,764.44), CAIC (4,783.44), CLC (4,641.62), KIC (4,700.00), SABIC (4,703.96), and the highest ICL (-4,950.38, less negative than alternative models), indicating a superior balance between model fit and parsimony relative to the other two-class parameterizations. In addition, an analytic hierarchy process based on multiple fit indices (AIC, AWE, BIC, CLC, and KIC) also supported Model 6 as the optimal solution. The selected model’s log-likelihood was -2,320.00, with AIC = 4,678.00, AWE = 4,944.00, BIC = 4,764.44, CAIC = 4,783.44, CLC = 4,641.62, KIC = 4,700.00, SABIC = 4,703.96, and ICL = -4,950.38. Entropy, a measure of classification precision ranging from 0 to 1, was acceptable

at 0.72, indicating reasonably good separation between classes. The minimum and maximum posterior classification probabilities were 0.91 and 0.93, respectively, suggesting that individuals were assigned to profiles with high certainty on average. The BLRT (BLRT = 484.77, $p = 0.0099$) indicated that the two-class solution provided a significantly better fit than a more parsimonious model (e.g., a single-class solution), further justifying the retention of two latent profiles. The main fit indices are displayed in Table 3.

Because Model 6 provided the best global fit, all subsequent interpretations are based on this two-class solution. In this model, the variances of the three indicators were constrained to equality across classes and were all statistically significant: autonomy frustration variance = 0.52, $SE = 0.04$, $p < 0.001$; relatedness frustration variance = 0.43, $SE = 0.03$, $p < 0.001$; competence frustration variance = 0.48, $SE = 0.04$, $p < 0.001$. The corresponding standard deviations were approximately 0.72, 0.65, and 0.70, respectively, indicating moderate within-class variability around the profile means.

The line plot demonstrating the LPA results is presented in Figure 1.

The two identified latent profiles can be characterized by markedly different levels of basic psychological need frustration (Table 4). For interpretative clarity, we label the profiles based on the relative magnitude of the three frustration dimensions.

The first profile (Class 1, High Need Frustration), comprising approximately 43.5% of the sample, was characterized by relatively elevated levels of frustration across all three psychological needs. The estimated means for this class were 3.21 for autonomy frustration ($SE = 0.06$, $p < 0.001$), 2.81 for relatedness frustration ($SE = 0.08$, $p < 0.001$), and 3.43 for competence frustration ($SE = 0.07$, $p < 0.001$). Given that scale midpoints in basic need frustration measures are typically near 3 on a 5-point scale, these values suggest that students in this profile tend to experience their learning context as moderately to strongly frustrating of their autonomy and competence, and moderately frustrating of their relatedness. The relatively high mean of competence frustration is particularly marked, indicating that students in this profile feel ineffective, or blocked in demonstrating competence in their studies.

The second profile (Class 2, Low Need Frustration), representing approximately 56.5% of the sample, was characterized by comparatively low levels of need frustration. The estimated means were 2.21 for autonomy frustration ($SE = 0.05$, $p < 0.001$), 1.65 for relatedness frustration ($SE = 0.04$, $p < 0.001$), and 1.96 for competence frustration ($SE = 0.07$, $p < 0.001$). These means are clearly below the scale midpoint, indicating that students in this group experience relatively little frustration of autonomy, competence, and relatedness in the context of their studies.

Because the variances of the indicators were constrained to be equal across classes, within-class dispersion around the profile means was comparable in both groups (autonomy frustration variance = 0.52, relatedness frustration variance = 0.43, competence frustration variance = 0.48; all $ps < 0.001$). This constraint facilitates a cleaner interpretation of the profiles as primarily differing in mean levels (i.e., severity of frustration) rather than variability. Overall, the two-profile solution reveals a clear differentiation between students who experience the learning environment as comparatively need-thwarting versus those who experience relatively low levels of psychological need frustration.

After identifying the two latent profiles, we examined how motivational beliefs (H2) and attentional control (H3) predicted

TABLE 3 Fit indices for alternative two-class latent profile models.

Model	Classes	LogLik	AIC	AWE	BIC	CAIC	CLC	KIC	SABIC	ICL	Entropy
1	2	-2472.32	4965.0	5104.0	5009.87	5019.87	4946.08	4977.63	4978.12	-5145.29	0.72
2	2	-2420.00	4867.0	5048.0	4926.00	4939.00	4842.00	4883.00	4884.00	-5037.00	0.77
3	2	-2390.00	4806.0	4988.0	4865.00	4878.00	4782.00	4822.00	4823.60	-5047.00	0.64
6	2	-2320.00	4678.0	4944.0	4764.44	4783.44	4641.62	4700.00	4703.96	-4950.38	0.63

Lower values on AIC, AWE, BIC, CAIC, CLC, KIC, SABIC, and ICL indicate better fit. The best-fitting model (Model 6) showed the lowest values across the majority of indices.

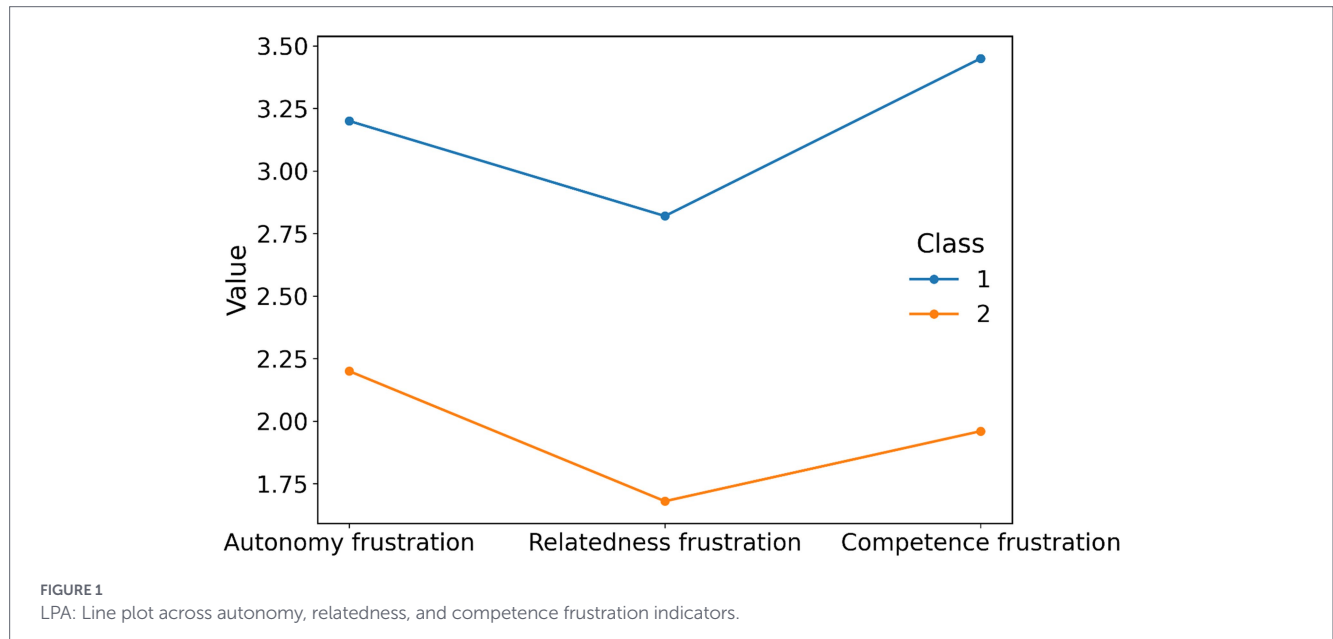


TABLE 4 Latent profile means and variances for autonomy, relatedness, and competence frustration.

Class	Latent profile label	Autonomy frustration M (Var)	Relatedness frustration M (Var)	Competence frustration M (Var)	Approx. class proportion
1	High need frustration	3.21 (0.52)	2.81 (0.43)	3.43 (0.48)	0.43
2	Low need frustration	2.21 (0.52)	1.65 (0.43)	1.96 (0.48)	0.57

Variances were constrained to equality across classes.

membership in the High Need Frustration versus Low Need Frustration groups. A binomial logistic regression was conducted with latent profile membership as the dependent variable. The predictors included task value, self-efficacy, extrinsic goal orientation, self-directed learning, self-directed learning with ICT, collaborative learning, collaborative learning with ICT, and attention control. All predictors were entered simultaneously into the model. The omnibus likelihood ratio test yielded $\chi^2(8) = 22.30, p = 0.004$, indicating that the set of predictors jointly differentiated between membership in the High and Low Need Frustration classes. All variance inflation factors (VIFs) ranged between 1.17 and 2.92, well below conventional thresholds for concern (e.g., $VIF > 5$ or 10), suggesting that the logistic regression coefficients are stable and not unduly distorted by redundancy among predictors. The AIC for the fitted model was 730 and the BIC was 768. McFadden's pseudo- R^2 was 0.0304. This effect size is modest, and it suggests that the model represents only part of a

broader constellation of factors associated with students' experiences of need frustration.

Table 5 presents the logistic regression coefficients, standard errors, Wald z statistics, p values, odds ratios, and 95% confidence intervals for the odds ratios. Two predictors emerged as statistically significant: extrinsic goal orientation and attentional control. The remaining predictors, including task value, self-efficacy, self-directed learning, self-directed learning with ICT, collaborative learning, and collaborative learning with ICT, did not reach conventional levels of statistical significance.

Extrinsic goal orientation was a significant negative predictor of membership in the Low Need Frustration profile relative to the High Need Frustration profile. The regression coefficient for extrinsic goal orientation was $B = -0.36, SE = 0.11, z = -3.33, p < 0.001$. The corresponding odds ratio was 0.70, with a 95% confidence interval of [0.56, 0.86]. This indicates that for each one-unit

TABLE 5 Binomial logistic regression predicting membership in the low vs. high need frustration profiles (membership = 2 vs. 1).

Predictor	<i>B</i>	<i>SE</i>	<i>z</i>	<i>p</i>	Odds ratio	95% CI for OR (Lower, Upper)
Intercept	1.92	0.74	2.59	0.010	6.85	[1.59, 29.47]
Attentional control	-0.60	0.24	-2.53	0.011	0.55	[0.35, 0.88]
Extrinsic goal orientation	-0.36	0.11	-3.33	< 0.001	0.70	[0.56, 0.86]
Collaborative learning	-0.16	0.17	-0.94	0.347	0.86	[0.62, 1.18]
Collaborative learning with ICT	0.24	0.16	1.47	0.141	1.27	[0.93, 1.73]
Self-efficacy	0.08	0.15	0.51	0.610	1.08	[0.81, 1.45]
Self-directed learning	-0.19	0.15	-1.22	0.222	0.83	[0.62, 1.12]
Self-directed learning with ICT	0.12	0.15	0.77	0.443	1.13	[0.83, 1.52]
Task value	0.26	0.16	1.58	0.113	1.29	[0.94, 1.78]

Dependent variable coded as 2 = Low Need Frustration, 1 = High Need Frustration. $N = 541$. McFadden's $R^2 = 0.0304$; $\chi^2(8) = 22.30$, $p = 0.004$; AIC = 730; BIC = 768.

increase in extrinsic goal orientation, the odds of belonging to the Low Need Frustration class (Class 2) versus the High Need Frustration class (Class 1) decrease by about 30%. Stated differently, higher endorsement of extrinsic goals, such as studying primarily to obtain external rewards or avoid negative consequences, is associated with a greater likelihood of being in the class characterized by higher frustration of autonomy, competence, and relatedness.

Attentional control was also a significant negative predictor of membership in the Low Need Frustration class. The regression coefficient for attention control was $B = -0.60$, $SE = 0.24$, $z = -2.53$, $p = 0.011$, corresponding to an odds ratio of 0.55 [95% CI (0.35, 0.88)]. This indicates that higher levels of attention control are associated with lower odds of belonging to the Low Need Frustration class relative to the High Need Frustration class. Put differently, students who report greater perceived control over their attention and concentration are more likely to be in the profile characterized by higher psychological need frustration.

Discussion

Based on SDT, EVT, and previous research (e.g., Chiu, 2021, 2023; Evans et al., 2024; Hartnett, 2019; Hartnett et al., 2007; Herrera et al., 2021; Lawson and Mayer, 2024; Rovai and Wighting, 2005; Teuber et al., 2021; Vansteenkiste and Ryan, 2013; Wirzberger et al., 2024; Yan and Wang, 2021; Zhao et al., 2021; Zhou et al., 2021), the present study identified two latent profiles among online learners based on self-reported autonomy, competence, and relatedness need frustration. In this sample, roughly 44% of learners belonged to a High Need Frustration profile, experiencing frequent pressure, incompetence, and moderate social disconnection, and the remaining 56% formed a Low Need Frustration profile, with relatively little frustration of any need. This binary split echo prior person-centered research on online learner motivation (Maddens et al., 2023). In line with SDT, the high need frustration profile likely represents learners whose basic psychological needs are chronically thwarted, presumably contributing to maladaptive motivation outcomes (Rosli et al., 2022).

Competence frustration was highest in the High Frustration group, suggesting that feeling unable to master online course demands

may be a central source of distress. Relatedness frustration was also elevated in this group, reflecting the social challenges of online learning (Bowers and Kumar, 2015; Krijgsman et al., 2025), but it was somewhat less extreme than competence frustration. In the Low Frustration group, relatedness frustration was particularly low, implying that these learners either managed to maintain adequate social connections (e.g., through online interaction) or were less dependent on in-course relationships to feel satisfied. Besides, we did not find more complex profiles (e.g., high competence but low relatedness frustration), and this may reflect moderately strong correlations among need frustration in our data and the possibility that when online learning environments are problematic, they tend to thwart multiple needs simultaneously (e.g., rigid designs can limit choice, obscure competence feedback, and reduce social presence) (Krijgsman et al., 2025).

Although we did not measure basic needs satisfaction directly, the findings suggest that learners in the Low Frustration profile experienced at least moderate autonomy, competence, and relatedness, and this aligns with research indicating that distance learning is not inherently demotivating; when courses are well-designed and need-supportive, many learners can thrive (Hu and Xiao, 2025; Müller et al., 2021; Maddens et al., 2023). Recent work by Hu and Xiao (2025) draws attention to that online learning engagement is jointly shaped by learner factors (e.g., motivation, self-directed strategies) and environmental variables (e.g., task design, interaction opportunities), and our findings suggest that learners in the low need frustration profile can perceive a learning environment as need-supportive, which can foster autonomous motivation and well-being (Alonso et al., 2023).

A key contribution of this study is the examination of motivational and cognitive correlates from both SDT and EVT frameworks and the demonstration that extrinsic goal orientation is a robust correlate of need frustration profiles. Out of several predictors considered – extrinsic goal orientation, task value, self-efficacy, self-directed learning, collaborative learning, only extrinsic goal orientation significantly differentiated profile membership. Learners with a stronger extrinsic goal orientation were substantially more likely to belong to the high need frustration group, and from an SDT perspective, this pattern is theoretically coherent: extrinsic goal orientation (a focus on external rewards or grades) is a hallmark of controlled motivation in SDT, which often arises when autonomy and intrinsic interest are low (Ryan and Deci, 2020; Zhou and Zhang, 2024). Controlled motivational orientations, such as extrinsic goals centered on grades or

external approval, are associated with higher pressure, internal tension, and vulnerability to need frustration (Lim and Yeo, 2021; Zhou and Zhang, 2024). When learners drive themselves primarily for external outcomes, they may overlook intrinsic interest (Hartnett, 2019; Nagle, 2021; Hu and Xiao, 2025), feel compelled rather than autonomous, and adopt surface learning strategies. Besides, previous studies found that in e-learning contexts extrinsically regulated goals correlate with higher stress and lower well-being (Li et al., 2024; Rosli et al., 2022). In addition, prior research affirmed that intrinsically motivated students experience less anxiety and distress and show greater engagement, whereas those driven by external rewards alone are more prone to negative emotions and burnout when the learning context is unsupportive (Hu and Xiao, 2025; Ingavélez-Guerra et al., 2023; Maddens et al., 2023). The findings of this study also support the idea that strongly extrinsically oriented online learners are more likely to inhabit a “need-thwarting” profile and resonate with Rosli et al.’s (2022) observation that uncontrolled extrinsic drives could easily turn into amotivation if needs are unmet (Rosli et al., 2022).

The second key finding of this study concerns attentional control: learners in the High Frustration profile reported markedly less difficulty sustaining attention during online study than those in the Low Frustration profile, and attentional control remained a significant predictor of profile membership in the logistic regression. This finding is counterintuitive in light of prevailing theories, as both SDT and EVT would predict that students experiencing severe frustration of their basic needs (autonomy, competence, relatedness) or low motivation would show decrements in self-regulatory capacities like attentional control (Hodis and Hodis, 2025).

SDT research generally links psychological need frustration with diminished energy, poorer cognitive self-regulation, and disengagement, whereas need satisfaction is thought to fuel effective concentration and engagement (Bates, 2025; Campbell et al., 2018; Costa et al., 2016; Rosli et al., 2022), and from an EVT perspective, students who lack fulfillment of needs or who feel devalued/inefficacious tend to have lower expectancies and task values, which can translate into lower persistence and focus. Typically, students experiencing high levels of psychological need frustration would be expected to demonstrate lower attentional control, rather than higher. The present result suggests that strong attentional control can co-occur with high psychological need frustration, which means that high-frustration group students, despite feeling autonomy-deprived or under extreme performance pressure, nonetheless force themselves to concentrate. Their strong attentional control might reflect discipline in service of controlled motivation: they remain focused on academic tasks because they feel they “have to” (to avoid punishment, failure, or guilt) rather than because they “want to.” In other words, a controlling environment can co-exist with high attentional focus, but that focus is tension-filled and not accompanied by the usual positive outcomes of autonomous engagement. This aligns with prior observations that when autonomy needs are thwarted, engagement often feels conflicted and pressured (Hartnett, 2015; Hodis and Hodis, 2025; Vansteenkiste et al., 2004). Over time, this pattern could contribute to emotional strain or burnout. In addition, presumably, faced with unfulfilled needs (lack of competence, social support, or autonomy), some students may redouble their effort and concentration as a way to regain a sense of efficacy or control. For instance, experimental work by Waterschoot et al. (2020) found that after

experiencing competence need frustration (via negative feedback), individuals high in resilience showed an attentional bias toward competence-related cues, which helped them recover their sense of competence over time (Waterschoot et al., 2020), and this suggests that directing attention can serve as a need-restoring coping strategy. By analogy, the high-frustration profile learners might be those who respond to need-thwarting environments by intensely focusing on their learning activities as a way to compensate; their strong attentional control may be a effortful strategy to cope with need frustration, and this compensatory focus could temporarily boost performance or persistence despite psychological distress. In addition, high-need-frustration students might have personality and motivational traits (like self-critical perfectionism or strong extrinsic goal orientation) that drive both their elevated focus and their discontent (Bates, 2025; Campbell et al., 2018). Perfectionistic students, for example, often set extremely high standards and maintain intense concentration on their goals, yet they also experience constant fear of failure and dissatisfaction (Herrera et al., 2021; Liu et al., 2024). This implies that learners who are attentive and driven to excel (never content with anything less than perfection) might indeed report high attentional control concurrently with high need frustration (Costa et al., 2016; Rosli et al., 2022). Such learners could be highly conscientious and focused yet internally distressed, feeling incompetent or unfulfilled despite their diligence. Overregulated students may appear remarkably focused, but their focus is fueled by unhealthy stress, perfectionism, or external pressure rather than intrinsic interest or joy in learning, and this could explain why their basic needs are frustrated even as they demonstrate strong attentional control. In sum, strong attentional control in the high-frustration group may reflect a form of controlled motivation which is known to diminish psychological well-being, even if it can sustain short-term performance.

Limitations, implications, and future directions

While this study offers some insights, it has several limitations. First, the use of cross-sectional self-report data means that a snapshot of students’ perceptions and motivations were captured at one point in time. Causal interpretations should therefore be made with caution. Longitudinal designs would help determine how frustration profiles evolve and whether, for instance, prolonged frustration leads to increasing amotivation or dropout. Experimental studies could also test the effectiveness of the recommended interventions (e.g., introducing an autonomy-supportive module and observing if previously frustrated learners shift to a more positive profile). Besides, the sample consisted of e-learners in a particular context; generalizability to other populations (such as K-12 online learners or corporate e-training participants) may be limited. Different age groups or cultural contexts might exhibit different profile structures or predictor effects. Future research should replicate the profile structure in diverse educational systems and course types, including fully asynchronous and synchronous formats. Future research could also compare profiles across diverse e-learning settings or examine additional predictors (e.g., perceived technological support, learning environment usability) which might also impact need frustration.

In this study, we focused on need frustration rather than need satisfaction, but the frustration is not merely the opposite of

satisfaction but a separate construct with its own outcomes (Bartholomew et al., 2011; Liu et al., 2024). It would be enlightening to investigate if a parallel person-centered approach on need satisfaction yields complementary profiles (perhaps mapping onto high vs. low thriving), and how those relate to our frustration-based profiles. This could deepen our understanding of the full spectrum of learner experiences.

Although the logistic model identified significant predictors, the explained variance was modest. This is common in educational and motivational research, but it shows that many other factors likely contribute to whether learners experience high or low need frustration. Integrating contextual measures (e.g., perceived instructor autonomy support, platform usability, gamification features) and personality traits (e.g., conscientiousness, neuroticism) may yield richer models.

In addition, in this study, we examined self-directed and collaborative learning tendencies, and did not directly measure actual behaviors (e.g., logged time on task, forum participation). Combining self-report with behavioral metrics from learning management systems could reveal how motivational profiles translate into concrete engagement patterns.

Despite limitations, this study contributes novel evidence to the literature on online learner motivation. By integrating SDT and EVT perspectives in a latent profile analysis, it provides a differentiated view of e-learners: not all online students are alike – some are navigating their courses with relative fulfillment and self-regulation, while others are caught in a cycle of thwarted needs and controlled motivation.

Future studies could incorporate measures of motivational quality (autonomous vs. controlled motivation) alongside attentional control to see how they interact in predicting need satisfaction or frustration. Longitudinal research can also test whether high-attentional-control, high-frustration students are at risk of burnout or academic maladjustment over time. Additionally, it would be important to investigate contextual moderators, such as the role of teacher or peer to peer support, learning environment variables, or parental pressure. Finally, research could explore the efficacy of interventions (e.g., self-compassion) that address the psychological need deficits of need-frustrated but focused students. Recognizing that strong attentional control can coexist with need frustration opens up new questions about individualized learning (Dietrich et al., 2021; Bayly-Castaneda et al., 2024) and possible contribution of educators and psychologists to supporting students in the online learning environments.

Practical recommendations

Based on the findings of this study, the following practical recommendations can be suggested to educators, instructional designers, and policymakers.

Prioritizing need-supportive instructional design

Since nearly half of the learners reported high frustration of basic psychological needs, particularly autonomy, course designers and instructors should integrate autonomy-supportive practices into online curricula, e.g., offering meaningful choices in tasks, deadlines, and learning pathways, framing learning activities with rationales to help students understand their value, avoiding overly controlling language. Instructors should be not only content experts but also motivation-sensitive facilitators, trained to recognize signs of need frustration (e.g., disengagement,

rigid overperformance, help-seeking avoidance) and create environments that validate student agency, capability, and connection.

Shifting focus from outcomes (grades, rankings) to processes (learning, mastery)

The finding that extrinsic goal orientation is a strong predictor of high need frustration suggests that environments that overemphasize grades, rewards, or competition may contribute to psychological tension. Therefore, we recommend emphasizing intrinsic values of course content (e.g., real-world relevance) and de-emphasizing performance-based comparisons. Assessment systems could incorporate formative assessments that emphasize growth over outcomes, provide feedback that is informative rather than judgmental.

Monitoring attentional control in digital learning

While attentional control is typically seen as a self-regulatory strength, this study indicates that high attentional control can co-occur with elevated need frustration, possibly reflecting pressure-driven or perfectionistic engagement. Therefore, educators should encourage balanced approaches to study, promoting not just focus but also rest, healthy motivation, and self-compassion.

Identifying high-risk learners and providing relevant interventions

Given that a part of learners falls into a High Need Frustration profile, institutions could implement early detection mechanisms, such as periodic surveys or learning analytics to flag students showing signs of over-engagement or disengagement. Targeted interventions can help students adjust their motivational orientation or study strategies before burnout or dropout. Intervention programs should address both motivation quality (supporting autonomy, competence, and relatedness) and regulation style (ensuring attentional control is healthy and self-endorsed).

Conclusion

This study demonstrates that online learners are far from uniform in frustration of their basic psychological needs.

The present study presumed (H1) there are at least two groups of online learners: a “High Need Frustration” profile and a “Low Need Frustration” profile, and this was confirmed. The findings identified two latent profiles among online learners based on self-reported autonomy, competence, and relatedness need frustration. Roughly 44% of learners belonged to a High Need Frustration profile.

It was also hypothesized (H2) that basic needs’ frustration is related to lower task value and self-efficacy, higher extrinsic goal orientation, lower self-directed and collaborative learning tendencies, and this was partially confirmed. Only extrinsic goal orientation significantly increased the likelihood of belonging to the High Need Frustration profile.

The study also assumed that (H3) difficulties in attentional control are linked to basic psychological needs frustration. The findings showed that attentional control is a significant predictor of membership in the High Need Frustration group.

The findings reinforce SDT's claim that controlled motivation is a risk factor for need frustration and extend prior work by highlighting attentional control as an additional vulnerability in digital learning contexts.

Data availability statement

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

Ethics statement

The studies involving humans were approved by Institutional Review Board of Klaipeda University (Approval No. STIMC-BMTEK-P03, April 12, 2021). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AD: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. APe: Methodology, Writing – review & editing. APa: Formal analysis, Writing – review & editing. ŽS-P: Writing – review & editing. JŠ: Writing – review & editing.

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