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Driven by grit, inspired by curiosity: Enhancing students' academic engagement in Physical Education in the higher education system

Impulsados por la determinación, inspirados por la curiosidad: cómo mejorar el compromiso académico de los estudiantes en la educación física en el sistema de educación superior

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Abstract

This study examined the roles of grit and curiosity in predicting academic engagement among physical education students at a selected state university. Using quantitative methods with a sample of undergraduates enrolled in Physical Activity Toward Health and Fitness courses, it assessed the influence of these psychological traits on academic engagement. The results showed that grit significantly predicted academic engagement, highlighting its importance in fostering perseverance and sustained effort. However, curiosity alone did not significantly influence engagement, though combined with grit, it contributed to a more profound interest in learning. The study acknowledged limitations such as focusing on a single university and potential bias from self-report measures. Despite these limitations, the research added valuable insights specific to this studied context, indicating that educational strategies should aim to develop both grit and curiosity to enhance student engagement and performance in physical education and other academic areas.

Keywords: curiosity, higher education, motivation, perseverance, physical education.

Resumen

Este estudio examinó el papel de la determinación y la curiosidad en la predicción del compromiso académico entre los estudiantes de educación física en una universidad estatal seleccionada. Utilizando métodos cuantitativos con una muestra de estudiantes de grado matriculados en cursos de Actividad Física para la Salud y el Fitness, evaluó la influencia de estos rasgos psicológicos en el compromiso académico. Los resultados mostraron que la determinación predijo significativamente el compromiso académico, destacando su importancia para fomentar la perseverancia y el esfuerzo sostenido. Sin embargo, la curiosidad por sí sola no influyó significativamente en el compromiso, aunque combinada con la determinación, contribuyó a un interés más profundo en el aprendizaje. El estudio reconoció limitaciones como centrarse en una sola universidad y el sesgo potencial de las medidas de autoinforme. A pesar de estas limitaciones, la investigación agregó información valiosa específica para este contexto estudiado, indicando que las estrategias educativas deben apuntar a desarrollar tanto la determinación como la curiosidad para mejorar el compromiso y el rendimiento de los estudiantes en educación física y otras áreas académicas.

Palabras clave: curiosidad, educación superior, motivación, perseverancia, educación física.

Introduction

The relationship between psychological traits such as grit and curiosity and academic engagement has been widely studied in various educational contexts worldwide (Lobo, 2024; Oliveira & Lathrop, 2022). *Grit*, characterized by sustained effort and perseverance toward long-term goals (Kannangara et al., 2018), and *curiosity*, the intrinsic motivation to explore and seek out knowledge (Berlyne, 1960), have both

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positively influenced academic engagement. Numerous studies highlighted these traits' significant role in fostering student commitment and success (Hong, 2014; Jones et al., 2023). However, research on grit and curiosity as predictors of academic engagement still needs to be improved in an understudied part of the globe, such as the Philippines, particularly within higher education settings. Given the study's unique cultural and educational landscape, further investigation is crucial to understand how these traits influence academic engagement among college students and determine whether global study findings apply similarly to local contexts.

In the Philippines, PE is integral to the higher education curriculum, designed to promote holistic development among students (Tolentino & Sinio, 2024). The Commission on Higher Education (CHEd) mandates PE courses across various degree programs, underscoring the importance of physical fitness, mental well-being, and the cultivation of social skills (Aquino, 2023). PE programs in the Philippines aim to enhance physical abilities and contribute to developing life skills such as leadership, discipline, and perseverance (Malones, 2024) —attributes closely related to grit and curiosity. Despite its significance, research on how these psychological traits manifest in PE settings within the Philippine higher education system remains limited. Therefore, Understanding PE's role in fostering academic engagement and resilience in students is essential, particularly in light of the country's cultural emphasis on holistic education.

Gritty, Grittier, Grittiest – *Does it matter in the higher education?*

Grit, a concept popularized by Duckworth et al. (2007), refers to perseverance and passion for long-term goals and has become a key predictor of success across various fields (Duckworth et al., 2007a). In higher education, grit is often seen as a critical trait that enables students to persist through academic challenges and remain engaged despite setbacks (Datu, 2021). The distinction between different levels of grit can be understood as variations in how students demonstrate resilience in the face of adversity. While all students may encounter obstacles during their academic journey, those with higher grit levels are often better equipped to navigate these difficulties (Toyama, 2024). Furthermore, students remain focused on their goals, and sustain their

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efforts over time. This raises the question of whether the degree of grit significantly impacts student outcomes in higher education.

In the higher education context of this study's locale, where pressures such as economic hardship and demanding coursework can weigh heavily on students (Pagulayan et al., 2021). Thus, understanding the varying degrees of grit is essential. Limited research has explored how different levels of grit influence academic engagement and success in this setting. Are grittier students more likely to succeed, or does the grittiest perseverance result in diminishing returns due to burnout or stress? Investigating these nuances can shed light on the role of grit in academic resilience and offer insights for educators and policymakers to develop targeted interventions that support students in achieving their academic goals, regardless of where they fall on the grit spectrum. Self-Determination Theory provides a valuable framework for understanding how individuals sustain motivation and effort toward long-term goals (Deci & Ryan, 1985). According to SDT, when students experience a sense of autonomy, competence, and relatedness, they are more likely to remain intrinsically motivated. Hence, this directly supports their persistence through challenges. This intrinsic motivation aligns with the core aspects of perseverance in educational settings. Students who feel that their academic goals are self-directed and meaningful are more likely to persist in their efforts. Furthermore, the need for competence in SDT suggests that students who believe in their abilities are better equipped to continue working toward their goals. Therefore, further supporting sustained engagement and resilience in academic pursuits.

Curiosity – *does it drive students to engage more?*

The innate human propensity for curiosity serves as a powerful catalyst for motivation, constituting a key focus of investigation among psychologists and educational researchers who explore core qualities and personality traits (Spitzer et al., 2023). The investigation of curiosity has encountered challenges in the form of conflicting vocabulary, operational descriptions, and measuring methodologies. This has hindered its progress despite its appeal to academics. Intrinsic motivation is frequently conceptualized in manners congruent with curiosity (Di Domenico & Ryan, 2017). Intrinsic motivation is the inherent inclination of individuals to actively pursue novelty,

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challenges, personal growth, exploration and learning (Ryff, 1989). It stands out as a remarkable manifestation of the good aspects of human nature (Ryff, 1989). Similarly, the belief in flow, characterized by complete engagement in a demanding and pleasurable task, necessitating the utilization of one' entire skill set, has been delineated as an intensified manifestation of curiosity (Fredrickson, 1998).

Curiosity, a psychological construct, is sometimes utilized synonymously with several other phrases, such as interest, novelty-seeking, and openness to experience, among many others. Inherent in this conceptualization of curiosity is the notion that individuals must possess a feeling of self-efficacy. This is to adequately navigate and comprehend the new, ambiguous, and unpredictable situations encountered during their exploratory endeavors. The level of confidence may exhibit variability depending on the specific circumstances (Lochbaum et al., 2022). However, confidence is likely manifested through a readiness to accept and engage with daily existence's unfamiliar, uncertain, and capricious aspects. A crucial aspect of this concept pertains to embracing uncertainty rather than succumbing to fear and evading it (Anderson et al., 2019). Throughout an individual's life, curiosity plays a multifaceted role in facilitating the acquisition of knowledge, development of skills, establishment of relationships, and cultivation of expertise (Ernst & Burcak, 2019). Ultimately, individuals who engage with unfamiliar stimuli are inevitably subjected to a certain extent of unique knowledge and experiences that were previously inaccessible (Kashdan et al., 2009). Hence, an additional characteristic of curiosity entails the inclination and aspiration to consistently amass novel skills and encounters.

The concept of curiosity encompasses individuals' inclination to expand their abilities. Curiosity is the cognitive process of recognizing, embracing, and actively seeking knowledge and novel experiences (Chang et al., 2023). The body of research about the advantages of curiosity is still in its nascent stages of development. Curiosity is believed to contribute to various adaptive outcomes. Including the development of intelligence, wisdom, happiness, purpose in life, distress tolerance, gratifying and engaging social interactions, and school involvement (Karcher et al., 2022; Kashdan et al., 2020). According to the research conducted by Kashdan et al. (2009), curiosity can be delineated into two unique components, as measured by their produced curiosity

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assessment tool. Firstly, the concept of *stretching* can be characterized as actively engaging in the pursuit of novel information and experiences (Fry et al., 2023). Conversely, *embracing* refers to the inclination to accept and adapt to daily existence's new, unfamiliar, and unpredictable aspects (Devereux, 2022). The convergence of the dimensions of stretching and embracing is observed through the interconnecting parts of curiosity as expounded upon by numerous theorists (Berlyne, 1960; Deci, 1975; Litman, 2019).

Aims and Hypotheses of the Study

Published scholarly works have determined that grit and curiosity are both two positive psychological traits that can predict academic engagement (Papendieck & Clarke, 2024; Zhao et al., 2024). In this regard, this study is determined to assess if these two particular constructs predict students' academic engagement in Physical Education, specifically in the higher education landscape. Therefore, this present study tested the following hypotheses:

H_1 Grit and Curiosity predicts Academic Engagement;

H_{1a} Grit influences Academic Engagement; and

H_{1b} Curiosity influences Academic Engagement.

METHODS

Participants and Sampling Technique

The research focused on undergraduate students who were enrolled in Physical Activity Toward Health and Fitness 2 and 4 (PATH-Fit 2 and 4) courses at a specified higher education institution. A *purposive sampling* method, a targeted non-random approach aimed at selecting participants with specific traits, was used to obtain relevant and meaningful insights. Data collection was carried out between September and December 2023. To ensure the validity and reliability of the gathered data, a set of well-defined selection criteria was applied to the survey respondents:

1. Currently enrolled in PATH-Fit 2 and 4 courses;
2. From various spectrum of gender; and
3. Ages 19 years old and above.

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To determine the appropriate sample size for this study, the Raosoft Sample Size Calculator was employed. With an estimated population of 1,500 students enrolled in PATH-FIT 2 and 4, the required sample size was calculated to be 306 (CF: 95%, MOE: 5%). During the data collection process, 404 responses were received. After conducting data cleansing procedures, 312 valid responses were retained for analysis, resulting in an overall response rate of 77.23%. Table 1 provides a breakdown of the respondents' gender distribution, with the majority being male (58.3%), followed by female respondents (34.6%), LGBTQIA+ (5.4%), and choosing not to disclose their gender (1.6%). The ages of participants ranged from 19 to 28 years, with an average age of 21.33 years.

Table 1. Gender distribution of the respondents

Variable	Items	N(%)
Gender	Male	182(58.3%)
	Female	108(34.6%)
	LGBTQIA+	17(5.4%)
	Prefer not to disclose	5(1.6%)
	Total	312(100.00%)

Instruments

The present study has gathered data through the use of online survey by using Google Forms. Online survey offers the advantage of quickly reaching a large number of participants with minimal logistical effort. The survey questionnaire used in the present study is divided into fourt parts. The first part asked the respondents for their age and gender. The second part is the Grit Scale by Duckworth et al. (2007b). It is a 12-item validated psychometric tool designed to measure an individual's perseverance and passion for long-term goals through self-reported assessments. The data are encoded using a 5-point Likert scale ranging from 1- not like me at all to 5- very much like me. The third part is the Curiosity and Exploration Inventory-II by Kashdan et al. (2009). It is a 10-item self-report instrument which measures individual differences in the recognition, pursuit, and integration of novel and challenging experiences and

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information. The said questionnaire is subdivided into two constructs: Stretching and Embracing. Responses are encoded in a 5-point Likert Scale from 1- very slightly or not at all to 5- extremely. Lastly, is the Utrecht Work Engagement Scale for Students (UWES-9S) by Carmona-Halty et al. (2019). This particular scale is a nine-item self-report instrument that measures the overall engagement of students. This particular instrument is subdivided into three unique features: Vigor, Dedication and Absorption. The responses are documented in a 6-point Likert Scale from 0- never to 6- always. In this, the online survey link was distributed by the physical education instructors of the institution through Google Classroom for each of their respective classes from September to December 2023.

To guarantee the cultural relevance and reliability of the questionnaires, a factor analysis was performed using SmartPLS4. Items were retained only if their factor loadings surpassed 0.70, following the guidelines of Hair et al. (2021), with any items below this threshold being excluded. Reliability was confirmed through Cronbach's Alpha and Composite Reliability, which needed to exceed 0.70 (Hair et al., 2021). The Average Variance Extracted (AVE), used to assess the extent to which items capture a construct, was also examined, with an acceptable threshold set at >0.50 (Hair et al., 2021). Additionally, statistical significance was ensured with a p-value of <0.05 (Hair et al., 2021). In this, Table 2 demonstrates that the threshold values for Cronbach's Alpha, composite reliability, and average extracted variance have been met for Grit (CA: 0.888, CR: 0.889, AVE: 0.642), Curiosity (CA: 0.953, CR: 0.981, AVE: 0.697) and Academic engagement (CA: 0.920, CR: 0.921, AVE: 0.714), establishing convergent validity. Also, an evaluation of collinearity was also conducted to verify the absence of common method bias (CMB). In this, the results required to show variance inflation factors (VIF) values below the acceptable threshold of <5 (Hair et al., 2019), ensuring no significant multicollinearity issues were present as can be seen as well in Table 2. Additionally, discriminant validity was assessed using the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio. As shown in Table 3, the square root of the AVE values exceeded the correlations between the latent variables, indicating that discriminant validity has been established.

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Table 2. Measurement model assessment, convergent validity metrics and variance inflation factors

Variables	Items	Item loadings	CA	CR	AVE	VIF
Grit	GRT1	0.813	0.888	0.889	0.642	2.246
	GRT4	0.776				1.976
	GRT6	0.791				2.100
	GRT9	0.808				2.153
	GRT10	0.803				2.938
	GRT12	0.816				3.049
Curiosity	CEI1	0.808	0.953	0.981	0.697	2.845
	CEI2	0.738				2.413
	CEI3	0.825				3.505
	CEI4	0.816				3.325
	CEI5	0.877				4.792
	CEI6	0.861				3.080
	CEI7	0.876				3.635
	CEI8	0.875				4.184
	CEI9	0.866				3.490
	CEI10	0.799				2.190
Academic Engagement	VI2	0.843	0.920	0.921	0.714	2.405
	VI3	0.843				2.580
	DE2	0.836				2.571
	DE3	0.863				2.974
	AB1	0.852				2.676
	AB3	0.833				2.431

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Table 3. Discriminant validity metrics

Constructs	CEI	ENG	GRT
	Fornell-Larcker Criterion		
CEI	0.835		
ENG	-0.104	0.845	
GRT	-0.054	0.705	0.801
	Heterotrait-Monotrait Ratio (HTMT)		
CEI			
ENG	0.098		
GRT	0.075	0.777	

Legend: CEI- Curiosity, ENG- Academic Engagement, GRT- Grit.

Finally, Table 3 displays the HTMT ratio results, all of which were below the recommended threshold of <0.90. Thus, discriminant validity has been confirmed. On the one hand, concerning the model fit estimated model: SRMR: 0.05; d_ULS: 0.64; d_G: 0.39; χ^2: 696.981; NFI: 0.88. The SRMR value is <0.08, χ^2 is <=3, and NFI value is within the threshold value which is considered a good fit. In this regard, it can be assumed that the instrument is valid, reliable, and applicable in the current context of the study.

Statistical Analysis

Gender distribution was analyzed using frequency and percentage statistics, while the mean was calculated for age. A normality test, a statistical procedure used to determine whether a data set follows a normal distribution (a bell-shaped curve), was performed to evaluate the distribution of the constructs under study (Mishra et al., 2019). A normal distribution is crucial because many statistical tests, including regression analysis, assume that data follows this pattern. As presented in Table 4, all four constructs fell within the acceptable normality range (between -2 and 2 for skewness and kurtosis), confirming that the data is normally distributed.

Subsequently, multiple regression analysis was employed to evaluate the direct influence of grit and curiosity on academic engagement. Multiple regression is a

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statistical technique that assesses the relationship between a dependent variable (in this case, academic engagement) and two or more independent variables (grit and curiosity) (Mohr et al., 2022). Using this method, the analysis can determine how much each independent variable contributes to predicting academic engagement while controlling for the influence of the other variables. This approach provides insights into the relative influence of grit and curiosity on the engagement levels of students academically.

Table 4. Normality estimates

Constructs	Mean ± Std. Dev.	Skewness	Kurtosis
Grit	3.87 ± .78	-.540	-.022
Curiosity	3.92 ± .89	-1.339	1.791
Academic Engagement	3.85 ± .79	-.496	0.71

Ethical Statement

Ethical considerations were strictly adhered to throughout the study. Data were collected via an online survey using Google Forms, which outlined the study's purpose, inclusion criteria, and the variables to be measured. The voluntary nature of participation was emphasized, and respondents were informed of their right to withdraw at any time. Potential risks, such as discomfort when answering sensitive questions, were disclosed, and no monetary compensation was provided. Data were securely stored on a password-protected Excel file, with access limited to the researchers, and were stored on a USB drive for three months before being permanently deleted. Respondents were assured that their information would not be used for any future research. Anonymity and confidentiality were maintained throughout the data collection, analysis, and reporting stages. All processes complied with the Data Privacy Act of 2012 (RA 10173).

RESULTS

Table 5 shows that grit and curiosity are significant predictors of academic engagement in Physical Education [$F(2, 309) = 151.146$, $p < .001$], explaining 49.5% of the variance ($R^2 = .495$). Grit strongly predicts engagement ($\beta = .711$, $p < .001$),

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indicating that perseverance in academic goals leads to consistent student engagement, supporting H_{1a}. However, curiosity does not significantly influence engagement (β = -.049, p = .176), suggesting that while curiosity may spark initial interest, it does not sustain long-term academic involvement, leading to the rejection of H_{1b}. In conclusion, while grit alone is a powerful driver of academic engagement, fostering both grit and curiosity together may provide the most substantial benefits.

Table 5. Multiple regression and hypotheses testing results

Hypothesis	Paths	β	R^2	F	t-value	p-value	Decision
H_1	GRT x CUR → ENG	-	.495	151.146	-	<.001	Accepted
H_{1a}	GRT → ENG	.711	-	-	17.241	<.001	Accepted
H_{1b}	CUR → ENG	-.049	-	-	-1.355	.176	Rejected

Note: Significance is at p <.05.

Legend: GRT- Grit, CUR- Curiosity, ENG- Academic Engagement.

DISCUSSION

The findings from this study offer valuable insights into the interplay between grit and curiosity in predicting academic engagement. The significant combined influence of grit and curiosity suggests that these traits are essential in fostering student engagement. This result underscores the notion that while individual traits have their contributions, their interaction can produce a more pronounced impact. The synergy between grit and curiosity indicates that students who exhibit perseverance and a strong interest in learning are more likely to be deeply engaged in their academic endeavors (Wong et al., 2020). This highlights the importance of addressing multiple aspects of student motivation in educational programs, suggesting that interventions designed to enhance both traits might be more effective in boosting engagement than those focusing on just one.

The strong influence of grit on academic engagement emphasizes the critical role of perseverance in maintaining student commitment and focus (Alhadabi & Karpinski, 2020). Grit, characterized by long-term dedication and sustained effort (Tang et al., 2019), is pivotal in driving engagement and overcoming academic challenges (Duckworth et al., 2007a). This finding is consistent with existing research that

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highlights the importance of grit in achieving academic success (Li et al., 2024; Zhao et al., 2024). Students who demonstrate higher levels of perseverance are significantly more likely to stay engaged and active in their studies (Yau & Shu, 2023). Therefore, educational strategies that aim to cultivate grit could substantially enhance college student engagement and overall academic performance (Noronha et al., 2024).

On the other hand, the lack of a significant influence of the construct of curiosity on engagement suggests that curiosity alone may not be a strong predictor of academic engagement as supported by (Powell & Nettelbeck, 2014), which is different from other previously conducted studies for the past years (Mahama, 2022; Singh & Manjaly, 2022). While curiosity is often associated with a desire for knowledge and exploration (Kashdan et al., 2009, 2020), this study indicates that its influence on sustained engagement might be less direct. Curiosity may drive initial interest and motivation (Tang et al., 2022), but might only be sufficient to maintain long-term engagement (Aslan et al., 2021) with the support of other traits like grit (Datu et al., 2023). This highlights the need to consider how different traits interact and influence each other in the context of academic engagement.

In the context of physical education, both grit and curiosity are crucial for enhancing student engagement and success (Gwon & Shin, 2023; Lobo, 2024). Grit, emphasizing perseverance and sustained effort (Gwon & Shin, 2023), drives students to persist through the physical and mental challenges often encountered in sports and fitness activities (Stamatis et al., 2024). This quality is essential for overcoming obstacles, maintaining commitment to training, and achieving long-term goals (Guelmami et al., 2022). Conversely, curiosity fosters a genuine interest in exploring new skills, techniques, and activities (Scandle et al., 2024), which can deepen engagement and motivation (Simón-Chico et al., 2023). Together, these traits ensure that students are resilient in the face of difficulties and eager to learn and grow continuously within the physical education setting. Cultivating grit and curiosity can significantly enhance students' involvement, performance, and overall experience in physical education programs. As what von Stumm et al. (2011) have mentioned, a "hungry mind" is a core determinant of academic engagement and success.

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Therefore, while fostering curiosity can be beneficial for sparking interest in learning, developing grit is crucial for sustaining academic engagement (Christopoulou et al., 2018). Educational approaches focusing on building perseverance and resilience will likely be more effective in keeping students engaged with their studies (Polat, 2024). Strategies that simultaneously nurture grit and curiosity could provide a more comprehensive approach to enhancing student engagement. Future research should continue to explore how different psychological traits interact to influence academic success and engagement and examine the mechanisms through which these traits impact student behavior and outcomes.

CONCLUSION

In conclusion, this study underscores the critical roles of grit and curiosity in shaping academic engagement, particularly within physical education. The findings reveal that while grit alone is a powerful predictor of sustained student engagement, the combined influence of grit and curiosity significantly enhances academic engagement, highlighting the importance of both traits in educational settings. With its focus on perseverance and long-term commitment, grit enables students to overcome challenges and maintain motivation despite difficulties, making it a key driver of academic success. Though less influential, curiosity plays a crucial role in sparking interest and fostering a desire for exploration, complementing the effects of grit. Together, these traits create a dynamic interplay that supports deeper involvement and enthusiasm in physical education activities. Consequently, educational programs should aim to develop both grit and curiosity in students to maximize their engagement and performance. By integrating strategies that cultivate perseverance and a passion for learning, educators can enhance students' overall experience and success in physical education, paving the way for more effective and holistic approaches to student development.

Bridging Traits and Engagement: Translating Grit and Curiosity into Academic Success – Practical Applications

The findings of this study offer several practical applications for educators, administrators, and policymakers in higher education. Understanding the influence of

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psychological traits like grit and curiosity on academic engagement can help educators design targeted interventions to foster these traits in students, ultimately enhancing their engagement and academic success. For instance, integrating activities that promote perseverance and curiosity-driven learning in the classroom, such as project-based learning or inquiry-based approaches, could lead to more sustained academic effort and deeper engagement. Additionally, the insights gained from this study can inform the development of support programs, such as mentorship initiatives or academic advising, aimed at helping students build resilience and intrinsic motivation. For university administrators, these findings guide the allocation of resources toward programs that develop non-cognitive skills, complementing traditional academic support services. Policymakers may also use these results to advocate for educational reforms that emphasize the holistic development of students, encouraging the integration of grit and curiosity-enhancing curricula across institutions in the Philippines and beyond.

Limitations of the Study

One notable limitation of this study is its focus on respondents from a single state university in the Philippines, which may restrict the generalizability of the findings to other educational contexts or institutions. The specific cultural and institutional factors unique to this university, such as the demographic profile of the students, campus resources, or pedagogical approaches, could influence the results. This limits the extent to which the findings can be applied to different educational environments, especially those outside the Philippines or even within different regions. The distinctive characteristics of this university may not represent the diversity of experiences found in private institutions, technical schools, or universities with differing resources and student populations. Therefore, the external validity of the study's results could be more robust.

Additionally, the study relies on self-report measurements, which introduces another significant limitation. Self-reports are subjective and depend on the individual participants' perceptions of their behaviors, thoughts, and emotions. While these measurements can offer valuable insights into students' experiences, they are inherently susceptible to various biases. For example, social desirability bias may cause

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participants to answer in ways they believe are more socially acceptable or favorable rather than providing accurate responses. Similarly, inaccurate self-assessment could lead to over- or under-estimating their engagement or personal characteristics, such as grit and curiosity. These factors could distort the data, reducing the accuracy of the conclusions drawn from the study.

Moreover, self-report data only captures what individuals are willing or able to disclose and may not fully reflect actual behaviors or traits. For instance, students might report high levels of engagement, but their day-to-day participation and motivation in academic tasks may not align with these reports. As a result, self-reports may provide a partial picture of the phenomena under study. This limitation highlights the need for future research to incorporate additional data collection methods to provide a more comprehensive view. For example, including behavioral observations, teacher evaluations, or peer assessments could help cross-validate the self-report findings and reduce the influence of subjective biases.

To enhance the reliability and generalizability of the findings, future research should also aim to expand the sample size and include participants from a broader range of institutions, such as private universities, rural and urban schools, or international settings. By diversifying the sample, researchers can determine whether the relationships between grit, curiosity, and academic engagement hold across different educational and cultural contexts. Additionally, employing a mixed-methods approach or triangulation—where multiple methods or data sources are used to examine the same phenomena—could further strengthen the study's findings and provide a richer understanding of the factors influencing student engagement.

Positioning Philippine studies within the global body of literature highlights the unique contributions and insights that research from this country can offer. This study enriches the international discourse on educational psychology and student motivation by examining the interplay between grit, curiosity, and academic engagement in the context of Philippine higher education. It underscores how cultural and regional factors can shape the dynamics of these traits, offering a broader perspective that enhances the global understanding of academic engagement. Furthermore, integrating findings from Philippine research into the global literature helps to address gaps and diversify the

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evidence base, ensuring that educational strategies and theories are inclusive of varying cultural contexts. This broadens the applicability of research findings and fosters a more comprehensive approach to developing effective educational interventions worldwide.

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