PREDICTING UNIVERSITY ENGAGEMENT OF PHYSICAL EDUCATION TEACHER EDUCATION (PETE) STUDENTS VIA THREE POSITIVE TRAITS: LIFE SATISFACTION, ACADEMIC RESILIENCE, AND CURIOSITY

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ABSTRACT

Previous studies have examined life satisfaction, academic resilience, and curiosity as individual predictors of student engagement. Yet, limited evidence addresses how these traits collectively relate to university engagement, particularly among Physical Education Teacher Education (PETE) students. This study investigated the predictive roles of life satisfaction (LS), academic resilience (ARS), and curiosity and exploration (CUR) in relation to university engagement (UE) and its three dimensions: vigor (VI), dedication (DE), and absorption (ABS). A sample of 2,730 PETE students from higher education institutions across the Philippines participated, and regression analyses were conducted. Results showed that curiosity consistently demonstrated significant associations with overall university engagement and each dimension. Academic resilience related only to dedication, while life satisfaction revealed no significant links with any domain. These findings suggest that while LS and ARS may support broader well-being, curiosity is more directly tied to participation, emotional commitment, and cognitive immersion in university life. For PETE students, whose engagement spans academic and performance demands, cultivating curiosity may be vital. The study highlights the importance of fostering learning environments that encourage exploration and openness, thereby strengthening engagement and better preparing future educators to navigate the complexities of teaching and lifelong professional growth.

KEYWORDS

Academic resilience, curiosity, education policy, life satisfaction, physical education, teacher education

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Highlights

- *Life satisfaction, academic resilience, and curiosity are significantly and positively associated with the university engagement of PETE students.*
- *Among the three positive traits, curiosity emerged as the most consistent predictor across all components of engagement.*
- *Despite high R^2 values, individual trait associations with subdimensions of engagement (vigor, dedication, absorption) varied, emphasizing the multidimensional nature of student motivation.*
- *Findings underscore the importance of fostering curiosity-driven learning environments in PE teacher education to optimize engagement and support long-term academic resilience.*

INTRODUCTION

Numerous scholarly investigations have consistently highlighted the role of three positive psychological traits, such as life satisfaction, academic resilience, and curiosity, in fostering student engagement and academic performance (Antaramian, 2017; Burgos-Videla et al., 2022; Martin et al., 2022; Oliveira and Lathrop, 2022). Within the domains of educational and positive psychology, growing scholarly

interest has been directed toward these constructs due to their individual contributions to students' well-being and academic success (Kashdan et al., 2009; Veenhoven, 2015; Vidler, 1980). While substantial empirical research has examined these traits separately, there is limited evidence assessing their combined associations with university engagement. Moreover, few studies have explored how these positive traits relate to the specific components of university engagement (*vigor, dedication*, and *absorption*), particularly in the context of Philippine higher education. To address this gap, this study investigated the joint and individual associations of these three positive traits — life satisfaction, academic resilience, and curiosity —with university engagement among PETE students.

Theoretical Foundations of University Engagement and Positive Psychological Traits

Conceptualizing University Engagement

University engagement has emerged as a central construct in educational psychology, valued for its potential to predict student success and academic persistence (Liu et al., 2021). Engagement reflects the degree to which students are mentally, emotionally, and behaviorally invested in their learning processes. It manifests in behaviors such as attentiveness, curiosity, sustained effort, and emotional involvement with academic content (Charkhabi et al., 2019). Scholars have widely accepted that engagement operates across three interconnected domains: cognitive, affective, and behavioral (da Fonseca, Santos, and Santos, 2023; de Toro et al., 2023).

These domains are operationalized and contextualized through three core dimensions (Jaya and Ariyanto, 2021): *vigor* (VI), referring to energy and resilience in academic tasks (Demirbatır, 2020; Pulido-Martos et al., 2020); *dedication* (DE), which reflects a sense of purpose, enthusiasm and pride in one's studies (Listau, Christensen and Innstrand, 2017; Teuber, Nussbeck and Wild, 2021); and *absorption* (ABS), characterized by deep immersion and focus during learning activities (Dacillo et al., 2022). These dimensions form the foundation of the Utrecht Work Engagement Scale for Students (UWES-9S) by Carmona-Halty, Schaufeli, and Salanova (2019), which has been used in numerous studies to examine the correlation between engagement and various academic outcomes. A growing body of research confirms that higher engagement is consistently linked to improved academic achievement across diverse populations and learning contexts (Acosta-Gonzaga, 2023; Luo et al., 2023).

Life Satisfaction as a Psychological Resource

Life satisfaction, a key indicator of subjective well-being, refers to a person's overall evaluation of their quality of life according to self-defined standards (Gazi et al., 2025; Shin and Johnson, 1978; Veenhoven, 2015). It encompasses both emotional and cognitive appraisals of life circumstances and is closely related to an individual's perception of meaning, fulfillment, and psychological balance (Ellison, Gay, and Glass, 1989; Usán Supervía, Salavera Bordás, and Murillo Lorente, 2020). Suikkanen's (2011) rational life satisfaction theory posits that individuals evaluate their lives based not only on present feelings but also on how closely their actual experiences align with an idealized life trajectory shaped by rational self-reflection. In the academic context, life satisfaction has been linked to a range of adaptive outcomes, including increased motivation, enhanced emotional regulation, and greater resilience (Zhang et al., 2023). While primarily studied in relation to general well-being, emerging studies suggest that students who report high levels of life satisfaction tend to demonstrate greater engagement in academic activities. Longitudinal and cross-cultural investigations have consistently found that students who are content with their lives are more likely to be immersed in learning, persist through challenges, and derive meaning from school-related experiences (Rainey, 2017; Upadyaya and Salmela-Aro, 2017; Yuen, 2016).

Academic resilience and the capacity to engage

Academic resilience refers to a student's ability to adapt to and recover from significant academic setbacks or stressors (Ang et al., 2022; Van Breda, 2018). Grounded in resilience theory, it encompasses personal traits (e.g., perseverance, motivation), social support systems (e.g., relationships with teachers), and contextual factors (e.g., school climate) that help students cope effectively with adversity (Hartling, 2008; Hechanova et al., 2023). In educational settings, academic resilience has been viewed as both a protective factor and a developmental competency. Students with higher resilience are more likely to remain engaged despite academic pressures, perform well, and avoid disengagement or dropout (Fiorilli et al., 2020; García-Crespo, Fernández-Alonso, and Muñiz, 2021). Recent studies have explored how resilient students utilize support systems, regulate their emotions, and sustain their involvement in learning activities, even in challenging conditions (García-Crespo et al., 2021; Lohner & Aprea, 2021). Although some research presents mixed results regarding the strength of the relationship between resilience and engagement (Rodríguez-Fernández, Ramos-Díaz, and Axpe-Saez, 2018), many scholars argue that academic resilience can reinforce students' persistence and commitment to academic tasks (Ahmed et al., 2018; Lobo, 2023; Tortosa Martínez, Pérez-Fuentes, and Molero Jurado, 2023).

Curiosity and the drive to explore

Curiosity is widely recognized as a core driver of intrinsic motivation and learning engagement (Kashdan et al., 2009; Spitzer et al., 2023). It entails the active pursuit of novel information and experiences, reflecting a psychological readiness to explore ambiguity and uncertainty (Chang, Shih, and Lin, 2023; Jirout, 2020). Curiosity is not merely an emotional impulse. It is also a cognitive and behavioral tendency associated with personal growth, academic achievement, and adaptability (Ernst and Burcak, 2019; Evans et al., 2023). Kashdan et al. (2009) distinguish between two components of curiosity: *stretching*, which involves the active seeking of new knowledge and challenges (Fry, Elkins, and Farrell, 2023), and *embracing*, which is the willingness to accept and navigate uncertainty (Devereux, 2022). These components are crucial in fostering sustained engagement, particularly in educational environments that demand critical thinking, creativity, and openness to change (Berlyne, 1960;

Deci, 1975; Litman, 2019). Several recent studies have shown that learners with high levels of curiosity are more likely to engage meaningfully with academic content, demonstrate persistence in problem-solving, and perform better in cognitive tasks (Mahama, Yusuf Dramanu, and Asamoah-Gyimah, 2023; Schutte and Malouff, 2022). Moreover, curiosity has been positively associated with both emotional engagement and deep learning strategies, positioning it as a vital resource for academic success (Singh and Manjaly, 2022; Whitecross and Smithson, 2023).

Objectives of the study and hypotheses formulation

This study investigated the association between three positive psychological traits—life satisfaction (LS), academic resilience (ARS), and curiosity and exploration, comprising stretching (STR) and embracing (EMB) —and University Engagement (UE) among PETE students in the Philippine higher education context. Specifically, it examined the joint and individual associations of these traits with overall UE and its three subcomponents: vigor (VI), dedication (DE), and absorption (ABS). The following hypotheses guided the investigation:

- $\mathbf{H}_1$ to $\mathbf{H}_5$: LS, ARS, STR, and EMB, as well as their joint construct, were each positively associated with UE
- $\mathbf{H}_6$ to $\mathbf{H}_{10}$: LS, ARS, STR, and EMB, and their joint construct was each positively associated with VI
- $\mathbf{H}_{11}$ to $\mathbf{H}_{15}$: LS, ARS, STR, and EMB, and their joint construct was each positively associated with DE
- $\mathbf{H}_{16}$ to $\mathbf{H}_{20}$: LS, ARS, STR, and EMB, and their joint construct was each positively associated with ABS

METHODS AND MATERIALS

Participants and Sampling Technique

This study involved undergraduate students enrolled in the Physical Education Teacher Education (PETE) program from multiple higher education institutions in the Philippines. A combination of *purposive* and *convenience* sampling was employed to recruit participants who met specific eligibility criteria: (1) current enrollment in any teacher education specialization, (2) aged 19 years and above, and (3) identifying as either male or female. These techniques allowed for efficient access to participants who could provide relevant and meaningful responses (Bhardwaj, 2019; Frey, 2018). Data collection was conducted from February to April 2022. A total of 2,730 valid responses were obtained and retained for analysis after data cleaning. The demographic characteristics of the participants are presented in Table 1.

Variables	Items	*N* (%)
Sex	Male	1031(37.8%)
	Female	1699(62.2%)
Age group	19-21 years old	2232(81.8%)
	22-24 years old	409(15.0%)
	25 years old and above	89(3.3%)
Institution	Aklan State University	432(15.8%)
	Northern Iloilo State University	365(13.4%)
	Capiz State University	430(15.8%)
	Central Luzon State University	863(31.6%)
	Mabalacat City College	296(10.8%)
	Pampanga State Agricultural University	344(12.6%)

Table 1: Demographic Profile of the respondents

Instruments and Data Gathering

Five self-report instruments were used in this study. The first section of the questionnaire collected demographic information, including sex, age group, and academic institution. All psychometric scales were administered in English, which is both the official language and primary medium of instruction in Philippine higher education. Therefore, no translation or cultural adaptation was further performed.

To assess life satisfaction, the Satisfaction with Life Scale (SwLS) by Diener et al. (1985) was adopted. This 5-item scale uses a 7-point Likert format ranging from 1 ("strongly disagree") to 7 ("strongly agree"), with higher scores indicating greater life satisfaction. A sample item includes: "The conditions of my life are excellent." Furthermore, to measure trait curiosity, the Curiosity and Exploration Inventory-II by Kashdan et al. (2009) was employed. This 10-item instrument is divided into two subdimensions: Stretching (e.g., "I am at my best when doing something complex or challenging") and Embracing (e.g., "Everywhere I go, I am out looking for new things or experiences"), rated on a 5-point Likert scale from 1 ("very slightly or not at all") to 5 ("extremely"). Moreover, academic resilience was measured using the Academic Resilience Scale (ARS-30) developed by Cassidy (2016). This 30-item instrument assesses cognitive, affective, and behavioral responses to academic challenges. Items (e.g., "I would start to monitor and evaluate my achievements and effort") are scored on a 5-point Likert scale ranging from 1 ("unlikely") to 5 ("likely"). Lastly, university engagement was assessed through the Utrecht Work Engagement Scale for Students (UWES-9S) by Carmona-Halty et al. (2019). This 9-item tool measures three dimensions: vigor (e.g., "I feel energetic and capable when I'm studying or going to class"), dedication (e.g., "I am proud of my studies") and absorption (e.g., "I feel happy when I am studying immensely"), rated from 0 ("never") to 6 ("always"). For all instruments, composite scores were computed by summing item responses. Higher composite scores represent higher levels of the respective constructs.

Data analysis

A normality and reliability test was first performed on all the variables being examined. Based on the findings, most of the scales obtained the threshold value of -2 to 2. In this regard, it can be determined that the data are normally distributed [SwL (5.45 ± 1.35; *Skew* = -1.134 *Kurt* = 1.002), ARS (3.61 ± .38; *Skew* = .582 *Kurt* = 3.258), curiosity and exploration: STR (4.19 ± .83; *Skew* = -1.890 *Kurt* = 3.913), EMB (4.07 ± .75; *Skew* = -1.561 *Kurt* = 3.000), UE (4.09 ±.76; *Skew* = -1.659 *Kurt* = 3.258), VI (4.06 ± .75; *Skew* = -1.315 *Kurt* = 2.006), DE (4.31 ± .83; *Skew* = -1.970 *Kurt* = 4.082), and ABS (3.89 ± .78; *Skew* = - .986 *Kurt* = .1234)]. Furthermore, the reliability test has shown that all scales obtained high reliability scores [SwL ($\alpha \approx .93$), ARS ($\alpha \approx .81$), Curiosity and Exploration: STR ($\alpha \approx .93$), EMB ($\alpha \approx .89$), UE ($\alpha \approx .95$), VI ($\alpha \approx .87$), DE ($\alpha \approx .90$), and ABS ($\alpha \approx .84$)]. Lastly, a series of *multiple regression analysis* was performed. This form of modeling involves predicting a target variable by utilizing data derived from multiple predictors (Li et al., 2022). In the present analysis, the present study has three predicting variables. The objective is to explore the association of these predictors with university engagement. Finally, the three aforementioned predictor variables will be analyzed as a single model to assess their influence on the three separate dimensions of UE.

Ethical Statement

The respondents were provided with information regarding the objectives of the research, as well as the particular measurements and factors that were of importance. The researchers have additionally communicated the study's implications to the various universities and the broader scientific community. The participants indicated their consent by selecting an integrated agreement option within the Google Forms. Additionally, they were provided with the opportunity to choose whether or not to participate. The potential for respondents to experience discomfort when answering personal and sensitive survey questions was also identified as a minor risk that participants should consider before consenting to participate in the study. Respondents were allowed to withdraw or receive debriefing at any point, according to these restrictions.

RESULTS

The regression analysis showed that the combination of LS, ARS, STR, and EMB significantly predicted overall UE [$F(4, 2725) = 149{,}061.180$, $p < .001$]. The model accounted for 99.5% of the variance ($R^2 = .995$). Among the predictors, STR ($\beta = .431$, $t = 142.723$, $p < .001$) and EMB ($\beta = .567$, $t = 169.676$, $p < .001$) were positively and significantly associated with UE. In contrast, LS ($\beta = -.001$, $t = -.851$, $p = .395$) and ARS ($\beta = -.005$, $t = -1.783$, $p = .075$) were not significant.

For VI, the model remained significant [$F(4, 2725) = 10{,}083.833$, $p < .001$], explaining 93.7% of the variance ($R^2 = .937$). Both STR ($\beta = .158$, $t = 12.934$, $p < .001$) and EMB ($\beta = .911$, $t = 67.551$, $p < .001$) significantly predicted VI, while LS ($\beta = .002$, $t = .654$, $p = .513$) and ARS ($\beta = .010$, $t = .947$, $p = .344$) did not. A similar pattern emerged in the DE model [$F(4, 2725) = 6{,}496.695$, $p < .001$], explaining 90.5% of the variance ($R^2 = .905$). Both STR ($\beta = .647$, $t = 43.446$, $p < .001$) and EMB ($\beta = .357$, $t = 21.631$, $p < .001$) remained significant predictors. Interestingly, ARS ($\beta = -.027$, $t = -2.115$, $p = .035$) was also significant but negatively associated, while LS ($\beta = .001$, $t = .188$, $p = .851$) remained non-significant. For ABS, the model was also significant [$F(4, 2725) = 3{,}339.627$, $p < .001$], explaining 90.5% of the variance ($R^2 = .905$). Both STR ($\beta = .488$, $t = 25.935$, $p < .001$) and EMB ($\beta = .433$, $t = 20.801$, $p < .001$) significantly predicted ABS. LS ($\beta = -.004$, $t = -.982$, $p = .326$) and ARS ($\beta = .031$, $t = 1.919$, $p = .055$) again showed no significant association. Across all models, STR and EMB consistently emerged as the strongest predictors of UE and its components (VI, DE, ABS). At the same time, LS and ARS showed limited or no significant direct associations, as can be seen in Table 2.

DISCUSSION

This study examined the associations between life satisfaction, academic resilience, curiosity, and exploration and university engagement among PETE students. The regression analyses revealed that while all three constructs contributed to the overall model, only curiosity consistently showed significant and positive associations with the university engagement of PETE students and its subcomponents. In contrast, life satisfaction and academic resilience demonstrated minimal or inconsistent associations with engagement, suggesting the primacy of curiosity-driven dispositions in sustaining PETE students' academic involvement.

The absence of a significant association between life satisfaction and university engagement diverges from earlier empirical assertions that students who are satisfied with their lives are more likely to invest effort and energy in academic activities (Rainey, 2017; Upadyaya and Salmela-Aro, 2017; Yuen, 2016). While these prior studies emphasize a reciprocal dynamic between well-being and engagement, the present findings highlight a more nuanced picture. Life satisfaction is often considered a global and subjective assessment of one's quality of life (Shin and Johnson, 1978; Zhou and Lin, 2016), which may not directly translate to daily academic behaviors. It is plausible that students may perceive their lives as fulfilling without necessarily feeling compelled to participate vigorously in university tasks. Factors external to the academic domain (i.e., family life, friendships, or spirituality) could shape their sense of satisfaction, thereby diluting any direct connection to academic engagement (Amati et al., 2018; David et al., 2022; Vautero et al., 2021). This highlights the importance of considering life satisfaction as a distinct dimension of psychological well-being that may not always align with students' academic motivations or investments.

Similarly, the limited associations observed between academic resilience and university engagement call for critical reflection. While academic resilience has often been described as a protective factor that enables students to recover from setbacks and maintain goal-directed behavior (Allan, McKenna, and Dominey, 2014; Fiorilli et al., 2020; Martin, 2013), the current findings suggest that such resilience may not necessarily foster higher levels of engagement across all contexts. Interestingly, while academic resilience showed a modest negative association with dedication, it was not a consistent predictor of vigor or

Hypothesis	Regression weights	Beta Coefficient	R^2	*F*	*t*	*p*	Decision
H_1	LS+ARS+STR+EMB → UE	-	.995	149061.180	-	< .001	Accepted
H_2	LS → UE	- .001	-	-	- .851	.395	Rejected
H_3	ARS → UE	.005	-	-	1.783	.075	Rejected
H_4	STR → UE	.431	-	-	142.723	< .001	Accepted
H_5	EMB → UE	.567	-	-	169.676	< .001	Accepted
H_6	LS+ARS+STR+EMB → VI	-	.937	10083.833	-	< .001	Accepted
H_7	LS → VI	.002	-	-	.654	.513	Rejected
H_8	ARS → VI	.010	-	-	.947	.344	Rejected
H_9	STR → VI	.158	-	-	12.934	< .001	Accepted
H_{10}	EMB → VI	.911	-	-	67.551	< .001	Accepted
H_{11}	LS+ARS+STR+EMB → DE	-	.905	-	6496.695	< .001	Accepted
H_{12}	LS → DE	.001	-	-	.188	.851	Rejected
H_{13}	ARS → DE	- .027	-	-	-2.115	.035	Accepted
H_{14}	STR → DE	.647	-	-	43.446	< .001	Accepted
H_{15}	EMB → DE	.357	-	-	21.631	< .001	Accepted
H_{16}	LS+ARS+STR+EMB → DE	-	.905	3339.627	-	< .001	Accepted
H_{17}	LS → ABS	- .004	-	-	- .982	.326	Rejected
H_{18}	ARS → ABS	.031	-	-	1.919	.055	Rejected
H_{19}	STR → ABS	.488	-	-	25.935	< .001	Accepted
H_{20}	EMB → ABS	.433	-	-	20.801	< .001	Accepted

Legend: LS- Life Satisfaction, ARS- Academic Resilience, Curiosity and Exploration (STR- Stretching, EMB- Embracing), UE- University Engagement (VI- Vigor, DE- Dedication, ABS- Absorption)

Table 2: Predicting university engagement and subdimensions from life satisfaction, academic resilience, and curiosity constructs: Summary of regression models

absorption. This could indicate that resilience operates more as a reactive capacity (activated during adversity), rather than as a day-to-day driver of motivation or focus. Students may possess strong coping skills but still exhibit disengagement if the learning environment lacks challenge, relevance, or emotional support. Moreover, the educational climate in which students operate may either activate or suppress the expression of resilient behaviors (Lacoe, 2020; Thapa et al., 2013). This aligns with the view that resilience is context-sensitive and may require the presence of adversity or meaningful goals to manifest as sustained academic energy (Riley and Masten, 2005).

On the other hand, the role of curiosity and exploration emerged as central in understanding students' engagement with university life. Both stretching and embracing were strongly and positively associated with all three dimensions of university engagement. These findings affirm the theoretical argument that curiosity is a fundamental psychological resource that promotes sustained academic involvement (Fry et al., 2023; Schutte and Malouff, 2022). Students who actively seek novel information and show a willingness to engage with complexity are more likely to experience learning as a meaningful and energizing process (Lobo, 2024; Lobo et al., 2024). In contrast to resilience or life satisfaction, curiosity functions as an anticipatory trait, encouraging proactive exploration rather than simply helping students bounce back from challenges. This aligns with Dubey, Griffiths, and Lombrozo's (2022) conceptualization of curiosity as a multi-faceted driver of intellectual growth, competence development, and motivational persistence throughout the lifespan. In the university context, which often demands independent learning and abstract thinking, curiosity appears to be a particularly adaptive asset.

In sum, this study highlights the differential roles that life satisfaction, academic resilience, and curiosity and exploration play in relation to students' university engagement. Although life satisfaction and academic resilience are often emphasized in educational research as crucial psychological resources, their direct associations with vigor, dedication, and absorption appeared limited in this context. By contrast, the strong and consistent associations between curiosity-based traits and all components of engagement underscore their centrality in understanding what motivates students to meaningfully connect with academic life. These findings contribute to a more nuanced understanding of student engagement and invite further research into how these traits operate across varying learning conditions and student populations.

CONCLUSION

This study examined the relationships between life satisfaction, academic resilience, curiosity-exploration traits, and university engagement among Physical Education Teacher Education (PETE) students in the Philippines. Findings revealed that while life satisfaction and academic resilience had limited or non-significant associations with students' engagement in the university context, curiosity-related traits showed strong and consistent links with overall engagement and its subdimensions. These results suggest the importance of interest-driven and exploratory dispositions over generalized psychological well-being or adversity-coping traits in predicting engagement behaviors within the higher education landscape, particularly among pre-service physical educators.

Implications and pedagogical applications

The study has direct implications for PETE programs and teacher education pedagogy. Since curiosity showed the most

robust associations with university engagement, Physical Education instruction should prioritize strategies that ignite and sustain exploratory learning. This includes incorporating movement-based inquiry, problem-solving in physical activities, gamification of fitness principles, and culturally meaningful sports and dance traditions that invite students to ask questions, try new forms, and make meaning from embodied experience.

Moreover, given that PETE students are being trained to become future educators, the development of curiosity is not only essential for their own learning but also vital for cultivating curiosity in their future learners. Therefore, teacher training curricula should model curiosity-driven instruction, encouraging reflective practice, innovation in lesson planning, and integration of learner-centered pedagogies. This aligns with the growing emphasis on 21st-century teaching competencies that extend beyond content delivery to promote critical thinking, adaptability, and lifelong learning.

It also invites institutions to critically assess the limitations of purely resilience-based or wellness-centered interventions, which, while important, may not directly foster classroom engagement or teaching motivation. Instead, institutions should consider designing professional growth experiences that position curiosity as a pedagogical asset, especially in dynamic disciplines like physical education, where creativity, flexibility, and exploratory teaching are central.

Limitations of the study

Despite its meaningful contributions, this study acknowledges several limitations. First, data were obtained through self-reported instruments, which are susceptible to biases such as social desirability, overreporting of engagement, or misinterpretation of survey items. Second, all psychological and engagement-related constructs were analyzed as composite scores, which, while statistically efficient, may mask finer variations and multidimensional nuances within each construct. Third, although the study yielded relatively high R^2 values, this should be interpreted cautiously. The strength of these predictive relationships, while encouraging, may partly reflect contextual or methodological artifacts. Specifically, the lack of construct revalidation for the Filipino PETE population means that instrument sensitivity and cultural alignment could have influenced the precision of measurement and inflated explained variance estimates. Fourth, the cross-sectional nature of the design prohibits any conclusions about temporal dynamics or developmental progression. Engagement and psychological traits may evolve significantly over the course of a PETE student's academic journey, particularly during transitions from theoretical coursework to a field-based teaching practicum. Therefore, a snapshot view limits the generalizability of associations over time. Fifth, while the sample size was statistically robust and drawn from multiple institutions, it may still fall short of representing the full heterogeneity of PETE learners across the country, especially those from geographically isolated or resource-deprived institutions. Lastly, the study centered solely on intra-individual psychological traits, excluding critical contextual variables such as instructional quality, peer collaboration, institutional support systems, and access to physical activity spaces, all of which may significantly influence student engagement in physical education contexts. These limitations provide valuable guidance for refining future inquiries and temper the interpretation of the high predictive capacity suggested by the model.

Future research directions

Future studies are encouraged to examine how contextual and environmental variables interact with individual traits to shape engagement in PETE programs. Mixed-methods designs could enrich understanding by capturing the voices of students in naturalistic teaching and learning settings. Longitudinal studies would also help track how curiosity and engagement evolve across the teacher education journey, from coursework to field experiences and internship placements. Further validation of curiosity constructs within the PE and Filipino cultural context is warranted, especially in ensuring semantic alignment of terms like "embracing uncertainty" or "stretching knowledge" when applied to embodied learning. Exploring the impact of teacher modeling, learning climate, and curriculum design on the development of curiosity in PE settings could also provide important pedagogical insights. Comparative studies across academic disciplines might also help determine whether the strength of associations found here is unique to PETE or generalizable to other professional programs.

Contribution to global discourse

This study contributes to global conversations on student engagement by highlighting the critical role of curiosity in shaping the academic vitality of future educators. Examining PETE students in a Global South context adds empirical weight to the argument that fostering intellectual exploration and openness may be more effective in stimulating meaningful academic participation than relying solely on well-being or adversity-based constructs. Moreover, the findings encourage rethinking how institutions support teacher candidates, not merely through resilience-building but by fostering cognitive-affective dispositions that are more directly aligned with sustained engagement and pedagogical creativity. This opens new dialogues on interest development, embodied curiosity, and motivation in movement-based education, expanding the global framework of student engagement to include culturally grounded, discipline-specific, and curiosity-informed perspectives.

DECLARATIONS

Conflict of Interest

The contributors hereby certify that there are no conflicts of interest.

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Data and Materials

Access to materials and data will be provided exclusively upon request.

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