

**The Role of Student Engagement in the Relationship Between Intrinsic Motivation and
Academic Performance**

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Abstract

This study examined the relationships between intrinsic motivation, student engagement, and academic performance among psychology students at the University of Groningen. Using a cross-sectional design, data were collected from 653 participants, predominantly female and with an average age of 20. The survey included scales measuring academic intrinsic motivation and student engagement, as well as academic performance through the participants' grades that were obtained directly from the university system. Our findings indicated that intrinsic motivation was positively associated with both student engagement and academic performance. However, student engagement did not predict academic performance, nor did it mediate the relationship between intrinsic motivation and academic performance. These results suggest that while intrinsic motivation enhances engagement, it does not necessarily translate into better academic outcomes through this pathway. The study underscores the importance of fostering intrinsic motivation in educational settings to improve learning outcomes but questions the role of student engagement as a mediator. Future research should explore other potential mediators and moderating variables, employ random sampling, and include diverse cultural contexts to enhance the generalizability and applicability of the results.

Keywords: intrinsic motivation, student engagement, academic performance

The Role of Student Engagement in the Relationship Between Intrinsic Motivation and Academic Performance

Education is a key foundation for both individuals and society, acting as a source of hope and a way to improve personal and community well-being. For individuals, doing well academically increases the chance of getting a good job and earning more money, which is important for a better life. Looking at the bigger picture, it is clear that the strength of a country's education system is crucial. It is essential to identify areas that need improvement and share knowledge effectively to improve the conditions. In this context, academic success is often measured by indicators such as Grade Point Average (GPA) and Scholastic Assessment Test (SAT) scores, which reflect the efficacy of these educational strategies. However, to fully understand the complexity of education and what affects academic performance, we need to look beyond just these numbers. In the domain of educational psychology, intrinsic motivation is identified as one of the factors impacting academic achievement. This type of motivation is characterized by engaging in activities for the sheer joy and fulfillment they provide, setting itself apart by not just chasing external rewards (Gottfried, 1985). The association between intrinsic motivation and academic success posits that the pleasure derived from the learning process can significantly strengthen educational outcomes (Vansteenkiste et al., 2005). Nevertheless, the dynamic between intrinsic motivation and academic performance is intricate, and potentially influenced by other variables. Delving into these potential mediators is crucial for expanding our comprehension and creating effective strategies to improve student achievement. Understanding these mediators allows us to develop a better comprehension of the mechanisms that drive academic success. Among various factors that could impact the relationship between the variables, our study proposes student engagement as a significant mediating element. Student engagement is a multifaceted concept that includes behavioural, emotional, and cognitive

aspects of a student's involvement in their educational journey. Behavioural engagement involves participation in academic and extracurricular activities, emotional engagement reflects feelings of interest and belonging, and cognitive engagement encompasses intellectual efforts to understand and master the material. This comprehensive understanding of engagement highlights its critical role in linking intrinsic motivation to academic performance (Appleton et al., 2008).

While previous research has established a positive correlation between intrinsic motivation and academic success, the mediating role of student engagement in this relationship is an area less examined in current literature. Investigating this mediating role is important because understanding how intrinsic motivation translates into academic performance through student engagement can help create better strategies, material, classroom norms, and relationships between teachers and their students. This study aims to investigate this complex interaction by addressing the research question: *Does student engagement serve as a mediator in the relationship between intrinsic motivation and academic performance?*

Intrinsic Motivation

Intrinsic motivation stems from an inner drive to engage in activities for the satisfaction they provide, marked by self-determination and enjoyment. Unlike extrinsic motivation, driven by external rewards, intrinsic motivation is fuelled by autonomy, purpose, and curiosity. Deci and Ryan's (1985) Self-Determination Theory (SDT) has significantly impacted the understanding of intrinsic motivation, particularly through its sub-theories, such as Cognitive Evaluation Theory (CET) and Organismic Integration Theory (OIT), which are especially relevant to educational settings. CET explains how intrinsic motivation is enhanced when students experience autonomy and competence in their learning environment, emphasizing the role of intrinsic motivators like interest and enjoyment in academic tasks.

OIT focuses on the internalization of motives, highlighting how supportive educational contexts can foster internal motivation. These applications of SDT demonstrate how academic intrinsic motivation enhances engagement, performance, and persistence (Niemi et al., 2009). By focusing on academic intrinsic motivation, we can better understand how this specific form of motivation influences academic performance, guiding the development of improved educational techniques.

Intrinsic Motivation and Academic Performance

Research on the relationship between intrinsic motivation and academic performance has consistently revealed positive correlations, with intrinsic motivation being closely linked to improved grades and overall academic success. The study by Lepper et al. (2005) highlights this by examining how students' motivational orientations – whether intrinsic or extrinsic – affect their academic performance. Their findings underscore that students who are intrinsically motivated, engaging in study for the love of learning itself, tend to achieve higher grades and exhibit greater student engagement than their extrinsically motivated counterparts. Building on this understanding, the longitudinal study conducted by Gottfried et al. (2001) further deepens our insight into the nature of intrinsic motivation's impact on academic success. Their research tracks the stability and influence of intrinsic motivation from childhood through late adolescence, illustrating that sustained intrinsic motivation significantly correlates with academic achievement over time. This study not only showcases the positive relationship between intrinsic motivation and academic performance but also suggests that cultivating intrinsic motivation from an early age can have long-lasting benefits on students' educational paths. These findings support the assumption that fostering intrinsic motivation enhances immediate academic performance and significantly influences a student's lifelong approach to learning and achievement, underscoring its importance as a crucial area for educational interventions.

H1. *Intrinsic motivation is positively associated with academic performance.*

Student Engagement

Student engagement, operationalized in the current study, refers to the positive state of fulfilment, where individuals exhibit a strong sense of enthusiasm towards their tasks, and work hard towards their academic goals (Hallberg & Schaufeli, 2006; Bakker et al., 2008; Maslach et al., 2001). This engagement can be broken down into three key components: vigour, dedication, and absorption (Schaufeli et al., 2002). It encompasses behavioural indicators, such as attendance and task completion, as well as cognitive engagement, reflecting students' investment in learning activities and their willingness to show effort to understand the material. Emotional engagement, characterized by interest, enthusiasm, and a sense of belonging in the learning environment, is also a fundamental element. This operational definition emphasizes observable behaviours and internal states relevant to academic performance and persistence in educational settings. This study underscores the importance of fostering environments that encourage active and meaningful participation in learning, suggesting that student engagement plays a complementary role to intrinsic motivation in promoting educational success and well-being. While intrinsic motivation drives students' internal desire to engage in learning activities, student engagement reflects the observable behaviours and emotional involvement in the learning process. Recognizing the interplay between intrinsic motivation and student engagement highlights the need for educational strategies that cultivate both elements to maximize academic achievement.

Student Engagement and Academic Performance

The interaction between student engagement and academic performance has been an important point of educational research, with evidence strongly supporting the notion that greater engagement leads to enhanced academic outcomes. Trowler's (2010) comprehensive

review combines the literature on student engagement, highlighting its multifaceted nature and its impact on academic achievement. Trowler discusses various dimensions of student engagement, including behavioural engagement (such as attendance and participation), emotional engagement (reflecting students' interest and enthusiasm for learning), and cognitive engagement (involving deep thinking, problem-solving, and intellectual investment in learning tasks). By recognizing these different facets, Trowler emphasizes the complexity of student engagement and its diverse effects on academic achievement. Trowler's analysis concludes that students who actively participate in both curricular and extracurricular activities tend to exhibit higher levels of academic success, underscoring the importance of engagement that encompasses diverse educational experiences. This includes involvement in traditional classroom activities as well as participation in clubs, organizations, community service, and experiential learning opportunities. By embracing a range of educational experiences, students develop multifaceted skills and competencies that contribute to their overall academic achievement and well-rounded education. Furthermore, Fredricks et al. (2004) in their seminal work on the dimensions of student engagement, define the critical components of engagement – behavioural, emotional, and cognitive – and their direct correlation with improved academic performance. Their research suggests that fostering an environment that nurtures all aspects of engagement can significantly boost students' academic trajectories. Together, these studies present a broader perspective on how comprehensive engagement strategies are essential for optimizing academic performance and facilitating enduring educational success.

H2: Intrinsic motivation is positively associated with student engagement.

Student Engagement and Intrinsic Motivation

Educational psychology has increasingly recognized the link between intrinsic motivation and student engagement, highlighting their shared role in facilitating effective

education. Skinner et al. (2008) found that teacher support plays a crucial role in enhancing students' intrinsic motivation and engagement in school. Their study revealed that when teachers provide an environment that supports autonomy, competence, and relatedness, students are more likely to show increased engagement and intrinsic motivation. Importantly, their findings suggest a positive association between intrinsic motivation and student engagement, indicating that as students' intrinsic motivation increases, so does their student engagement. This underscores the reciprocal relationship between intrinsic motivation and student engagement, with each reinforcing the other to promote optimal learning experiences. This environment encourages students to take an active interest in their learning and engage more deeply with academic content, leading to better educational outcomes.

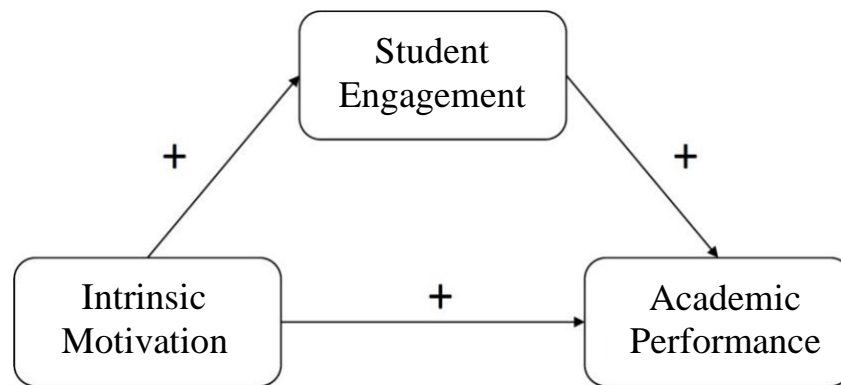
H3. Student engagement is positively associated with academic performance.

Given the assumed association between intrinsic motivation and student engagement, as well as between student engagement and academic performance, we propose that student engagement plays a mediating role in the relationship between intrinsic motivation and academic performance.

H4. Student engagement mediates the relationship between intrinsic motivation and academic performance.

Figure 1

Predicted Mediation Model With Student Engagement as a Mediator in the Relationship Between Intrinsic Motivation and Academic Performance



Method

Participants

The sample of participants consisted of 742 Psychology students at the University of Groningen in the Netherlands. 89 of the participants were excluded from the sample. The excluded participants either did not provide consent, failed the instructed response items, or did not complete the survey. The final sample of 653 participants consisted of 25.3% men, 74.4% women, and 0.3% of participants who preferred not to say their biological sex assigned at birth. The mean age of the participants was 20.19 ($SD = 2.19$). The nationalities were distributed as follows: 53.7% were Dutch, 20.7% were German, and 25.6% were other. 5.2% of participants have completed another degree (Bachelor's, Master's, or Doctoral).

Measures

Intrinsic Motivation

The variable of intrinsic motivation was assessed using items from the subscales of the 28-item self-perceived Academic Motivation Scale (Vallerand et al., 1992), which distinguishes between intrinsic motivation to know, to experience stimulation, and toward accomplishment. Since we investigated intrinsic motivation as a unitary concept, all items of the three mentioned subscales were used. The scale questions the participants about why they attend university or college and provides them with different statements. The participants

were asked to rate statements using seven-item Likert scales, spanning from 1 (does not correspond at all), 2 (corresponds very little), 3 (corresponds a little), 4 (corresponds moderately), 5 (corresponds enough), 6 (corresponds a lot) and finally, 7 (corresponds exactly). The entirety of the used items demonstrated excellent reliability (Cronbach's $\alpha = .9$).

Engagement

We measured engagement using all items of the nine-item self-report scale The Utrecht Work Engagement Scale for Students (UWES-9S) by Carmona-Halty et al. (2019). The participants were provided with statements such as “When I’m doing my work as a student, I feel bursting with energy”. Their responses were measured on a seven-item Likert-type scale, which ranged from 0 (never) to 6 (always/every day), with the middle points being 1 (almost never/ a few times a year or less), 2 (rarely, once a month), 3 (sometimes/a few times a month), 4 (often/ once a week), 5 (very often/ a few times a week). The UWES-9S has excellent overall reliability (Cronbach's $\alpha = .9$) (Carmona-Halty et al., 2019).

Academic Achievement

To measure Academic Achievement, we used the *Grade Point Average* (GPA) of the Psychology students of the University of Groningen by gaining access to students' grades obtained in the current study year. The GPA ranged from 1 to 10 (1 being the lowest grade and 10 being the highest grade, with a minimum passing mark of 5.5).

Procedure

The ethical committee of the Faculty of Behavioural and Social Sciences approved the study at the University of Groningen. We conducted the survey using an online questionnaire via Qualtrics, which was presented to participants in English. We recruited participants

through advertisements placed on campus and various social media platforms, such as WhatsApp, as well as via the first-year SONA practicum pool. All participants' participation in this research was voluntary, and they had the right to refuse to partake in the study at any time. Furthermore, participants who were part of the SONA practicum pool received SONA credits as compensation, while those who were not, received financial compensation for their participation. The completion of the survey took approximately 20 minutes.

At the start of the survey, there were two modes of recruitment. We then informed participants about the goal of the study, the procedure and the consequences of participating in this study. Furthermore, we informed participants about the confidentiality of their data and their right to informed consent. Participants responded to several components of the survey starting with demographic questions regarding their gender, nationality and highest completed level of education. The next part of the survey focused on cognitive, motivational and behavioural aspects related to academic performance, including engagement. This part of the survey also addressed the previously mentioned three variables and the two questionnaires. Subsequently, we asked some additional questions about mental health diagnoses as well as medication and substance use. At the end of the survey, we asked participants to indicate if they had completed the survey truthfully and with a thorough understanding of the English language and allowed them to leave comments.

Design and Statistical Data Analysis

In order to analyze the obtained data, the study will employ a cross-sectional correlational mediation analysis. In the model, intrinsic motivation will act as an independent variable, academic achievement as a dependent variable, and engagement as a mediator variable between the aforementioned variables.

Before the analysis of data, the assumption checks, such as homoscedasticity, normality, linearity, multicollinearity, and outliers will be performed to make sure our data

can be properly evaluated. Once the assumption checks are supported, the mediation analysis will be initiated.

Firstly, simple linear regressions will be computed between academic intrinsic motivation and academic achievement, engagement and achievement, as well as between academic intrinsic motivation and engagement. If the three simple linear regressions show a positive significant correlation, a multiple linear regression will be initiated using the bootstrap method. Specifically, the possible influence of engagement on the link between intrinsic motivation and academic achievement will be measured.

Results

Assumption Testing

Initially, the assumptions underlying linear regression and mediation analysis were evaluated. To ensure the validity of the linear regression and mediation analysis, we assessed the assumptions by evaluating outliers' influence on the data, independence of residuals with the Durbin-Watson test, normality through kurtosis and skewness values along with histograms and P-P plots for the variables, linearity and homoscedasticity via residual plot patterns, and tested for interaction between the predictor and mediator variables using PROCESS (model 4, Hayes, 2022). We determined that all assumptions were satisfactorily met. The outliers identified within the dataset did not exert a significant influence warranting their exclusion from the subsequent data analysis. Consequently, the analyses were conducted with these outliers. The Durbin-Watson test yielded positive values, indicating the presence of independent residuals within the dataset. Furthermore, the residual plots exhibited a random pattern, thereby satisfying the assumptions of linearity and homoscedasticity. Assessment of kurtosis and skewness values for the variables indicated adherence to characteristics suggestive of a normal distribution. Moreover, examination of histograms for the variables – namely, intrinsic motivation, student engagement, and academic performance

- revealed an approximate normal distribution, a finding supported by the observation of straight-line patterns in the normal *P-P* plots. Moreover, the interaction between the predictor and mediator variables was assessed via the utilization of PROCESS (model 4, Hayes, 2022)
- no significant interaction between these variables was found.

Descriptive Statistics

Table 1 presents the descriptive statistics, including means, standard deviations, and correlations among the variables of interest. The mean values for intrinsic motivation, student engagement, and academic performance surpassed the midpoint of the respective scales., indicating that the sample exhibits high levels of those constructs. Additionally, the standard deviations were comparatively small, indicating minimal variability in the data, implying a relatively homogenous sample in terms of these characteristics. Significant positive correlations were observed between intrinsic motivation and student engagement, suggesting a robust association between these constructs. Conversely, the correlation between intrinsic motivation and academic performance was found to be moderate yet still positive. Similarly, academic performance exhibited a weak positive correlation with student engagement, indicating a modest relationship between these variables.

Table 1

Descriptive Statistics of the Variables

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3
1. Intrinsic motivation	653	4.736	0.935	-		
2. Student Engagement	653	4.646	0.939	.623**	-	
3. Academic performance	653	6.777	1.172	.163**	.144*	-

Note. **indicates significance at the .01 level (2-tailed)

Main Analyses

A summary of the analyses can be found in Figure 3.

Hypothesis 1

Utilizing multiple regression analysis, a statistically significant positive association was observed between intrinsic motivation and academic performance with a p-value of 0.027, thereby providing support for Hypothesis 1.

Hypothesis 2

Following the execution of simple linear regression analysis, the regression coefficient for the association between intrinsic motivation and student engagement was found to be 0.626, yielding a statistically significant p-value of 0.000. As such, Hypothesis 2 was supported.

Hypothesis 3

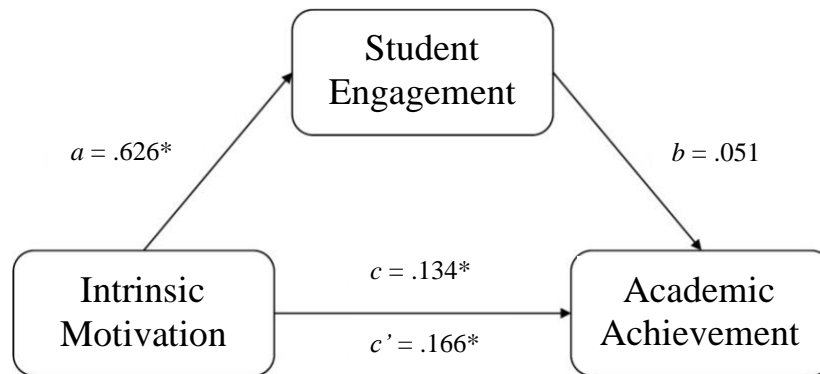
Through the application of multiple regression analysis, the regression coefficient for the association between student engagement and academic performance was found to be 0.051, exhibiting a non-significant p-value of 0.436. Consequently, Hypothesis 3 was not supported.

Hypothesis 4

We conducted a mediation analysis employing the PROCESS bootstrapping method (model 4, Hayes, 2022). The results of the analysis revealed a non-significant indirect effect of intrinsic motivation on academic performance when student engagement served as a mediator. Notably, the 95% confidence interval of the indirect effect included zero, thus failing to provide support for Hypothesis 4 ($B = 0.032$, $Boot\ SE = 0.040$, $CI = [-0.050, 0.109]$).

Figure 2

Unstandardized Coefficients in the Mediation Model With Intrinsic Motivation as a Predictor, Academic Performance as an Outcome Variable, and Student Engagement as a Mediator.



Discussion

In this study, we investigated how intrinsic motivation impacts academic performance by examining the role of student engagement as a potential mediator. We found that intrinsic motivation positively influenced both student engagement and academic performance. These findings are consistent with the aim of promoting self-motivation and active participation in the learning process. However, despite the positive association between intrinsic motivation and student engagement, we did not observe a direct impact of student engagement on academic performance. Additionally, student engagement did not act as a mediator in the relationship between intrinsic motivation and academic performance, indicating that other factors may play a role in translating intrinsic motivation into concrete academic outcomes.

The first hypothesis posited that intrinsic motivation is positively related to academic performance. The results of our study supported this hypothesis, confirming the findings of previous research (e.g., Lepper et al., 2005; Gottfried et al., 2001), which suggests that intrinsically motivated students have better academic performance. This implies that fostering

intrinsic motivation can significantly improve students' learning outcomes. Moreover, these findings underscore the importance of educational strategies that enhance intrinsic motivation, such as offering autonomy-supportive learning environments, providing meaningful and challenging tasks, and fostering a growth mindset. Future research could explore the specific mechanisms through which intrinsic motivation influences academic performance and investigate potential moderating variables, such as age, subject matter, and socio-cultural context.

The second hypothesis posited a positive association between intrinsic motivation and student engagement. Our findings confirmed this, demonstrating that intrinsic motivation enhances engagement by making academic tasks more absorbing. It aligns with previous research (e.g. Hulleman and Harackiewicz, 2009; Skinner et al., 2008) which found that intrinsically motivated students tend to exhibit higher levels of involvement and enthusiasm in their learning endeavours, contributing to greater overall student engagement. The implications of these studies are far-reaching, suggesting that educators and policymakers should prioritize environments that foster intrinsic motivation as a pathway to deeper engagement and sustained academic achievement.

Contrary to our third hypothesis, we found no significant association between student engagement and academic performance. Consequently, student engagement did not mediate the relationship between intrinsic motivation and academic performance, suggesting it may not be an effective mediator in this context. Previous research, for example, Trowler's analysis, concluded that students who actively participate in both curricular and extracurricular activities tend to exhibit higher levels of academic success, underscoring the importance of engagement in the educational experience. Similarly, Fredricks et al. (2004) suggest that fostering an environment that nurtures all aspects of engagement can significantly enhance students' academic trajectories. Our findings suggest that aspects of

student engagement that are not driven by intrinsic motivation seem to have little impact on academic success within educational settings. Therefore, until further evidence demonstrates the significance of student engagement in this relationship, educators should be cautious in emphasizing it as a primary strategy to improve teaching effectiveness.

Several potential explanations exist for why student engagement did not play a significant mediating role. The Utrecht Work Engagement Scale (UWES) measures aspects of engagement such as energy, mental resilience, and inspiration. Different operationalizations of student engagement, particularly those that include behavioural aspects such as class attendance, participation in discussions, and assignment completion, may offer a more comprehensive understanding of its influence on academic performance. This is because behavioural engagement indicators provide direct evidence of students' active involvement in the learning process, which is likely to have a more direct impact on GPA. For example, consistent attendance and active participation in discussions may lead to a better understanding of course material and improved performance on assessments. Similarly, completing assignments on time reflects students' commitment to their studies and may contribute to overall academic success. Thus, focusing on behavioural engagement metrics may provide valuable insights into the specific behaviours that contribute to academic achievement. Further research is needed to explore these dimensions of student engagement and their impact on academic outcomes.

Several limitations of this study should be acknowledged, along with suggestions for future research to address these issues. First, the use of a convenience sample limits the generalizability of the findings. Participants who consented to share their grades had relatively high GPAs, potentially introducing bias. Future research should employ random sampling methods to enhance the generalizability of the findings. Second, motivation may vary significantly depending on the degree program, which was not accounted for in this

study. Different degree programs often attract students with varying levels of intrinsic and extrinsic motivation. For example, students in highly competitive programs such as medicine or law might have different motivational profiles compared to those in less competitive fields (Guay et al., 2010). Future studies should investigate different degree programs to determine whether the observed associations vary by the field of study, providing a more comprehensive understanding of how motivation impacts academic performance across various disciplines. Third, the sample was predominantly from Western European countries, limiting the applicability of the results to other cultural contexts. Expanding the sample to include participants from a wider range of countries and cultures in future research will provide a more globally relevant perspective on the relationship between student engagement and academic performance. Fourth, GPA was used as the sole indicator of academic performance, which may not fully capture students' academic abilities or achievements. Future research could incorporate multiple indicators of academic performance, such as course-specific grades, standardized test scores, and qualitative assessments, to offer a more holistic view of academic success. Fifth, the operationalization of student engagement may not have comprehensively measured all relevant aspects, particularly behavioural components such as class attendance and participation. Future studies should develop and use more comprehensive measures of student engagement that include behavioural, emotional, and cognitive factors. Lastly, the study's design does not allow for causal relationships to be established, only associations. Future research should consider longitudinal designs or experimental methods to explore the specific mechanisms through which intrinsic motivation influences academic performance and investigate potential moderating variables, such as age, subject matter, and socio-cultural context. These approaches will help establish causality and provide deeper insights into the factors that drive academic success.

Conclusion

This study examined the relationships between intrinsic motivation, student engagement, and academic performance. While intrinsic motivation was positively associated with academic performance, student engagement did not mediate this relationship significantly. These findings suggest that intrinsic motivation plays a direct role in enhancing academic outcomes, whereas student engagement, although important, may not be the key mediating factor in this context. The exact mechanisms behind the link between intrinsic motivation and academic performance remain unclear. Our findings highlight the importance of fostering intrinsic motivation in educational settings. Identifying these factors is crucial for enhancing educational quality and allowing students to improve their academic performance.

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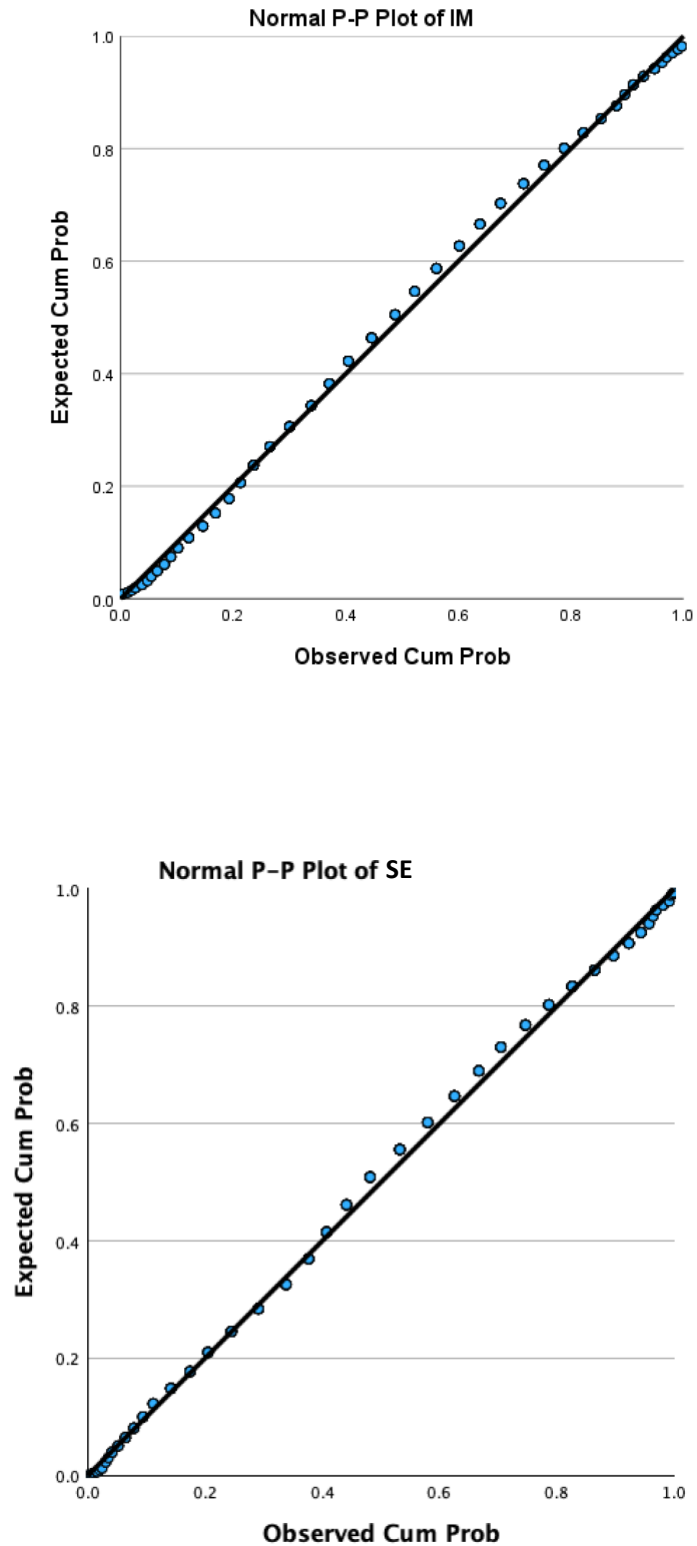
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Appendix

Figure A1

Normal P-P Plots of Intrinsic Motivation (IM), Student Engagement (SE), and Academic Performance (AP) Respectively



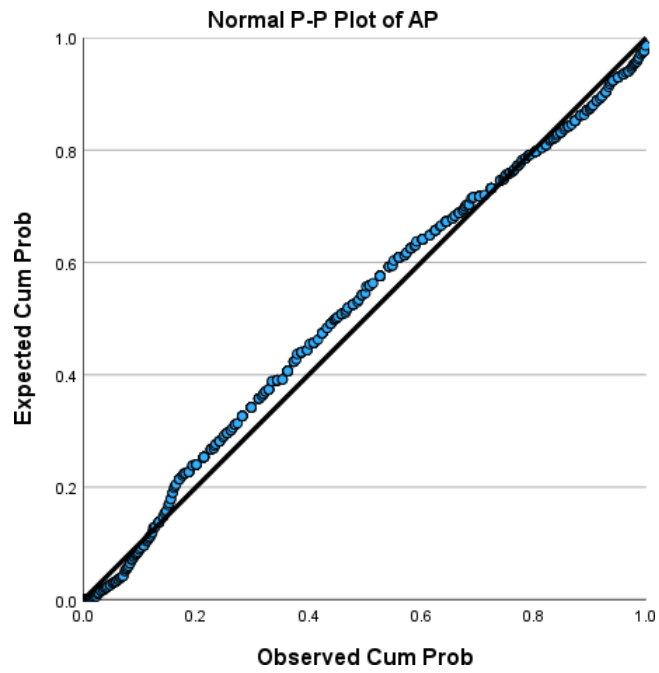


Figure A3

Residual Plot. Predictors: Intrinsic Motivation (IM), Student Engagement (SE); Dependent Variable: Academic Performance (AP)

