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EDITED BY

Douglas F. Kauffman,
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REVIEWED BY

Elena Mirela Samfira,
University of Life Sciences, Romania
Dennis Arias-Chávez,
Continental University, Peru

*CORRESPONDENCE

Mohamed Frikha

✉ mfrikha@kfu.edu.sa;

✉ medfrimed@gmail.com

†These authors share first authorship

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Enhancing institutional integration and enjoyment among Saudi female physical education students: exploring the mediation of motivation and psychological needs satisfaction

Mohamed Frikha^{1,2*†}, Nesrine Chaâri^{2†}, Nourhen Mezghanni³,
Ahmad K. Hassan^{1,4}, Majed M. Alhumaid¹ and
Mohammed S. Alibrahim¹

¹Department of Physical Education, College of Education, King Faisal University, Al-Ahsa, Saudi Arabia, ²Research Laboratory Education, Motricity, Sport and Health (LR19JS01), High Institute of Sport and Physical Education, Sfax University, Sfax, Tunisia, ³Department of Sport Sciences, College of Education, Taif University, Taif, Saudi Arabia, ⁴Department of Team Sports and Racket Games, Faculty of Physical Education, Minia University, Minya, Egypt

Institutional integration and enjoyment in physical education (PE) represent catalysts for greater students' social cohesion and academic performance. This cross-sectional study addressed the lack of data and examined the mediating effect of basic psychological needs satisfaction (PNS) and motivation on the association between physical activity enjoyment (PAE) and institutional integration (SII) in Saudi female PE students. Participants ($N = 507$) were invited to complete the PE autonomy relatedness competence scale, the PE motivation scale, the students' institutional integration scale, and the enjoyment questionnaire. The direct and indirect effects were explored using the SPSS Hayes process macro (Model 4). The results indicate that autonomy, relatedness and extrinsic motivation partially mediate the relationship between the PAE and SII in female Saudi PE students. Therefore, the PAE had a direct effect on SII of 16.2% and an indirect effect of 25.3% through the mediation of autonomy, relatedness, and extrinsic motivation. The psychological processes that promote the development of SII are PAE, autonomy, relatedness, and extrinsic motivation but not intrinsic motivation nor competence. The results are discussed within the self-determination theory and can be used by benefic for students, teachers, administrators or program makers to support institutional integration and enjoyment perception in Saudi female PE students.

KEYWORDS

adaptation, sense of belonging, pleasure, flow, recovery, motivation, autonomy, competence

1 Introduction

The transition from school to university has garnered interest from researchers seeking to better understand the factors that facilitate student institutional integration and enhance student academic achievement (Worsley et al., 2021). Hence, the first years in higher education are often regarded as a pivotal period in students' lives, where students are supposed to acquire new academic and social skills and to adjust to the demands of independent learning within an unfamiliar context (Timmis et al., 2022).

In the Saudi Arabian context, PE programs for girls in schools and universities were recently introduced starting in the 2018–2019 academic year (Aljehani et al., 2022). This has contributed to societal expectations and conventions that hinder women from participating in physical activity (Alharbi, 2024; Alsamih, 2024). However, in physical education (PE), which is an undervalued subject within the educational curriculum (Bailey, 2018), institutional integration was shown to enhance learning for all students (Abdul-Rahaman et al., 2022). To the best of our knowledge, research on Saudi females' PE students' institutional integration is still limited. Hence, it is critical to promote this concept in a society that is still in transition to assist in integration and improve physical, mental, and psychological health (Aljehani et al., 2022).

According to Zekioglu and Kalkan (2019), physical activity (PA) is a type of psychological relief that promotes overall healthy growth and emotional development. It improves moderation, patience, and emotional control by helping individuals maintain physical control and neurological equilibrium. For instance, in the Saudi Arabian context, it was discovered that women's participation in sports has both beneficial and negative psychological impacts, including feelings of satisfaction, guilt and depression. It eliminates feelings of isolation and frustration and improves individuals' confidence perception, sense of responsibility, and decision-making (Al Habdan, 2017).

In view of the above considerations, examining institutional integration, enjoyment perceptions, and psychological factors that could support their relationships (i.e., motivation, basic psychological needs satisfaction) remains highly important in Saudi female students. The results will provide an understanding of how PE students' motivation and PNS act in a complementary manner in fulfilling their institutional integration and enjoyment perceptions. The spin-off benefits from the findings of this study could potentially lead to valuable changes in teacher practice and aid in consideration of the learning environment that is provided for students, with the inclusion of how teachers can modify their practice to cater to diverse students. Further findings will provide teachers with a deeper understanding of the importance of fostering a mastery-oriented climate in promoting the development of self-determined forms of motivation and PNS, which ultimately lead to student enjoyment perception and institutional integration.

2 Literature review

2.1 Students' institutional integration

The concept institutional integration in education refers to the process by which a student becomes academically and socially integrated into the environment of a post-secondary institution. It has been extensively discussed in the literature (Pascarella and Terenzini,

1980; Tinto, 1993). It can be assumed to mean that "student's potential to benefit from academic experiences [which] requires that the student is able to meet the institution's educational demands and that the institution is able to meet the student's educational desires" (Clark et al., 2014, p. 31). It relates to the process that students go through when entering higher education, beginning with their personal qualities at the moment of admission and continuing with the quality of the institution that receives them. The term institutional integration encompasses not only the academic aspects of a student's adaptation to the new institution, but also their social interactions and sense of belonging within the campus community (Oxendine and Taub, 2021). Thus, it is crucial for students to feel connected to their academic environment in order to thrive and succeed in their educational pursuits. Hence, institutional integration is considered a dynamic, ongoing process that maximizes students' achievement of knowledge, skills, and dispositions that support their academic and social growth. It is a multifaceted approach that involves redefining students' academic experience inside and outside of the classroom. According to Araújo et al. (2014), students' academic performance, social integration, motivation, and attrition are related to the transition phase to higher education, which is considered crucial for students' adaptation. At first-year universities, students attempt to establish new social relationships and acclimate to a new environment. Therefore, the desire to belong plays a crucial role in their integration into higher education (Maunder, 2018), as it is fundamental in establishing and sustaining strong relationships with others, maintaining motivation and enjoyment, and promoting higher education achievements (Gillen-O'Neel, 2019; Pedler et al., 2022). According to Lakhali et al. (2020), the extent to which students can adapt to their academic surroundings significantly impacts their determination to continue their education or discontinue it.

2.2 Motivation and psychological needs satisfaction

According to the Self-Determination Theory (SDT) of Ryan and Deci (2017), three fundamental needs that are universally recognized including autonomy, which encompasses feelings of self-governance, self-acceptance, and self-determination, competence which refers to feelings of talent, ability, efficacy, and capability, and relatedness which encompasses a sense of belonging, intimacy, and connection to others. These three needs are essential for individuals to thrive and experience a sense of fulfillment in their lives. Autonomy allows individuals to have a sense of control and agency over their actions, competence enables them to feel capable and skilled in their endeavors, and relatedness fosters a sense of connection and belonging within social relationships. The concept of motivation is categorized into six levels of self-regulation, ranging from the highest to the lowest degree: intrinsic, integrated, identified, introjective, extrinsic, and amotivation. Motivation was demonstrated to have a direct effect on academic performance and an indirect effect through the mediation of academic integration (Clark et al., 2014). Research findings indicate that meeting fundamental needs leads to a higher level of intrinsic motivation (Vallerand, 2007). According to Vergara-Morales and Del Valle (2021), the satisfaction of basic psychological needs (PNS) indirectly influences students' intrinsic motivation through academic integration. The researchers concluded that academic integration

plays a crucial role in fostering the growth of intrinsic motivation toward learning. [Jeno et al. \(2023\)](#) noted that in-class teachers' autonomy support actions affect students' intrinsic motivation and sense of competence. While other researchers ([Van Rooij et al., 2018](#); [Vergara-Morales and Del Valle, 2021](#)) have demonstrated that motivation is positively correlated with academic integration and that personal choices related to learning activities foster students' integration into university life and thus aid their academic achievements. Recent studies ([Murray et al., 2022](#); [Othman et al., 2022](#); [Alharbi, 2024](#)) highlighted issues related to female students' motivation and sport awareness, which manifest as salient beliefs, cognitive impairment of the relevance of sports, and misunderstanding of the characteristics of physical activities.

Conversely, research has indicated a noteworthy association between basic PNS and the institutional integration of students. High PNS levels have been shown to be positively correlated with elevated levels of school adjustment, thereby promoting academic accomplishments and success ([Raižienė et al., 2017](#); [Mohamedhosein and Crul, 2018](#)). In addition, [Clark et al. \(2014\)](#) revealed that academic integration acts as a mediator of school achievement. This suggests that academic integration serves as a mechanism through which motivating factors can exert their influence on academic outcomes.

2.3 Physical activity enjoyment

Perceived enjoyment is often seen as one of the most important factors for maintaining regular PA ([Woods et al., 2012](#); [Rodrigues et al., 2021](#)). Physical activity enjoyment (PAE) occurs when students perceive an activity as pleasant ([Lohbeck et al., 2019](#)). This concept explores three separate dimensions of student satisfaction with PE: the pleasure experienced before engaging in PE, the positive state of flow experienced during PE, and the desired outcome of recovery after participating in PE ([Engels and Freund, 2019](#)). PAE is a major reason why people exercise in the long run. It is also a significant aspect of motivating and maintaining individuals' engagement in sporting activities ([Doolen and Bixby, 2017](#); [Yan et al., 2023](#)). According to previous studies, the more students enjoy engaging in physical education classes, the more they participate in extra class PA ([Chu et al., 2017](#); [Berki and Tarjányi, 2022](#)). Although enjoyment is recognized as important for maintaining an active lifestyle, there is limited understanding of how to promote enjoyment in PE and sports. Recently, [Rodrigues et al. \(2021\)](#) recommended the use of nonconventional models in PE aiming to increase the enjoyment of students, while [Van Rooij et al. \(2018\)](#) highlighted the benefits of using gamified exercises in enhancing students' enjoyment perception. Therefore, gaining awareness of which elements influence students' perceptions of enjoyment in PE is a critical precondition for optimally promoting interest in PAE. For instance, [Engels and Freund \(2020\)](#) presented evidence that social characteristics and perceived competence are among the most important variables in PAE.

2.4 The present study

The question of what determines institutional integration for novice students in their host universities remains crucial for researchers, students, faculty, and program makers. Success in this

transition phase foster learning, retention, and decrease the dropout rate ([Ma et al., 2019](#)). In university context, novice students need to adapt academically, socially, and emotionally to their new environment. Enjoying and becoming academically, socially integrated are important preconditions for successful learning. Indeed, [Ömeroğulları and Gläser-Zikuda \(2022\)](#) highlighted positive effects of school enjoyment on students' achievement and social integration in school context. However, our understanding of the associations among enjoyment and student integration in university life in the Saudi context is still limited. It seems that there are direct and indirect relationships between enjoyment, and institutional integration, and a mediating effects of motivation, and PNS.

Given that a few studies have focused on the relationships among Saudi female PNS, motivation, and achievement in PE ([Al Shahrani, 2020](#); [Aljehani et al., 2022](#); [Frikha et al., 2022, 2024](#)); that students' motivation is a solid framework for enjoyment in PE lessons ([Navarro-Patón et al., 2019](#)); Hence, we wanted to investigate the psychological mechanisms that have the potential to alter the connections formed between the enjoyment in physical activities and the level of integration of Saudi female PE students into university life. The results will provide an understanding of how students' motivation and PNS intervene in the promotion of enjoyment perception and how they foster students' institutional integration (SII). By understanding and promoting institutional integration, educators and administrators can help create a supportive and inclusive environment that enhances student learning and development ([Cabir and Mardikyan, 2021](#)). Therefore, this study tests the hypothesis that the enjoyment affects SII in female PE students through the mediation of PNS (autonomy, competence and relatedness) and motivation (intrinsic and extrinsic).

3 Methods

3.1 Research design and sample size calculation

The current investigation employs a quantitative cross-sectional design. For better representability, female students majoring in PE were randomly selected from four public universities situated in the western, central, northern, and eastern regions of Saudi Arabia. These universities collectively had 1,300 active female students. To ensure a reliable sample, the study assumed a prevalence (p) of 50%, a confidence level of 95%, a margin of error (e) of 5%, and an associated z score of 1.96. Consequently, the sample size (n) was determined to be 297 participants using [Daniel's \(1999\)](#) formula. However, to enhance student engagement, the questionnaire link was sent to nearly all regular PE female students at the selected universities, resulting in 1300 requests after receiving emails from the Dean of Information Technology. Ultimately, 507 positive responses were received, which was deemed the final sample size. The research protocol was approved by the King Faisal Ethics Committee under reference number (KFU-REC-2022- DEC -ETHICS-414).

3.2 Participants

Female physical education students from the four selected Saudi universities (Taif University, King Saud University, Hail University,

and Hafr Al-Batin University) were invited to participate in the study. The inclusion criteria were as follows: (i) Study regularity in a PE department or college. Students having less than 75% of attendance were not asked to participate in (ii) the presence of practical and theoretical courses on the student's schedule or (iii) the completion of all questionnaire questions. The study participants were provided with comprehensive information regarding the purpose of the research and agreed to participate. To ensure confidentiality, all respondents were guaranteed that their identities would remain anonymous, and no personal details that could disclose their identities were requested. Prior to proceeding with the questionnaire, participants were required to provide written consent by selecting a specific checkbox.

3.3 Questionnaires

In the present investigation, we collected demographic information (age, sex, weight, height, study level, and grade point average), and we used items from four questionnaires: the PE autonomy relatedness competence (PE-ARCS), the PE motivation scales (PE-MS) of Sulz et al. (2016), the Questionnaire for the Assessment of Students' Enjoyment in Physical Education (QUAEPE) of Lohbeck et al. (2019), and the adapted Questionnaire of Students' Institutional Integration (QSII) of Pascarella and Terenzini (1980).

3.3.1 The PE autonomy relatedness competence and motivation scales

The PE-ARCS included 12 items for which students were asked to rate their self-perceptions: autonomy (items 3, 6, 9, and 12), competence (items 2, 5, 8, and 11), and relationships (items 1, 4, 7, and 10). The PE-MS included nine items that assess intrinsic motivation (items 13, 16, and 19), extrinsic motivation (items 14, 17, and 20), and amotivation (items 15, 18, and 21). A 5-point Likert scale was used (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The values of autonomy, competence, relatedness, and intrinsic and extrinsic motivation were retained for analysis. A higher score indicates a greater degree of PNS and motivation. The validity and reliability of the Arabic versions of the PE-ARCS and PE-MS were previously verified (Frikha et al., 2024), with Cronbach's alpha values (0.758 for autonomy, 0.811 for competence, 0.761 for relatedness, 0.823 for intrinsic motivation, 0.836 for extrinsic motivation, and 0.849 for amotivation). The internal consistency of the scales was verified in the present study with satisfactory Cronbach's alpha values: 0.873 for autonomy, 0.821 for competence, 0.793 for relatedness, 0.803 for intrinsic motivation, 0.843 for extrinsic motivation, and 0.872 for amotivation.

3.3.2 The students' enjoyment in PE (QUAEPE) and The students' institutional integration (QSII) questionnaires

The students' PE enjoyment questionnaire (QUAEPE) included nine items assessing pleasure (items 22, 23, 24), flow (items 25, 26, 27), and recovery (items 28, 29, 30). A 4-point Likert scale (0 = never, 1 = sometimes, 2 = often, 3 = always) was used. The Questionnaire on Students' Institutional Integration (QSII) included five items (items 31, 32, 33, 34 and 35) assessing many aspects of social and academic integration, goal commitment, and institutional commitment. A 5-point Likert scale was used (1 = strongly disagree, 2 = disagree,

3 = neutral, 4 = agree, 5 = strongly agree). A higher score implies a greater degree of enjoyment and integration.

The English versions of the QUAEPE and QSII underwent translation and adaptation to ensure their applicability in the Saudi context, following the recommendations of Beaton et al. (2000). Initially, two bilingual translators translated the questionnaires into Arabic, resulting in standardized versions. Subsequently, two English speakers of Arab origin performed a back-translation of these versions into English, which was then meticulously reviewed by three bilingual experts. Any necessary adjustments highlighted by the experts were duly incorporated. A pilot study was conducted to assess the reliability and validity of the Arabic versions of the QUAEPE and QSII questionnaires. A sample of 31 PE students participated in the study. Exploratory factor analysis and Cronbach's alpha were used to test the factorial validity and internal reliability of the questionnaires, respectively. The Arabic versions of the QUAEPE and QSII were evaluated both individually and as part of the overall questionnaire. The obtained Cronbach's alpha values for pleasure, flow, recovery, and QSII were found to be satisfactory, with coefficients of 0.806, 0.795, 0.792, and 0.767, respectively.

4 Data analysis

Student enjoyment (PAE) was assumed to be the independent variable X, and institutional integration (SII) was the dependent variable Y. Autonomy, competence, relatedness, intrinsic motivation and extrinsic motivation were assumed to be the intermediary variables (M1, M2, M3, M4, and M5, respectively). The PAE thus positively affects SII, and autonomy, competence, relatedness, intrinsic motivation and extrinsic motivation play intermediary roles in the relationship between the PAE and SII (Figure 1). SPSS V.26 (IBM, Armonk, NY, United States) was used for the statistical analysis. Pearson correlation and regression analyses were used to evaluate the associations between indicators. The Hayes process macro (Model 4) was used to analyze the direct and indirect impacts of the PAE on SII. The total effect is the sum of the direct effect and the indirect effect. The QUAEPE and QSII questionnaires were subjected to exploratory factor analysis (EFA) using principal component analysis and Cronbach's alpha to assess their validity and reliability. Descriptive statistics, such as the means, standard deviations, and proportions, were used to summarize the data from the entire population. To check for normality, histograms and absolute values of skewness were examined, with all values found to be less than 2 (Kim, 2013). The significance level was established at $p < 0.05$.

5 Results

5.1 Validity and reliability of the Arabic versions of the QUAEPE and QSII

Exploratory factor analysis (EFA) was conducted using the principal component analysis extraction method and varimax rotation. In terms of the QUAEPE, the Kaiser–Meyer–Olkin (KMO) sampling adequacy surpassed the acceptable threshold of 0.6 (KMO = 0.757). Additionally, the result of Bartlett's sphericity test was found to be statistically significant ($p < 0.001$). Three components with eigenvalues greater than 1 (3.851, 3.161, and 2.834) were identified and retained, resulting in a cumulative variance of 84.279%. Similarly,

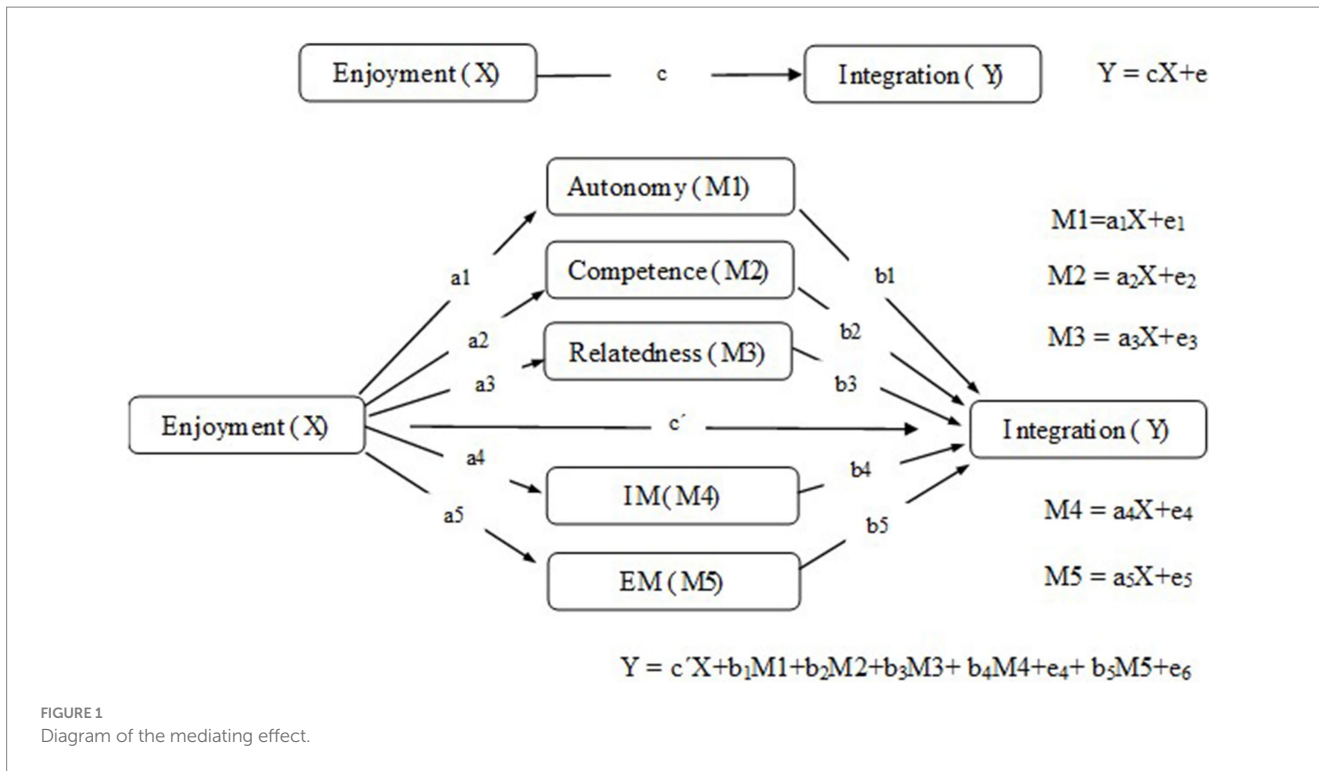


FIGURE 1
Diagram of the mediating effect.

for the QSII, the KMO sampling adequacy exceeded the acceptable threshold (KMO=0.625), and Bartlett’s sphericity test yielded a statistically significant result ($p < 0.001$). Two components with eigenvalues greater than 1 (2.406 and 1.134) were identified and retained, resulting in a cumulative variance of 70.803%.

The QUAPEPE’s internal reliability was assessed using Cronbach’s alpha values, which were found to be 0.902 for all items and 0.830, 0.899, and 0.855 for the pleasure, flow, and recovery subscales, respectively. The QSII also demonstrated good internal reliability, with a Cronbach’s alpha value of 0.738. These findings indicate that the Arabic versions of both the QUAPEPE and QSII scales are reliable and valid measures for assessing enjoyment and student institutional integration, respectively.

5.2 Sociodemographic characteristics

In total, 507 female PE students participated in the study, for a response rate of 39%. Table 1 shows the descriptive statistics of the variables, age, body mass index, university level, and GPA.

5.3 Relationships between motivation, enjoyment, PNS, and institutional integration

The results revealed significant correlations between the SII and PAE ($r = 0.517, p < 0.001$); between the SII and all mediators (autonomy, $r = 0.537, p < 0.001$; competence, $r = 0.557, p < 0.001$; relatedness, $r = 0.675, p < 0.001$; intrinsic motivation, $r = 0.429, p < 0.001$; and extrinsic motivation, $r = 0.406, p < 0.001$), as well as

between enjoyment and all mediators (competence, $r = 0.496, p < 0.01$; relatedness, $r = 0.001, 494, p < 0.01$; intrinsic motivation, $r = 0.464, p < 0.001$; and extrinsic motivation, $r = 0.354, p < 0.001$). The correlations between the study variables allowed a mediation model to be constructed to explore the mechanism of all the mediators’ effects on the relationship between the SII and PAE incidence (Table 2).

TABLE 1 Sociodemographic characteristics of the respondents (n = 507).

Variables	Values*
Age	20.45 ± 1.92 years
Body mass index (BMI)	21.18 ± 2.86 kg/m ²
Universities	
Taif University (TU)	211 (41.6%)
King Saud University (KSU)	96 (18.9%)
Hail University (HU)	92 (18.1%)
University of Hafr Al Batin (HBU)	108 (21.3)
Study level	
First and second	437 (86.2%)
Third and fourth	70 (13.8%)
Grade point average (GPA)	
1 < GPA ≤ 2	25 (4.9%)
2 < GPA ≤ 3	107 (21.1%)
3 < GPA ≤ 4	156 (30.8%)
4 < GPA ≤ 5	219 (43.2%)

*Values are given as n (%) unless otherwise stated.

TABLE 2 Correlations between motivation, enjoyment, PNS, and institutional integration ($n = 507$).

		Aut	Com	Rel	SII	PAE	IM	EM
Aut	Pears Correl	1						
	95% CI							
Com	Pears Correl	0.648**	1					
	95% CI	0.581 -. 714						
Rel	Pears Correl	0.616**	0.571**	1				
	95% CI	0.547–0.685	0.499–0.643					
SII	Pears Correl	0.537**	0.557**	0.675**	1			
	95% CI	0.463–0.611	0.484–0.629	0.611–0.740				
PAE	Pears Correl	0.437**	0.496**	0.494**	0.517**	1		
	95% CI	0.359–0.516	0.420–0.572	0.418–0.570	0.442–0.592			
IM	Pears Correl	0.486**	0.456**	0.429**	0.484**	0.464**	1	
	95% CI	0.466–0.613	0.441–0.591	0.467–0.614	0.552–0.690	0.397–0.551		
EM	Pears Correl	0.437**	0.413**	0.406**	0.565**	0.354**	0.469**	1
	95% CI	0.359–0.516	0.420–0.572	0.418–0.570	0.441–0.591	0.467–0.614	0.420–0.572	

SII, student institutional integration; PAE, physical activity enjoyment; Aut, autonomy; Com, competence; Rel, relatedness; IM, intrinsic motivation; EM, extrinsic motivation; CI, confidence interval. Correlations are significant at the 0.01 level (2-tailed).

5.4 Mediation analysis

This study assessed the mediating role of PNS (autonomy, competence and relatedness perceptions) and motivation (intrinsic and extrinsic) on the relationship between the PAE and SII in female physical education students. The results revealed a significant indirect effect of the PAE on SII through autonomy ($b=0.03$, $t=2.53$, $p<0.01$), relatedness ($b=0.12$, $t=7.03$, $p<0.001$), and extrinsic motivation ($b=0.72$, $t=8.10$, $p<0.001$). No significant indirect effects through intrinsic motivation ($b=0.02$, $t=1.65$, $p>0.05$), and competence perception ($b=0.01$, $t=0.53$, $p>0.05$) were detected. Furthermore, the direct effect of the PAE on SII was also significant ($b=0.16$, $t=5.87$, $p<0.001$). Hence, autonomy, relatedness, and extrinsic motivation partially mediate the relationship between PAE and SII. The mediation summary is presented in Table 3.

The coefficients c , c' , a_1 , b_1 , a_3 , b_3 , and a_5 , b_5 were all significant, indicating that autonomy, relatedness, and extrinsic motivation played a partial intermediary role in the relation between PAE and SII. Bootstrap methods were used to repeat the sampling process 5,000 times to test the mediating effect. All 95% confidence intervals of the mediation effects of paths do not include 0, which indicates that the mediation effects are statistically significant and account for 42% of the effect. In summary, the results showed that the PAE can directly affect SII incidence. SII is also impacted via the mediation of autonomy, relatedness, and extrinsic motivation perceptions (Figure 2).

6 Discussion

The aim of the present investigation was to assess the relationships between Saudi female PE students' institutional integration (SII), motivations (intrinsic and extrinsic), psychological needs satisfaction (PNS), and physical activity enjoyment (PAE). Path analysis revealed that (i) the PAE is associated with SII; (ii) there is a positive relationship between motivation, enjoyment, PNS, and the SII; and

(iii) the relationship between the PAE and SII is partially mediated by autonomy, relatedness, and extrinsic motivation (EM) but not by competence nor by intrinsic motivation (IM).

The results of the study indicated that there were positive associations between intrinsic and extrinsic motivation, and all psychological needs satisfaction (PNS). This finding aligns with the principles of self-determination theory proposed by Ryan and Deci (2017), which suggests that individuals are more likely to experience self-determination when their needs for competence, relatedness, and autonomy are fulfilled. Therefore, the intrinsic and extrinsic motivations observed in Saudi female PE students can be attributed to their level of satisfaction and increased sense of self-determination. Furthermore, recent research (Frikha et al., 2024) demonstrated that Saudi female students exhibited greater levels of autonomy, competence, and intrinsic motivation in online PE classes than did their male counterparts. This highlights the significance of the learning environment and its impact on students' motivation and engagement. Moreover, Al Shahrani (2020) identified several motives that drive Saudi women's involvement in sports, including the pursuit of fitness, agility, health preservation, and personal satisfaction. Moreover, Aljehani et al. (2022) identified two key factors that contribute to Saudi females' participation in physical activity: personal motivation (intrinsic motivation) driven by an internal desire for physical activity and a healthy lifestyle and family support (extrinsic motivation) encompassing encouragement and praise. These findings shed light on the multifaceted nature of motivation and the various factors that influence Saudi women's engagement in physical activity.

In general, female behavior is influenced not only by intrapersonal and interpersonal factors but also by the community, social institutions, and government policy (national, state, and community laws) (Elder et al., 2007; Chen et al., 2023). Therefore, institutional integration was found to be positively correlated with motivation, PNS, and enjoyment perceptions. This seems to be in line with the findings of Kulakow and Raufelder (2020) and Pekrun et al. (2011), who demonstrated that enjoyment predicts self-determined

motivation and is positively correlated with intrinsic motivation. Other studies have postulated that student engagement and motivation to learn are linked to positive adaptation in higher education environments, including increased levels of student academic achievement (Lee, 2014; Ungar et al., 2014). Similarly, the studies of Clark et al. (2014) and Van Rooij et al. (2018) have shown that motivation is positively correlated with academic integration and that personal choices related to learning activities promote integration into campus life, facilitating academic achievement. Similar results were found by Mohamedhosein and Crul (2018), who demonstrated that there is a positive relationship between PNS and student integration into university life. The greater the level of PNS is, the greater the level of university integration, promoting both academic achievement and social adaptation.

According to Lee (2014) and Obergriesser and Stoeger (2020), emotions, specifically enjoyment, strongly affect motivation and self-regulation in students, which in turn have a predictive impact on actions that support and sustain academic accomplishment. A more recent study showed that in-class teachers' autonomy support behaviors are predictors of students' intrinsic motivation and feelings of competency, while perceived competence is the only predictor of academic achievement (Jeno et al., 2023). Consequently, students who perceive enjoyment in PE sessions are more likely to be extrinsically motivated and have high autonomy and relatedness perceptions, which can affect their integration into the institution and eventually lead to greater academic accomplishment (Leon et al., 2015; Huhtiniemi et al., 2019). Thus, the enjoyment support (Adank et al., 2024), and the learning approach in PE (Schembri et al., 2021; Sucipto et al., 2023) may constitute a promoting solutions for enhancing autonomy, relatedness and extrinsic motivation of female students. This seems to be strongly related to the belonging construct of Gillen-O'Neel (2019), which is known as students' subjective feelings of connection and integration with their institution and campus community.

To the best of our knowledge, this is the first study investigating the mediating effect of PNS and motivation on the relationship between the PAE and SII. Previous studies have shown that academic

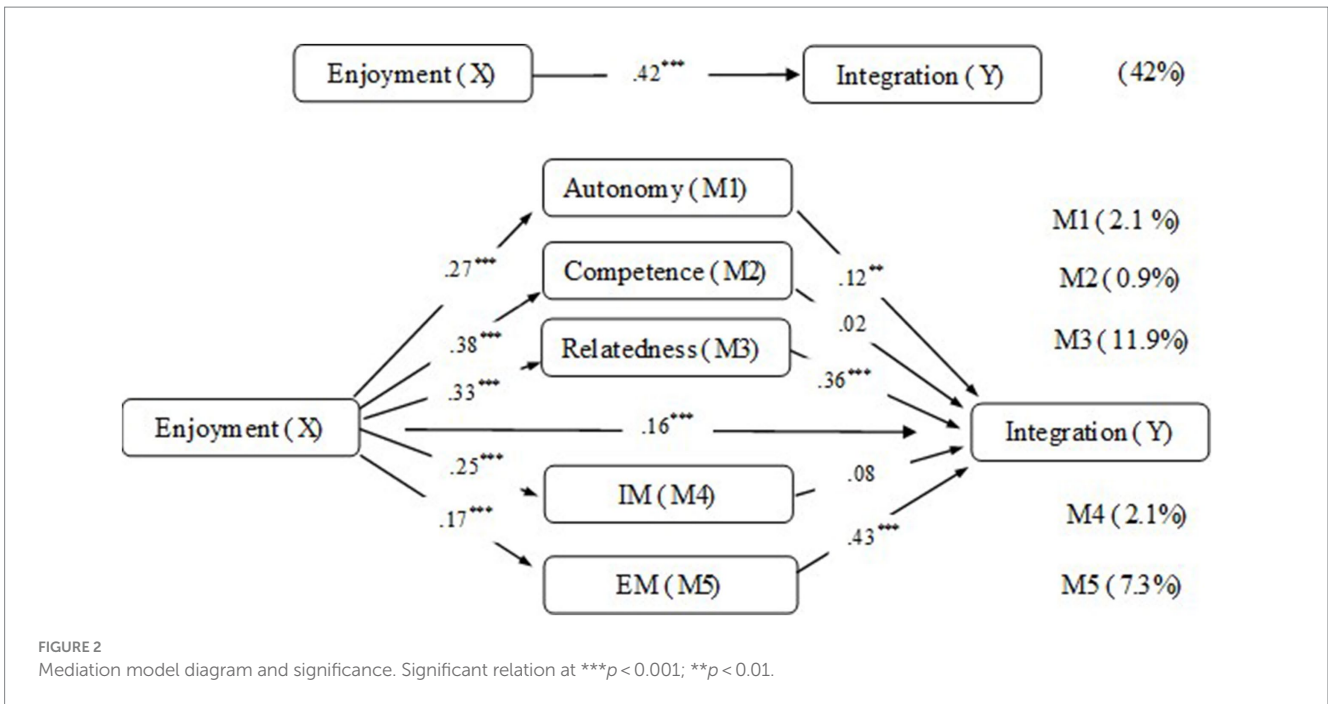
integration has a moderating influence on the relationship between PNS and intrinsic motivation (Vergara-Morales and Del Valle, 2021). Thus, academic integration as a psychological process enhances the intellectual development of students (Rienties et al., 2012) and promotes the strengthening of intrinsic motivation, one of the most significant predictors of academic achievements (Frikha et al., 2024). The research findings suggest that female students need to not only to perceive enjoyment during PE sessions, but also to be extrinsically motivated, to feel autonomy and relatedness. The mediating effects of autonomy, relatedness, and extrinsic motivation demonstrated the importance of these factors in the relationship between the PAE and SII. Indeed, students' interactions in universities with faculty members and peers are important factors in fostering a sense of integration and belonging in educational settings (Dost and Smith, 2023). These interactions have also been shown to increase students' effort, attentiveness, self-esteem, perseverance, and enjoyment during the learning process (Ulmanen et al., 2016). Although the present study failed to establish any mediation effect of intrinsic motivation and competence perception in the relationship between PAE and SII, the finding is still in accordance with the results of Berki and Tarjányi (2022) and Navarro-Patón et al. (2019) highlighting that enjoyment is a key determinant for student motivation and participation, and that intrinsic motivation is a solid predictor of enjoyment in PE classes. Moreover the PAE was found to affect achievement and social integration in school context (Ömeroğulları and Gläser-Zikuda, 2022). Furthermore, the findings suggest that to facilitate the development of enjoyment in the PE teaching-learning process, it is important to consider the environment that enhances students' satisfaction of basic psychological needs, as well as the choice of activities supporting the institutional integration of students, and the learning approach used (Sucipto et al., 2023).

The concept of physical education for girls in schools and universities in Saudi Arabia was newly introduced (Aljehani et al., 2022). Therefore, to foster SII and based on the present study findings, it is necessary to implement PA programs that support student PAE, autonomy, and relatedness perceptions. The latter are also fundamental in PE curriculum designs and in teachers' in-class didactic and

TABLE 3 Mediation analysis summary.

Total effect (SII → PAE)	Direct effect (SII → PAE)	Relationship	Indirect effect	BootSE	95% CI		t-statistics		Decision	
					LB	UB				
0.42 (0.00)	0.16(0.00)	M1	SII → Aut → PAE	0.03	0.18	0.00	0.07	2.53	a ₁ b ₁ c' > 0	CPM
		M2	SII → Com → PAE	0.01	0.02	- 0.03	0.05	0.53	a ₂ b ₂ c' < 0	NS
		M3	SII → Rel → PAE	0.12	0.02	0.08	0.16	7.03	a ₃ b ₃ c' > 0	CPM
		M4	SII → IM → PAE	0.02	0.01	- 0.01	0.05	1.65	a ₄ b ₄ c' < 0	NS
		M5	SII → EM → PAE	0.72	0.01	0.05	0.10	8.10	a ₅ b ₅ c' > 0	CPM

SII, student institutional integration; PAE, physical activity enjoyment; Aut, autonomy; Com, competence; Rel, relatedness; IM, intrinsic motivation; EM, extrinsic motivation; LB, lower band; UB, upper band; CPM, complementary partial mediation; NS, non-significant.



pedagogical behaviors. In addition, strengthening and improving the relationships established between students, teachers, administrators, and authorities, as well as promoting PA practice through extracurricular opportunities (Matta et al., 2017).

6.1 Study limitations and perspectives

The main objective of this study was to elucidate the relationship between the PAE and SII and the mediating effect of PNS and motivation perceptions. Understanding these relationships remains a crucial step in fostering the academic performance and the integration of Saudi female PE students in universities. Nonetheless, some limitations merit discussion. First, the cross-sectional design employed in this study may not be sufficient to establish causal relationships between the variables under investigation. Consequently, longitudinal studies are needed to gain a deeper understanding of how students' SII and PAEs evolve over time and in relation to their academic accomplishments. Second, the study did not consider the teaching strategies used by teachers (Rodrigues et al., 2021), students' social characteristics (Engels and Freund, 2020), which are considered essential variables in PAE improvement. Further studies are needed that focus on teachers' in-class behaviors and didactical choices in PE sessions or on students' adaptation to their new life at university with regard to their perceptions of homesickness (English et al., 2017).

7 Conclusion

The present study demonstrated the partial mediating effect of autonomy, relatedness, and extrinsic motivation perceptions on the relationship between student sense of enjoyment and institutional integration among Saudi female PE students. Overall, PAE, basic PNS (autonomy, relatedness), and extrinsic motivation are key elements

because they positively affect the SII of female PE students, which may have an impact on their achievements and reduce university dropout. Institutional integration and enjoyment should not only be encouraged in PE Saudi female students but also promoted via activities supporting their autonomy, relatedness, and extrinsic motivation perceptions. The aforementioned relationships, which have an impact on the improvement of academic achievements and on the prevention of student attrition, should be considered by teachers in choosing teaching strategies, tailoring content and interacting with students, as well as by university administrators and curriculum makers.

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 the King Faisal Ethics Committee under reference number (KFU-REC-2022- DEC -ETHICS414). 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

MF: Formal analysis, Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. NC: Visualization, Formal analysis,

Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Data curation, Conceptualization. NM: Formal analysis, Conceptualization, Writing – review & editing, Visualization, Validation, Methodology, Investigation, Data curation. AH: Formal analysis, Writing – review & editing, Visualization, Validation, Methodology, Investigation, Data curation, Conceptualization. MMA: Writing – review & editing, Data curation, Conceptualization, Funding acquisition. MSA: Writing – review & editing, Data curation, Supervision, Validation.

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Conflict of interest

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

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