Engagement factors affect academic success through study approaches among physical education and sport university students: a mediation analysis

Amayra Tannoubi[1,2], Tore Bonsaksen[3,4]*, Gry Mørk[3],
Farruh Ahmedov[5], Edi Setiawan[6] and Fairouz Azaiez[1]

[1]Department of Education, High Institute of Sport, and Physical Education of Gafsa, University of
Gafsa, Gafsa, Tunisia, [2]Research Unit: Sports Science, Health and Movement, UR22JS01, University of
Jendouba, El Kef, Tunisia, [3]Department of Health, Faculty of Health Studies, VID Specialized University,
Stavanger, Norway, [4]Department of Health and Nursing Sciences, Faculty of Social and Health
Sciences, University of Inland Norway, Elverum, Norway, [5]Department of Physical Education,
Samarkand State University, Samarkand, Uzbekistan, [6]Faculty of Teacher Training and Education,
Suryakancana University, Cianjur, Indonesia

Introduction: University students should engage with the study and ensure they adopt productive study approaches, but the nature of relationships between engagement and study approaches are under-researched. The study aimed to investigate how emotional, cognitive, and behavioral engagement affect academic success through study approaches among physical education and sports students.

Methods: Online forms were submitted by 488 students in physical education and sports (age range 19–25 years, Mean = 21 ± 1.5 year). They completed surveys regarding their academic engagement, study approaches, and grade point average (GPA). Analyses of associations were conducted through linear regression analysis and mediation analysis.

Results: Results from the linear regression analysis showed correlations between academic engagement factors, study approach variables, and GPA, with higher GPA correlating with higher scores on behavioral engagement, cognitive engagement, surface theory task, and deep theory task, and with lower scores on surface practical task. The analysis of total and direct effects revealed positive associations between all academic engagement factors and GPA. Emotional engagement exhibited a positive association with GPA mediated by study approaches. All engagement dimensions appear to influence academic success among these students.

Conclusion: The influence of emotional engagement on academic success appears in part to be operating through its effects on study approaches. The study can enable educators in monitoring and enhancing student engagement, thereby supporting students in their pursuit of high academic performance in physical education and sport.

KEYWORDS

emotional engagement, practical task, theoretical task, grade point average, predictor,
mediator

Introduction

Academic success remains a persistent issue for educators and scholars due to its intricate and multifaceted nature, which is shaped by a range of institutional, individual, and situational factors (Alyahyan and Düştegör, 2020; Kappe and van der Flier, 2012). Research indicates that intrinsic motivation (Trevino and DeFreitas, 2014), self-regulated learning (Young, 2005), and metacognitive abilities play a crucial role in determining students' academic achievements. Traditionally, academic success is illustrated by the Grade Point Average (GPA), a widely used metric that signifies the academic achievement of students, reflecting the accomplishment of educational objectives (Raju and Schumacker, 2015).

Academic achievement is influenced by a multitude of elements, encompassing engagement and approaches to learning (Niebaum and Munakata, 2023; Yang and Ogata, 2023; Tannoubi et al., 2023b). The concept of engagement has been widely examined within Engagement Theory, which posits that individuals are inclined to actively participate in their occupation under suitable circumstances (Kahn, 1990). Engagement can be conceptualized as a motivational construct and is characterized as the concurrent utilization and manifestation of an individual's "preferred self" in task-oriented behaviors that foster connections with work and colleagues, personal involvement (including physical, cognitive, and emotional aspects), and satisfaction with their position (Inceoglu and Fleck, 2010; Martin, 2009). Therefore, the motivated individual exhibits a high level of emotional and psychological engagement during the execution of their task (Schaufeli and Bakker, 2010). Additionally, in the context of educational environments, previous studies have defined engagement as the extent to which individuals demonstrate emotional, cognitive, and behavioral involvement in their education (Maroco et al., 2016; Preusche and Göbel, 2022; Li and Lerner, 2013).

Furthermore, research has demonstrated that the implementation of effective approaches to learning may significantly enhance student performance (Yoder and Hochevar, 2005; Freeman et al., 2014). The study approaches discussed in the literature are characterized as the strategies employed by students to effectively manage their study activities (Biggs et al., 2001; Byrne et al., 2002; Gijbels et al., 2005). Additionally, these approaches include the ways adopted by students to acquire, retain, and enhance their information with the aim of achieving improved learning outcomes and improved performance in examinations (Entwistle, 2001). Two separate types of study approaches have often been described, typically referred to as the "deep approach" and the "surface approach" (Biggs et al., 2001; Leung and Kember, 2003). The deep approach focuses on comprehending course content and making connections between concepts, whereas the surface approach relies on rote learning without engaging in self-reflection. The differentiation between the deep (DA) and surface (SA) approaches holds particular significance within the academic community as it aids in comprehending students' learning processes and facilitates the development of an appropriate educational setting.

Previous research has indicated that a favorable classroom climate has a positive impact on students' inclination to adopt a deep approach to learning (Poondej and Lerdpornkulrat, 2016; Englund et al., 2023; Postareff et al., 2015). Nevertheless, a recent investigation conducted among university students in physical education and sport expressed a need for more precision in examining the various approaches to study employed by these students (Tannoubi et al., 2022). Consequently, the research advised including dimensions that encompass both practical

and theoretical tasks related to each study approach. The study recognized the distinctive interdisciplinary character of physical education and sport (Cone et al., 2009; Kaittani et al., 2017), as well as the presence of a dual framework encompassing practical and theoretical activities within the education program. Proficiency in both practical and theoretical tasks is crucial to accomplishing success in the field (Tannoubi et al., 2022). Tannoubi et al. (2023b), Tannoubi et al. (2022), and Tannoubi et al. (2023a) also reported in their previous studies that academic achievement was influenced by academic engagement in all its dimensions, as well as by the use of different study processes.

Furthermore, due to the cognitive and emotional benefits of physical activity, there is growing evidence that it may have a substantial impact on academic achievement. For example, frequent exercise has been linked to enhanced executive functioning, working memory, attention, and processing speed—all of which are important for academic success (Erickson et al., 2019; Hillman et al., 2008). In addition, and regarding physical education and sport students, studies have shown that an active lifestyle influences academic performance (Singh et al., 2012; Klein and Hollingshead, 2015). As a result, the skills acquired in physical education and sport, such as discipline, teamwork and perseverance, can be transposed to academic settings.

Insufficient attention has been given to the engagement elements and study approaches in the field of physical education and sports, despite their significant relevance for the academic success of physical education students. Consequently, and according to our modest knowledge, there is a lack of understanding of the influence of cognitive, emotional, and behavioral engagement variables on students' academic success, as well as the mechanisms via which these effects are put into play. In the current study, we explore whether students' approaches to studying constitute such working mechanisms. Further, the current research combines social cognitive theory and self-determination theory as conceptual frameworks (Schunk, 2012; Teixeira et al., 2012). These concepts will provide us with the means to understand the complex dynamics between aspects of engagement, study approaches and academic outcomes in the distinct field of physical education and sport. The study aimed to investigate how the different factors of engagement (emotional, cognitive, and behavioral) affect academic success, both directly and indirectly through study approaches among physical education and sports university students.

To this end, we hypothesized the following:

H1: Engagement factors (emotional, cognitive and behavioral) directly affect academic success among physical education and sports university students.

H2: All engagement factors (emotional, cognitive and behavioral) indirectly affect academic success through study approaches among physical education and sports university students.

Materials and methods

Ethical statement

The study received ethical approval from the local ethics committee affiliated with the High Institute of Sport and Physical Education of El Kef, University of Jendouba, Tunisia, with reference number (n°04/2022), dated 25 January 2022. Furthermore, the study

procedures were consistent with the latest legal requirements outlined in the Declaration of Helsinki 2024 (World Medical A, 2024). Each participant completed an informed consent form. They were then asked to complete the surveys. Participation in the study was voluntary, and invited students did not have to state a reason for declining to participate.

Participants and data collection

A sample of 488 students from physical education and sport (PES) was recruited through a web-based survey to participate in the present study. The study's data collection period lasted 5 months, starting on January 30, 2022, and concluding on June 30, 2022, which was the day the institution's classes ended. All students were enrolled in the Bachelor of Physical Education program at the Institute of Physical Education and Sports in Kef, Tunisia. Students who failed to pass all exams were excluded from the study. An *a priori* power analysis was conducted, using the G*Power software (Version 3.1.9.7, University of Kiel, Kiel, Germany) and the *F*-test family (specifically, Linear multiple Regression: Fixed model, R^2 deviation from zero) (Faul et al., 2009). Based on the power analysis, it was determined that a minimum sample size of 119 participants would be sufficient to detect differences, given an effect size of $f^2 = 0.15$ and a significance level of $\alpha = 0.05$, while maintaining a power of 95%. The recruited individuals were extended invitations to participate in the study via Facebook or electronic mail obtained from the institution's administration. A total of 680 invitations were sent out. Five hundred and fifty-four students agreed to take part in the survey. After excluding students ($n = 66$) with a GPA below 10, data from 488 participants were retained. The electronic version of the questionnaire was disseminated through an online platform utilizing Google forms® (Google, California, USA). To minimize duplicate responses, the option of collecting participants' e-mail addresses was activated. This option allows only one response from the same address. In addition, the form was designed according to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2012).

Measures

In our study, gender and age were collected as basic sociodemographic characteristics.

The 20-item *Physical Education Study Process Questionnaire (PE-SPQ)* (Tannoubi et al., 2022) in Arabic language was used to evaluate study approaches. The scale was developed based on the original version of the R-SPQ-2F (Biggs et al., 2001) and the Arabic-language version validated with university students (Khine and Afari, 2018). The PE-SPQ assessed four context-specific tasks, each measured with five items. These tasks were referred to as follows: Deep Theory Task (DTT), Surface Theory Task (STT), Deep Practice Task (DPT), and Surface Practice Task (SPT). According to Tannoubi et al. (2022), the internal consistency indices for all four components of the PE-SPQ, as measured by McDonald, ranged between 0.86 and 0.94. The findings suggested a high level of consistency among all four components of the scale. The scoring of each item on the instrument followed a 5-point Likert scale, with a range from (0) to (4). A score of 4 represented the highest level of the item content, while a score of 0 indicated the lowest level.

The study employed the *University Student Engagement Inventory* (Maroco et al., 2016) in its Arabic version (Tannoubi et al., 2023a), a

Likert-type self-report scale to measure academic engagement. The scale included 15 items categorized into three dimensions: behavioral (BE), cognitive (CE), and emotional engagement (EE). Participants were asked to rate their responses on a scale ranging from 1 (indicating "never") to 5 (indicating "always"). Tannoubi et al. reported that Cronbach's α ranged from 0.70 to 0.86 for all three dimensions of the scale, indicating satisfactory internal consistency (Tannoubi et al., 2023a).

The participants were enrolled in a three-year bachelor's degree program and were categorized based on their current level of study, specifically as first-year students ($n = 147$; 30.12%), second-year students ($n = 179$; 36.68%), and third-year students ($n = 162$; 33.19%). Our study only recorded students with GPAs above 10, as we were only interested in those who passed.

Statistical analysis

Descriptive analyses were performed using IBM SPSS 27 for Windows (IBM Corporation, 2020). All variables were analyzed using means (M) and standard deviations (SD). The quantitative data was initially analyzed for irregularities, missing values, and data quality. The Kolmogorov–Smirnov test was used to determine whether the data distribution deviated from the normal distribution. Deviation from the normal distribution was confirmed by the test, and by the skewness and kurtosis values. However, in large samples, deviation from the normal distribution is commonplace and does not affect the validity of parametric statistical tests, such as the t-test and linear regression (Lumley et al., 2002). Therefore, we proceeded with parametric analysis.

Using SPSS, multiple linear regression models were used to assess relationships between academic engagement, approaches to study, and GPA. The proportion of variation explained by the regression model (R2) was also calculated using linear regression analysis (Schneider et al., 2010). ANOVA was used to assess the model's appropriateness and determine if the predictor variables explained the variability of the dependent variable (Seber and Lee, 2003; Eberly, 2007). Multicollinearity was not detected since all variables had VIF values <3.0 (Shrestha, 2020). Standardized beta weights were used as effect sizes and interpreted according to Cohen (1992): $\beta = 0.10$ (small effect), $\beta = 0.30$ (medium effect), and $\beta = 0.50$ (large effect).

Thereafter, the open-source program JASP Team (Version 0.17.3, 2023) was used to perform mediation analyses. Our study evaluated whether associations between dimensions of academic engagement (emotional, behavioral, and cognitive) and academic success were mediated by the students' study approaches. It was designed to find direct and indirect effects of the predictors on the outcome (Lee et al., 2019; Agler and De Boeck, 2017).

To ensure the model's accuracy and reliability in explaining the relationships between predictors, mediators, and the outcome, the Maximum Likelihood Estimation (ML) method was used to determine the parameters and path coefficients which were most likely to generate the observed data (Eliason, 1993; Myung, 2003). Also, we used the Bootstrapping technique to simulate data from 1,000 randomly generated samples. In several studies, mediation analysis has been performed using this method to estimate statistics and model variability (Kim et al., 2017; López and Yamashita, 2017). Statistical significance was determined at $p < 0.05$.

Results

Descriptive statistics

The characteristics of the study participants are shown in Table 1. Participants included in the study were within the age range of 19–25 years (21 ± 1.5 years, females 20.9 ± 1.3 years, males 20.8 ± 1.4 years). The gender distribution was nearly equal, with 252 female participants (51.6%) and 236 male participants (48.3%). Mean scores on the remaining variables are presented in Table 1.

Associations between academic engagement factors, study approaches, and exam grades

The four study approaches and three academic engagement traits were entered into the regression model to predict exam grades. The analysis showed that academic engagement factors and study approach variables significantly influenced GPA, explaining 38.5% (adjusted R^2: 37.6%) of the variance in students' GPA ($F = 42,85$ df = 7, $p < 0.001$). Higher GPA was associated with higher "BE" ($\beta = 0.12$, $p = 0.02$), higher "CE" ($\beta = 0.11$, $p = 0.02$), higher "STT" ($\beta = 0.12$, $p = 0.02$), and higher "DTT" ($\beta = 0.39$, $p < 0.001$). The coefficient for the predictor "SPT" ($\beta = -0.10$, $p = 0.01$) suggests a negative correlation with GPA. However, "EE" and "DPT" were non-significant predictors (both $p = 0.05$; see Table 2).

Associations between academic engagement factors and grade point average mediated by study approaches

First, findings from direct effects analysis showed that all the academic engagement factors were positively associated with the GPA, the estimate values were: [(estimate = 0.18, $p = 0.017$), (estimate = 0.14, $p = 0.047$) and (estimate = 0.16, $p = 0.024$)], respectively for BE, EE, and CE (see Table 3). Then, the table shows the mediation analyses' total effects of academic engagement characteristics on students' GPA (see Table 3). In concert with the results of the direct effect analysis, findings revealed statistically significant associations between BE (estimate = 0.23, $p = 0.008$), EE (estimate = 0.29, $p < 0.001$), and CE (estimate = 0.17, $p = 0.034$) and GPA (Table 3).

Next, findings from the total indirect effects analysis indicated that only the 'emotional engagement (EE)' factor showed a positive significative association (estimate = 0.15, $p < 0.001$) with GPA. Finally, the table shows all the indirect effects of academic engagement factors as predictors of GPA through study approaches. Only emotional engagement (EE) exhibited indirect effects on GPA (see Table 3 and Figure 1). Specifically, EE was positively related to GPA when mediated by all study approach measures: SPT (estimate = 0.025, $p = 0.005$), DPT (estimate = 0.212, $p = 0.019$), STT (estimate = 0.230, $p = 0.010$), and DTT (estimate = 0.323, $p < 0.001$).

Discussion

The present study aimed to investigate how the different dimensions of engagement, emotional (EE), cognitive (CE), and behavioral (BE), affect academic success both directly and indirectly through study approaches among physical education and sports university students. Overall, the study showed that while all dimensions of engagement were positively related to GPA, CE and

TABLE 1 Participant characteristics: age, gender, academic engagement factors, study approaches and grade point average.

Variables		
Sociodemographic	*n*	M ± SD
Age	488	20.93 ± 1.50
	n	%
Male gender	236	48.4
Female gender	252	51.6
Academic engagement	*n*	M ± SD
Behavioral (BE)	488	2.79 ± 0.66
Emotional (EE)	488	2.72 ± 0.69
Cognitive (CE)	488	2.64 ± 0.68
Study approaches	*n*	M ± SD
Deep Theory Task (DTT)	488	2.58 ± 0.89
Surface Theory Task (STT)	488	2.65 ± 0.68
Deep Practice Task (DPT)	488	2.92 ± 0.83
Surface Practice Task (SPT)	488	3.05 ± 0.82
Academic performance	*n*	M ± SD
Grade point average (GPA)	488	3.20 ± 0.86

M, mean; SD, standard deviation.

TABLE 2 Linear regression analysis of associations between academic engagement characteristics, study approaches, and grade point average

Independent variables	Model 1			
Academic engagement	Beta	95% CI[†]	β	p[†]
Behavioral (BE)	0.12	0.02–0.22	0.12	0.02
Emotional (EE)	0.10	−0.01-0.19	0.10	0.05
Cognitive (CE)	0.11	0.02–0.20	0.11	0.02
Study approaches				
Deep Theory Task (DTT)	0.30	0.22–0.39	0.39	<0.001
Surface Theory Task (STT)	0.10	0.03–0.18	0.12	0.02
Deep Practice Task (DPT)	0.07	0.00–0.14	0.09	0.05
Surface Practice Task (SPT)	−0.09	−0.16 - -0.02	−0.10	0.01

Dependent variable is the Grade Point Average (GPA); †: results are based on the 1,000 bootstrap samples.

TABLE 3 Direct, total direct and indirect effects of the academic engagement factors on grade point average mediated by study approaches.

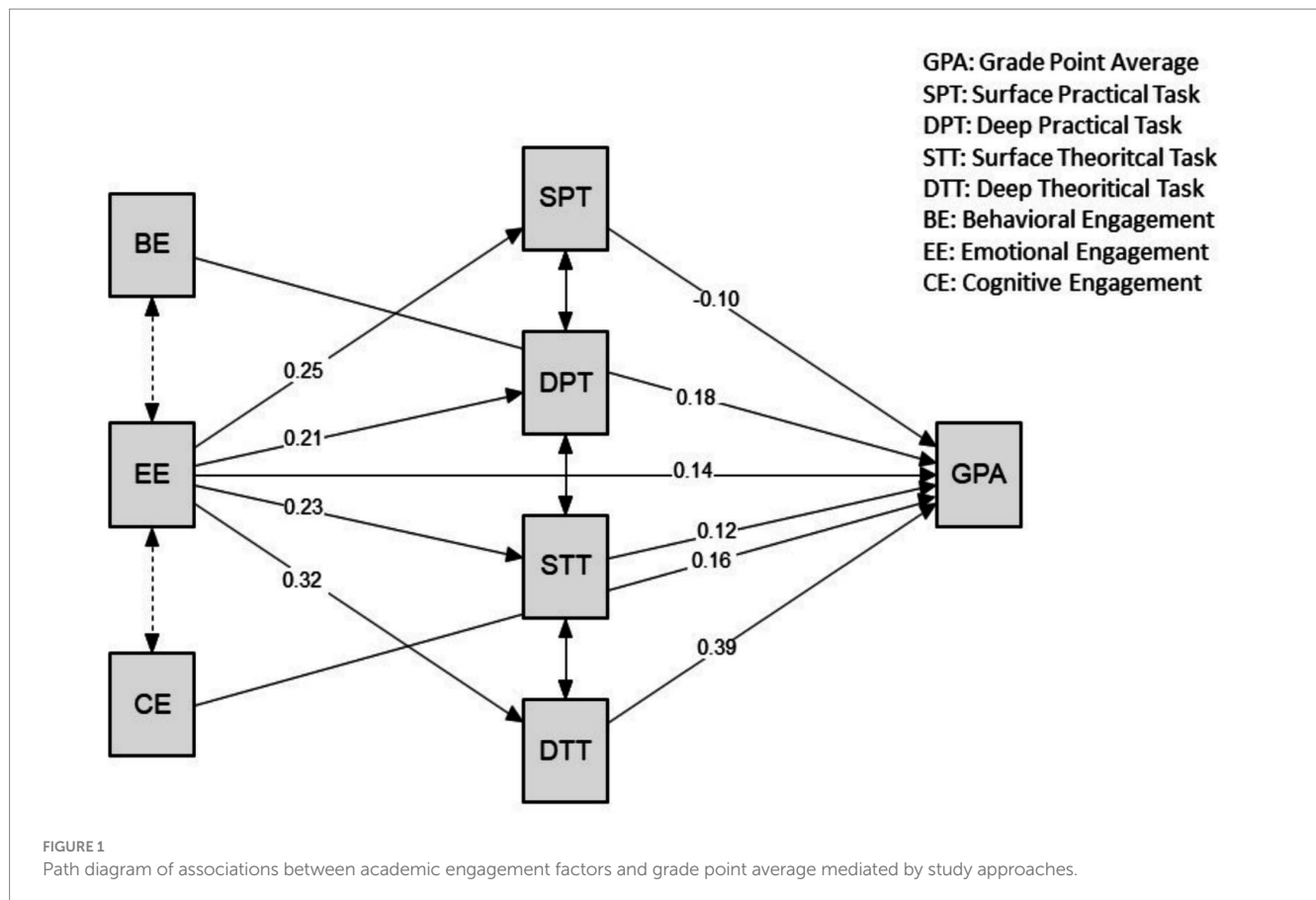|					95% CI	
Direct effects	Estimate	Std. error	z-value	p	Lower	Upper
BE → GPA	0.179	0.075	2.380	**0.017**	0.030	0.310
EE → GPA	0.144	0.073	1.982	**0.047**	−0.003	0.294
CE → GPA	0.159	0.070	2.257	**0.024**	0.020	0.285
Total effects						
BE → GPA	0.230	0.087	2.655	**0.008**	0.065	0.389
EE → GPA	0.291	0.083	3.504	**<0.001**	0.131	0.447
CE → GPA	0.173	0.082	2.125	**0.034**	0.029	0.326
Total indirect effects						
BE → GPA	0.052	0.045	1.150	0.250	−0.036	0.140
EE → GPA	0.146	0.044	3.297	**<0.001**	0.065	0.241
CE → GPA	0.014	0.042	0.345	0.730	−0.053	0.099
Path coefficients						
BE → SPT → GPA	−0.017	0.094	−0.179	0.858	−0.193	0.155
EE → SPT → GPA	0.251	0.090	2.796	**0.005**	0.078	0.426
CE → SPT → GPA	0.012	0.088	0.138	0.890	−0.153	0.177
BE → DPT → GPA	0.024	0.094	0.257	0.797	−0.152	0.179
EE → DPT → GPA	0.212	0.090	2.354	**0.019**	0.034	0.376
CE → DPT → GPA	−0.066	0.089	−0.740	0.459	−0.240	0.103
BE → STT → GPA	−0.038	0.094	−0.405	0.686	−0.252	0.137
EE → STT → GPA	0.230	0.090	2.563	**0.010**	0.087	0.396
CE → STT → GPA	0.051	0.088	0.579	0.563	−0.089	0.210
BE → DTT → GPA	0.134	0.091	1.477	0.140	−0.048	0.312
EE → DTT → GPA	0.323	0.087	3.731	**<0.001**	0.165	0.494
CE → DTT → GPA	0.039	0.085	0.455	0.649	−0.117	0.206

Confidence interval (CI); Grade Point Average (GPA); Behavioral engagement (BE); Emotional engagement (EE); Cognitive engagement (CE); Deep Theory Task (DTT); Surface Theory Task (STT); Surface Practice Task (SPT); Bold type: significant association.

BE exerted a direct influence on GPA while the influence of EE on GPA was in part mediated by study approaches. The findings of the study provide valuable insights into the effect of various engagement factors on the academic achievement of university students.

The correlation between BE and GPA demonstrated a positive relationship, which aligns with prior studies emphasizing the significance of active involvement and engagement in academic tasks and activities (Yoo, 2015; Li et al., 2022). This finding implies that students who exhibit greater levels of behavioral engagement are more likely to attain superior academic outcomes, possibly attributable to their active participation in classroom settings and their studies. Also, consistent with prior research (Reyes et al., 2012; Umemoto et al., 2016; Tao et al., 2022), the current study found that emotional engagement (EE) had a positive direct effect on GPA, although the different analytic procedures revealed slightly different significance values pertaining to this effect. Higher emotional engagement, which entails establishing more positive emotional connections with the learning process, has been linked to improved academic results (Fredricks et al., 2004; De Neve et al., 2023; Khan et al., 2023). Moreover, there was a positive correlation between

students' cognitive engagement (CE) in their studies, including their ability to persist in the face of obstacles, and better grades. The correlation between CE and GPA highlights the significance of ethical conduct and a robust sense of responsibility in fostering academic success (Khan et al., 2023; Li et al., 2023). Summarizing the above, we found that all aspects of the students' academic engagement were related to better grades among the students. Thus, monitoring and increasing students' engagement with their studies appears to be one way of securing their success in physical education and sports programs.

On the other hand, analyses of the indirect effects of engagement factors on GPA via the mediating study approach variables (SPT, DPT, STT, and DTT) revealed that emotional engagement (EE) also had an indirect effect on the students' GPA. The findings revealed that there were positive connections between EE and GPA when mediated by each of the study approaches. This implies that students who were emotionally engaged were also more inclined to use different approaches to studying in ways that would lead them to achieve academic success. Students who have a greater emotional connection to their learning process are more likely to actively participate in both

FIGURE 1
Path diagram of associations between academic engagement factors and grade point average mediated by study approaches.

practical and theoretical study tasks, and therefore, the results linking EE with GPA through the use of DTT and DPT are in line with several previous studies (Umemoto et al., 2016; Tao et al., 2022).

In addition, the results showed that higher SPT was negatively related to grades. Therefore, the positive indirect effect of EE on grades appears to exist because EE reduces SPT, and lower SPT in turn impacts on higher GPA. However, the results also showed that higher STT was related to higher GPA, and thus, the positive indirect effect of EE on grades appears also to be caused by EE increasing STT, which in turn impacts on higher GPA. In combination, these results demonstrate once more the complex interactions between students' emotional engagement, study behaviors and academic success (Zepke, 2011; Shernoff et al., 2016). While many studies have linked a surface study approach to poorer academic outcomes among students (Bonsaksen et al., 2021; Ward, 2011a; Diseth and Martinsen, 2003; May et al., 2012; Ward, 2011b), researchers have also questioned the notion that some study approaches are inherently and universally 'bad' while others are 'good', and instead suggested that appropriate study approaches depend on the nature of the knowledge to be acquired (Beattie et al., 1997). Also, according to Biggs' constructive alignment theory (Biggs et al., 2022), study behaviors among higher education students are often shaped by what they believe they will be exposed to in the course exam. If course exams are oriented toward assessing the students' ability to memorize and reproduce course materials, a surface approach may in fact be well suited to the purpose. Moreover, this study used separate scales for assessing deep and surface study

approaches related to theoretical and practical tasks, respectively. While this certainly increases the complexity of the study results, the apparently contrasting results for surface approach mediation – EE contributes to better grades, in part by increasing STT but by decreasing SPT–are intriguing and call for more exploration in later studies.

The study highlights the significance of directing emotionally invested students toward effective study practices, eventually resulting in enhanced academic success (Davidson, 2002; Fuller et al., 2011). It also renders a more nuanced understanding of the processes that may link students' emotional engagement to positive outcomes; processes which may involve both deep and surface study approaches. However, the largest effect of study approaches on GPA was shown for DTT, suggesting that while engaging in memorization appears to have a positive effect on grades, the effect of engaging in deep comprehension and application is substantially larger. This aligns with previous research that emphasizes the academic advantages of employing deep, analytical study methods (Biggs et al., 2001; Entwistle, 2001; Biggs, 1987; Entwistle and Ramsden, 2015). The study focused on physical education and sport university students; nonetheless, it is important to recognize that the participants' physical activity levels may have influenced their academic achievement. Prior studies have shown that physical activity improves cognitive performance and psychological well-being, both of which are favorably associated with academic success (Singh et al., 2012; Álvarez-Bueno et al., 2017). Future research should clearly assess and examine the correlation between physical

activity levels and academic achievement in this population to enhance the understanding of their association.

Strengths and limitations

This study addresses a gap in the existing literature regarding engagement and approaches to studying as factors influencing the academic success of students within the context of physical education and sport. Furthermore, the findings have the potential to assist educators and institutions in focusing on their instructional approaches to align with students' patterns of engagement and preferred approaches to study, ultimately enhancing their academic success. The study also contributes to the field of educational psychology by elucidating the complex pathways that influence academic success.

The combination of self-report measures and a cross-sectional design may add bias and complicate the estimation of causal inferences. Future studies of mediational pathways might benefit from introducing a time sequence between the measurement of predictors, mediators, and outcomes (Maric et al., 2012). However, to gain knowledge of students' own attitudes and perceptions, there is no way around using self-reports. While GPA might be more validly obtained by using the institutional register, we have no reason to believe that students were unaware of their performance or would be inclined to provide false information. Additionally, we used a measure (PE-SPQ) that was specifically adapted to students of physical education and sport. Thus, combined with the data collection taking place at one university only, the findings might be particularly applicable for the discipline of physical education and may have limited potential for generalization. To increase the validity of future studies, researchers may consider using mixed data collection techniques, using larger and more varied samples, and using longitudinal designs. A further limitation of the study relates to the fact that it did not take into account participants' physical activity levels, which may have affected their academic performance. Measures of physical activity should be incorporated into future studies to investigate how it affects students' performance in sports and physical education.

Conclusion

The present study concludes that all dimensions of engagement were positively related to academic success among physical education and sports university students. In addition, emotional engagement proved to be an important predictor of academic success through its impact on the study approaches adopted by the students. Thus, monitoring and exploring ways to increase students' engagement appears to be one way to support their efforts to succeed with university studies in physical education and sport. The findings of this study can be valuable for university educators and administrators in physical education and sports, as they provide insights into the factors that influence students' academic results.

Data availability statement

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

Ethics statement

The studies involving humans were approved by Ethics Committee of the High Institute of Sport and Physical Education of El Kef, University of Jendouba. 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

AT: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Writing – original draft, Writing – review & editing. TB: Conceptualization, Formal analysis, Funding acquisition, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. GM: Validation, Writing – original draft, Writing – review & editing. FAh: Writing – review & editing. ES: Writing – review & editing. FAz: Project administration, Supervision, Writing – review & editing.

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

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