

A Quantitative Analysis Of Student Motivation And Engagement Based On Self-Determination Theory In Higher Education

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ABSTRACT

Motivation remains a key factor in shaping students' academic paths in higher education. Based on the Self-Determination Theory (SDT), this study explored how intrinsic psychological needs—autonomy, competence, and relatedness—interact with behavioral, cognitive, and emotional aspects of engagement among 300 students. Using a quantitative approach, the researchers used validated survey tools and applied Pearson correlation, ANOVA, and t-tests to analyze the data. The results showed significant positive relationships: autonomy linked to behavioral engagement, competence to cognitive engagement, and relatedness to emotional engagement. These findings suggest that satisfying students' psychological needs promotes different types of academic engagement. Additionally, notable age-related differences emerged in cognitive engagement and competence, where younger students (18–20 years old) demonstrated higher cognitive involvement, while older students (21–23 years old) showed greater emotional engagement and relatedness. Regarding gender, although behavioral engagement and autonomy did not differ between males and females, cognitive engagement and competence, along with emotional engagement and relatedness, varied significantly, with female students reporting higher levels of involvement. These results underscore the importance of creating autonomy-supportive environments, enhancing students' sense of competence, and cultivating meaningful peer and teacher relationships. Implications for educational practice include designing strategies tailored to age and gender differences to boost engagement, motivation, and academic achievement. The findings advance understanding of how motivation appears across different demographic groups and lay the groundwork for future efforts to enhance student learning experiences in higher education.

Keywords: SDT, Autonomy, Competence, Relatedness, Behavioral Engagement, Cognitive Engagement, Emotional Engagement, Motivation.

INTRODUCTION

Motivation plays a central role in shaping students' educational trajectories, significantly influencing their engagement with academic content and their ability to persist through academic challenges (Deci & Ryan, 2020). Self-Determination Theory (SDT), developed by Deci and Ryan, provides a foundational framework for understanding motivation by highlighting three core psychological needs—autonomy, competence, and relatedness—that must be fulfilled to sustain intrinsic motivation and promote meaningful learning outcomes (Cheon et al., 2019). Within higher education, where students often face intensified academic demands and transitional stress, addressing these psychological needs becomes imperative. As Fuertes et al. (2023) argue, contextualizing motivational

strategies within student-specific environments can amplify their effectiveness, underscoring the need for tailored research in this area.

The literature on motivation in education continues to expand, yet key limitations remain. While various studies have emphasized the importance of intrinsic and extrinsic motivational factors (Ryan & Deci, 2020; Aydın, 2021; Wigfield et al., 2021), relatively few have incorporated a nuanced examination of emotional engagement or explored how individual demographic differences mediate motivation. Emotional dynamics, despite being vital to student engagement, are still underexplored within the SDT paradigm (Ekpenyong & Munshitha, 2023; Núñez & León, 2019; Linnenbrink-Garcia et al., 2010). To fill these gaps, the present study integrates emotional engagement alongside traditional SDT constructs, offering a more comprehensive understanding of motivational processes among students in higher education.

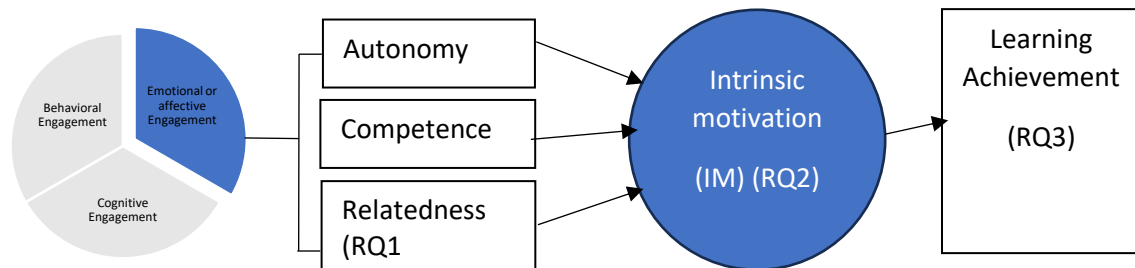


Figure 1 Dimensions of student engagement within taught contexts (Dobbins & Denton, 2017) and affective engagement perceived from the Self-Determination Theory (Deci & Ryan, 1985)

Furthermore, a critical enhancement to the traditional SDT framework in this study is the incorporation of demographic variables—specifically, age and gender—as analytical lenses. The rationale for this revision lies in the growing recognition that motivational patterns are not monolithic but are shaped by personal and contextual characteristics. Previous research demonstrates that demographic factors can influence students’ psychological needs and learning behaviors. For example, Cuerdo (2023) and Hanson (2024) reported that age groups often display differing levels of academic focus and engagement, while gender disparities have been linked to variations in perceived competence and emotional connection in academic settings (Llorens et al., 2021). By integrating age and gender, the present study not only aligns with the expanded conceptual applications of SDT but also addresses the pressing need for inclusive, data-informed strategies in educational psychology.

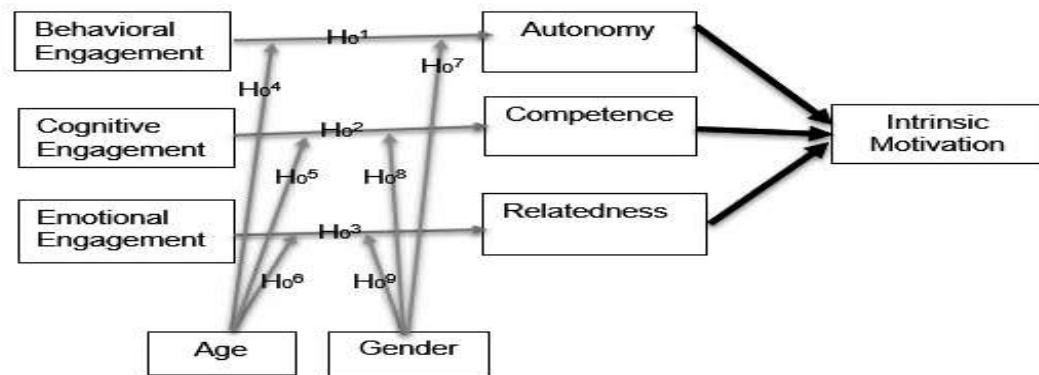


Figure 2
Proposed Self-Determination Theory
Theoretical Framework

This revision of the SDT framework is further supported by empirical evidence. Turner (2022) and Guay (2022) have highlighted how autonomy and competence manifest differently across student populations, often contingent on age or gender. Likewise, studies by Medina-Vidal et al. (2023) and Al-Saadi (2020) indicate that gender plays a significant role in shaping cognitive and emotional engagement, which are closely tied to SDT constructs. Recognizing such individual differences strengthens the predictive and explanatory power of the theory, making it more adaptable to diverse learning environments. Therefore, this study's inclusion of demographic profiles is not merely an extension but a necessary refinement of SDT to better reflect contemporary educational realities.

Informed by this revised theoretical approach, the present research adopts a quantitative methodology to explore the relationships between behavioral, cognitive, and emotional engagement and the core SDT needs—autonomy, competence, and relatedness—among higher education students. Additionally, it evaluates how these relationships differ across age and gender, thereby deepening the empirical understanding of how demographic diversity intersects with motivational psychology. By doing so, the study offers practical and theoretical contributions that aim to support educators and policymakers in designing more equitable and responsive educational systems.

Research Objective:

This study aims to examine the motivational factors influencing higher education students through the lens of Self-Determination Theory (SDT) by:

- (1) identifying their demographic profile based on age and gender;
- (2) assessing how behavioral, cognitive, and emotional engagement—along with autonomy, competence, and relatedness—act as motivational drivers;
- (3) identifying the key relationships between engagement types and core SDT constructs; and
- (4) analyzing whether these relationships vary significantly by age and gender.

RESEARCH METHODOLOGY

This study employed a quantitative research design, which is suitable for systematically examining the relationships between motivational constructs and student engagement, as outlined by Self-Determination Theory (SDT). By using this design, the research aimed to measure the impact of autonomy, competence, and relatedness on behavioral, cognitive, and emotional engagement among students in higher education. This approach allowed the researchers to objectively analyze patterns

and correlations within a large sample, ensuring both breadth and statistical reliability in answering the research questions.

To gather empirical data, a structured survey tool was employed. This instrument was carefully adapted from validated surveys in recent scholarly works, including those by Farikah et al. (2023) and Huang et al. (2019), ensuring both conceptual relevance and psychometric reliability. The survey had two main sections: the first collected respondents' demographic information (age and gender), while the second contained items measuring six key constructs—behavioral engagement, cognitive engagement, emotional engagement, autonomy, competence, and relatedness. Five carefully worded items represented each construct. Responses were recorded on a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), enabling detailed measurement of attitudes and perceptions.

The sample consisted of 300 undergraduate students enrolled at the university. Participants were selected using stratified random sampling to ensure proportional representation from various academic departments, thereby enhancing the generalizability of the results. Ethical standards were upheld throughout the research process. Before collecting data, institutional approval was secured, and informed consent was obtained from all participants. The study adhered to the principles of voluntary participation, anonymity, and confidentiality, fully complying with the Data Privacy Act of 2012 (Republic Act No. 10173).

Quantitative data underwent thorough statistical analysis. Descriptive statistics summarized demographic profiles and mean responses for each motivational indicator. Inferential statistics, including Pearson's correlation coefficient, Analysis of Variance (ANOVA), and independent samples t-tests, were used to explore relationships and differences among variables based on demographic factors. These methods provided empirical support for assessing how the psychological needs identified by SDT influence various forms of student engagement.

RESULTS AND DISCUSSIONS

Demographic Profile of The Respondents

The demographic profile of the respondents reveals important insights into the composition of the student body.

Table 1. Frequency and Percentage of Age (N=300)

Age	Frequency	Percentage
18-20	172	57.33%
21-23	118	39.33%
24-26	10	3.33%
Total	300	100 %

Table 1 shows the age distribution of the 300 student respondents, indicating that most (57.33%) are aged 18-20, followed by 39.33% aged 21-23, and a small group (3.33%) aged 24-26. This age profile reflects the typical demographic of undergraduate students in Philippine higher education institutions. The dominance of the 18-20 age group aligns with findings by Cuervo (2023), who stated that Filipino college campuses are primarily populated by younger students, mostly those

transitioning directly from senior high school. Likewise, national enrollment data from Hanson (2024) confirm that most college entrants fall within this younger age range, aligning with global trends where students tend to enter higher education soon after completing secondary school. From a motivational standpoint based on Self-Determination Theory (SDT), this age group is especially relevant, as younger learners are often at the early stages of developing their academic identity and are more responsive to autonomy-supportive learning environments. Therefore, understanding their developmental stage can help create targeted interventions that boost engagement and persistence.

Table 2. Frequency and Percentage of Gender (N=300)

Gender	Frequency	Percentage
Female	157	52.33%
Male	143	47.67%
Total	300	100%

Table 2 shows a nearly equal gender split among the student respondents, with 52.33% identifying as female and 47.67% as male. This balanced makeup is notable because it provides a fair basis for examining gender-related differences in motivational constructs without the influence of uneven representation. Llorens et al. (2021) note that, despite nearly equal enrollment, subtle gender disparities can persist in areas such as academic self-concept, emotional engagement, and perceived competence—factors closely related to SDT’s core principles. Therefore, the gender balance in this study enhances its ability to explore how males and females may experience autonomy, competence, and relatedness differently in an academic setting. Additionally, with both genders well represented, the findings—especially those related to engagement differences across genders—can be understood with more confidence. Consistent with previous research, the data suggest that further investigation is warranted into how gender-specific teaching approaches can meet the diverse motivational needs of different student groups.

Table 3. Motivational Catalyst (N=300)

Indicator	Mean	Verbal Interpretation
Behavioral Engagement	3.17	Agree
Cognitive Engagement	3.69	Moderately Agree
Emotional Engagement	3.76	Moderately Agree
Autonomy	3.18	Agree
Competence	3.7	Moderately Agree
Relatedness	3.65	Moderately Agree

Legend: 4.20-5.00 Strongly Agree (SA); 3.40-4.19 Moderately Agree (MA); 2.60-3.39 Agree (A); 1.80-2.59 Disagree (DA); 1.00-1.79 Strongly Disagree (SDA)

The data from Table 3 reveal nuanced insights into the motivational dynamics of students within the academic setting. Behavioral engagement, with a mean score of 3.17, falls within the "Agree" range, indicating that while students demonstrate a willingness to participate in academic activities, underlying constraints persist that limit optimal engagement. This moderate level emphasizes the need for interventions that address barriers to active participation, especially since such engagement is fundamental to academic achievement, as supported by Navarro et al. (2024) and Delfino (2019). In contrast, cognitive and emotional engagement received higher ratings, with means of 3.69 and 3.76, respectively, both categorized as "Moderately Agree." These findings reflect students’ significant

intellectual investment and emotional connection with their learning experiences, aligning with studies by Zhang et al. (2023), Ghelichli et al. (2020), and Liu and Chen (2024), which highlight the essential role of internal motivation and emotional attachment in maintaining academic involvement. Autonomy, with a mean of 3.18, indicates a moderate perception of control over learning experiences. Although students feel some degree of academic agency, the findings suggest room to foster more autonomy-supportive environments—an idea supported by Krause et al. (2019) and Kinsella and Wyatt (2023). The indicators of competence (mean = 3.70) and relatedness (mean = 3.65) further emphasize students' belief in their academic abilities and their social connection within the learning environment. These results are consistent with the observations of Alamri et al. (2020) and Turner (2019), who noted how competence and interpersonal bonds strengthen motivation and foster an academically enriching climate.

Significant Relationships

Table 4. Correlation Between Behavioral Engagement & Autonomy (N=300)

Variables	Pearsons r	p-value	Decision	Interpretation
Behavioral Engagement & Autonomy	0.30	0.002	Reject H_0^1	Significant Relationship

The moderate positive correlation ($r = 0.30$, $p = 0.002$) between behavioral engagement and autonomy implies that students who perceive greater autonomy in their academic environment tend to exhibit more active participation in learning tasks. This finding reinforces the assertion of Self-Determination Theory that autonomy is a fundamental psychological need that drives engagement. Brandisauskiene et al. (2023) emphasize that autonomy-supportive environments significantly enhance learners' motivational styles and resourcefulness. Thus, the implication is clear: empowering students through decision-making opportunities and self-directed learning can foster more consistent behavioral involvement in educational activities.

Table 5. Correlation Between Cognitive Engagement & Competence (N=300)

Variables	Pearsons r	p-value	Decision	Interpretation
Cognitive Engagement & Competence	0.45	<0.001	Reject H_0^2	Significant Relationship

The strong positive correlation ($r = 0.45$, $p < 0.001$) between cognitive engagement and competence indicates that students who perceive themselves as competent are more likely to invest effort into understanding academic content. This result highlights the intrinsic motivation derived from feelings of efficacy and mastery. As Baş and Bolat (2022) and Wara and Odongo (2018) discuss, cognitive competence is closely linked with critical thinking and academic success. The implication is that instructors should prioritize scaffolding, constructive feedback, and intellectually challenging tasks to promote both perceived competence and deeper cognitive involvement.

Table 6. Correlation Between Emotional Engagement & Relatedness (N=300)

Variables	Pearsons r	p-value	Decision	Interpretation
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Emotional Engagement & Relatedness	0.50	<0.001	Reject H_0^3	Significant Relationship
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The moderate-to-strong correlation ($r = 0.50$, $p < 0.001$) between emotional engagement and relatedness underscores that students who feel socially connected—whether to peers or instructors—are more emotionally invested in their academic journey. According to Liu and Chen (2024) and Huang (2023), the emotional quality of teacher-student and peer relationships can significantly enhance school attachment and performance. This suggests that learning environments promoting inclusion, empathy, and emotional safety may be crucial in cultivating deeper student engagement and persistence.

Significant Differences

Table 7. Significant Differences of Age Between Behavioral Engagement & Autonomy (N=300)

Comparison	F-value	p-value	Decision	Interpretation
Behavioral Engagement & Autonomy by Age	2.10	0.09	Accept H_0^4	No Significant Difference

The analysis of variance yielded no significant differences ($F = 2.10$, $p = 0.09$) in behavioral engagement and autonomy across age groups, suggesting that students, regardless of age, exhibit behavioral engagement and perceive autonomy in a relatively consistent manner. As shown in the findings by Yang et al. (2023), effective autonomy-supportive teaching practices benefit learners across age ranges. Therefore, the educational implication is that teaching strategies aimed at fostering autonomy can be uniformly applied, without the need to tailor behavioral engagement approaches to individual age groups.

Table 8. Significant Differences of Age Between Cognitive Engagement & Competence (N=300)

Comparison	F-value	p-value	Decision	Interpretation
Cognitive Engagement & Competence by Age	4.50	0.01	Reject H_0^5	Significant Difference

The significant difference ($F = 4.50$, $p = 0.01$) in cognitive engagement and competence based on age indicates that younger students (18–20 years) report higher levels of both, as shown in Table 8. This could be attributed to their heightened academic enthusiasm or recent transition from structured secondary education. The results support a previous study by Pavlin-Bernardić et al. (2017) which highlight age-based variations in academic motivation. The implication for educators is the need to provide differentiated cognitive support for older students to maintain or elevate their academic engagement and self-efficacy.

Table 9. Significant Differences of Age Between Emotional Engagement & Relatedness (N=300)

Comparison	F-value	p-value	Decision	Interpretation
Emotional Engagement & Relatedness by Age	3.20	0.04	Reject H_0^6	Significant Difference

A considerable variation ($F = 3.20$, $p = 0.04$) was observed in emotional engagement and relatedness across age groups, with older students (21–23 years) reporting higher levels, as shown in Table 9. This

reflects increased emotional maturity and stronger connections with peers or faculty over time. Timms et al. (2018) and Choi et al. (2018) similarly noted that older learners tend to value social bonds more deeply, which enhances emotional involvement. The implication here is that institutions should prioritize fostering social-emotional development in younger students through peer mentoring and community-building activities.

Table 10. Significant Differences of Gender Between Behavioral Engagement & Autonomy (N=300)

Comparison	t-value	p-value	Decision	Interpretation
Behavioral Engagement & Autonomy by Gender	1.60	0.11	Accept H_0^7	No Significant Difference

The t-test results ($t = 1.60$, $p = 0.11$) suggest no significant gender difference in behavioral engagement and autonomy, implying that both male and female students participate similarly and perceive autonomy equally in academic tasks. Hofer et al. (2022) echo these results, emphasizing that autonomy support predicts engagement across genders. This parity affirms the equitable application of autonomy-supportive practices in classrooms and highlights that both genders respond similarly when exposed to such environments.

Table 11. Significant Differences of Gender Between Cognitive Engagement & Competence (N=300)

Comparison	t-value	p-value	Decision	Interpretation
Cognitive Engagement & Competence by Gender	2.30	0.02	Reject H_0^8	Significant Difference

A significant gender difference ($t = 2.30$, $p = 0.02$) emerged in cognitive engagement and competence, with female students reporting higher levels of both. This aligns with findings by Medina-Vidal et al. (2023) and Al-Saadi (2020), which reveal superior female performance in critical and writing-related academic domains. This may reflect sociocultural factors or greater language proficiency among female learners. The educational implication is the need for more targeted cognitive scaffolding to support male students in bridging the engagement gap and enhancing their academic confidence.

Table 12. Significant Differences of Gender Between Emotional Engagement & Relatedness (N=300)

Comparison	t-value	p-value	Decision	Interpretation
Emotional Engagement & Relatedness by Gender	2.00	0.05	Reject H_0^9	Significant Difference

A marginally significant difference ($t = 2.00$, $p = 0.05$) in emotional engagement and relatedness was identified, with female students showing slightly higher levels. This aligns with prior findings by Brown (2024), which indicate that female students are more emotionally invested and socially connected within academic settings. These subtle gender differences suggest that male students might benefit from enhanced emotional support systems and inclusive learning environments that promote interpersonal bonding and psychological safety.

CONCLUSIONS

This study examines the intricate nature of student motivation and engagement in higher education through the lens of Self-Determination Theory. It confirms that fulfilling intrinsic psychological needs—autonomy, competence, and relatedness—significantly relates to different aspects of student engagement. Specifically, autonomy is linked to behavioral engagement, competence to cognitive engagement, and relatedness to emotional engagement. These links illustrate the various ways internal motivational factors influence students' academic actions and emotional involvement.

Moreover, demographic variations provided nuanced insights: younger students showed increased cognitive engagement and a stronger sense of competence, while older students expressed deeper emotional engagement and a more robust sense of relatedness. Gender-based analyses also revealed significant differences in cognitive and emotional engagement, with female students consistently reporting higher involvement. These findings underscore the significance of context in motivation, suggesting that age and gender play crucial roles in shaping how students perceive and interact with their academic environments. Ultimately, the study not only supports the theoretical foundation of SDT but also expands its application by confirming the significance of demographic variables in research on academic motivation.

RECOMMENDATIONS

Based on the findings, it is advised that higher education institutions create autonomy-supportive learning environments to boost student participation and motivation. Educators should offer differentiated instruction and constructive feedback to reinforce students' sense of competence, especially for older learners who might need additional cognitive support. To foster emotional engagement, schools should promote peer collaboration and inclusive practices that strengthen social connectedness. Lastly, interventions should be customized to meet the unique motivational needs of individuals across different age groups and genders, ensuring that support strategies are both responsive and equitable.

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