



The Mediating Role of Academic Procrastination in the Link Between Academic Motivation and Academic Adjustment Among University Students

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Abstract: *Introduction:* Academic adjustment is a crucial factor in the success of undergraduates. Understanding the various factors that shape this process can help develop effective strategies to support students. *Aim:* This study investigates the role of motivation in predicting academic adjustment among undergraduates, incorporating procrastination as a key mediating factor. *Method:* We adopted a cross-sectional design. Undergraduates from various Greek universities ($N = 284$; 63.4% female and 36.2% male students, M age = 21.2 years, and $SD = 1.7$) completed measures of academic motivation, academic procrastination, and academic adjustment. The students' past performance and demographic information were also collected. *Results:* Findings from structural equation modeling analysis supported the proposed model. Intrinsic motivation predicted better academic adjustment directly and through reduced procrastination, while extrinsic motivation showed a less significant direct effect but still contributed to procrastination behaviors. Amotivation predicted higher levels of procrastination and poorer academic adjustment. Procrastination negatively affected academic adjustment. *Conclusion:* Promoting intrinsic motivation could significantly enhance academic adjustment by reducing procrastination behaviors. Additionally, addressing amotivation and its role in procrastination is crucial to improving academic outcomes. Therefore, interventions should focus on fostering intrinsic motivation and reducing procrastination to improve academic adjustment.

Keywords: motivation, procrastination, adjustment, path analysis

Introduction

Understanding the role of different motivational and behavioral aspects in academic adjustment is essential to enhancing student success (van Rooij et al., 2018). Academic motivation and procrastination are particularly important factors that shape how effectively university students adapt to their academic demands (Oram & Rogers, 2022). According to a study (Vossensteyn et al., 2015), a substantial proportion of European students fail to complete their university studies. Additionally, research across 18 countries found that 40% of individuals aged 19–20 who enrolled in higher education in 2018 experienced a dropout rate of 12% among undergraduates entering their second year of studies (OECD, 2019). Experts widely agree that academic procrastination is a major factor contributing to student dropout (Bäulke et al., 2018), while others attribute it to insufficient motivation (Yusof et al., 2023). Recent

research conducted in Greece underscored the critical role of academic procrastination in shaping students' learning, success, and continuation of their studies (Vlachopanou & Karagiannopoulou, 2022a, 2022b, 2023).

Statement of the Problem

This study addresses the issue of academic adjustment among university students by examining the role of academic motivation and procrastination. Academic adjustment, defined by students' ability to meet academic challenges, has been identified as a key predictor of retention and performance (Ahmad & Rana, 2023). However, the combined effects of motivation and procrastination on academic adjustment remain underexplored. Insufficient academic motivation – whether intrinsic or extrinsic – and high levels of procrastination were found to negatively

affect students' academic performance, contributing to stress, anxiety, and potential dropout (González-Brignardello et al., 2023). Understanding the interaction between motivation and procrastination is essential to addressing the dropout problem and enhancing student success.

Theoretical Background

The present study draws upon self-determination theory (SDT), a widely accepted framework developed by Deci and Ryan (1985) and expanded by Deci and Ryan (2016). SDT categorizes motivation into two primary types: intrinsic motivation (engaging in activities for personal satisfaction) and extrinsic motivation (engaging in activities because of external pressures or rewards). According to SDT, higher levels of intrinsic motivation are associated with more positive academic outcomes, while extrinsic motivation can have mixed effects depending on the student's perception of external rewards or pressures (Deci & Ryan, 1985).

In addition, Vallerand's approach to motivation (Vallerand et al., 1992), grounded in SDT, refines this framework by introducing three dimensions: intrinsic motivation, extrinsic motivation, and amotivation. Intrinsic motivation refers to internal drives such as curiosity and achievement, while extrinsic motivation depends on rewards like grades. Amotivation reflects a lack of motivation, often leading to disengagement from academic tasks. Vallerand's approach is particularly useful for understanding academic adjustment because it highlights how different types of motivation shape learning behaviors and academic success (Vallerand et al., 1992). This study applies Vallerand's model to investigate how intrinsic and extrinsic motivation as well as amotivation predict academic adjustment, and whether procrastination mediates this relationship.

Academic Motivation and Academic Procrastination

Research indicates that different types of motivation – intrinsic, extrinsic, and amotivation – play a significant role in predicting academic procrastination (Apriliani et al., 2024). Intrinsic motivation involves engaging in activities for inherent satisfaction and interest and tends to be negatively associated with procrastination (Marin et al., 2023). Intrinsically motivated students are less likely to procrastinate because they find personal enjoyment and value in their academic tasks (Kok, 2016). Conversely, extrinsic motivation, driven by external rewards or pressures, can have a more complex relationship with procrastination. Studies suggest that students motivated by external factors

may procrastinate less if they perceive the rewards as attainable and the external pressures as manageable (Shaked & Altarac, 2022; Svartdal et al., 2020). However, if they perceive external pressures as overwhelming, this may lead to increased procrastination. Amotivation, on the other hand, characterized by a lack of motivation, is consistently linked to higher levels of academic procrastination. Amotivated students often struggle to see the value of their academic work and are more likely to delay tasks (Saplavskaya & Jerkunkova, 2018). Understanding these dynamics is crucial to developing interventions to reduce procrastination and improve academic adjustment.

Academic Procrastination and Academic Adjustment

Recent research has highlighted the critical role of academic procrastination in predicting academic adjustment (Balkis, 2013; Montgomery et al., 2019). Academic procrastination, characterized by delaying important academic tasks, is associated with negative behaviors that hinder students' ability to adapt to academic environments. Studies have found that students with higher levels of procrastination tend to experience increased stress, anxiety, and lower academic performance, all of which adversely affect their academic adjustment (González-Brignardello et al., 2023). Furthermore, procrastination disrupts time management and organizational skills, decreasing academic engagement and satisfaction (Calonia et al., 2023). Addressing academic procrastination through interventions such as time management training and motivational support significantly improves students' academic adjustment and success (Salguero-Pazos & Reyes-de-Cózar, 2023).

Academic Motivation and Academic Adjustment

Recent studies have underscored the vital role of academic motivation in predicting academic adjustment among university students (Girelli et al., 2018; Karakose et al., 2023). Academic motivation, encompassing both intrinsic and extrinsic forms, plays a significant role in how effectively students adapt to academic demands (Bin Abdulrahman et al., 2023). Intrinsic motivation, driven by genuine interest and enjoyment in learning, is strongly associated with positive academic behaviors, including higher engagement, better performance, and greater satisfaction (Froiland & Worrell, 2016). On the other hand, extrinsic motivation, fueled by external rewards or pressures, can also promote

academic adjustment, though its effects may vary depending on the nature and perception of these external factors (Deci et al., 2001). Moreover, students with higher levels of academic motivation are more likely to employ effective study strategies, manage their time efficiently, and seek help when needed, all of which contribute to better academic adjustment (Adams & Blair, 2019; Kryshko et al., 2020). Therefore, fostering both intrinsic and extrinsic motivation through supportive educational environments seems crucial to enhancing students' academic adjustment and overall success (Adamma et al., 2018).

This study seeks to understand the factors that shape academic adjustment among university students. Academic adjustment, which encompasses how well students adapt to the academic, social, and emotional demands of higher education, plays a critical role in their success. Previous research has identified both academic motivation and procrastination as significant predictors of academic adjustment. However, the connection between these factors and their collective effect on academic adjustment has not been extensively explored.

Academic motivation, including intrinsic motivation (driven by personal interest and enjoyment of learning) and extrinsic motivation (driven by external rewards, such as grades or fulfilling expectations), is positively linked to better academic adjustment. Intrinsic motivation fosters deep engagement with academic tasks, encourages self-directed learning, and helps students sustain their efforts in challenging academic environments (Deci et al., 2001). Extrinsic motivation, while often associated with short-term task completion, can also promote adjustment when students value the outcomes of their efforts, such as achieving career goals or meeting family expectations. Both forms of motivation contribute to helping students manage academic demands, though their mechanisms may differ in scope and depth.

On the other hand, academic procrastination is characterized by the habitual delay of essential academic tasks, which often results in stress, anxiety, and poor performance. Students who frequently procrastinate tend to struggle to adapt to the demands of higher education (Vlachopanou & Karagiannopoulou, 2022a, 2022b). Understanding how procrastination interacts with motivation to influence academic adjustment is vital for developing holistic intervention strategies.

The Rationale of the Study

This study is grounded in Vallerand's approach to motivation (Vallerand et al., 1992), which distinguishes between intrinsic motivation, extrinsic motivation, and amotivation. By applying this framework, the study aims to develop a predictive model of academic adjustment. This model explores

not only the direct effects of motivation and procrastination on academic adjustment but also the mediating role of procrastination in this relationship. The rationale for testing mediation lies in the possibility that while motivation directly predicts adjustment, its influence may also be partially channeled through procrastination. For example, students with higher intrinsic motivation may be less likely to procrastinate, which in turn enhances their ability to adapt to university life. Similarly, students with extrinsic motivation may experience varying levels of procrastination, depending on the perceived value or pressure associated with external rewards.

The findings of this study provide valuable insights for educators and administrators, enabling them to design strategies that enhance intrinsic motivation, appropriately utilize extrinsic incentives, and address procrastination. By doing so, they can foster better academic adjustment, reduce disengagement, and promote success among university students. Ultimately, this research seeks to advance the current understanding of how key factors interact to shape students' academic and emotional adaptation to higher education environments.

By considering these considerations, this study assumes that student adaptation to the university environment – including academic, social, institutional, and personal-emotional dimensions – is shaped by factors predating their entry into university or developing during their studies as part of their adaptation process. The conceptual framework illustrated in Figure 1 outlines the proposed mechanisms, including both direct and indirect relationships, through which these factors affect academic adjustment. Summarizing the rationale behind the proposed conceptual framework regarding the factors that affect university adaptation among sample students, we note the following:

Hypothesis 1 (H1): Higher levels of academic motivation, including both intrinsic motivation (e.g., curiosity and enjoyment of learning) and extrinsic motivation (e.g., achieving good grades or fulfilling parental expectations), positively predict students' academic adjustment. Specifically, more motivated students exhibit better adaptation to academic demands.

Hypothesis 2 (H2): Academic procrastination mediates the relationship between academic motivation and academic adjustment. Students with higher levels of academic motivation procrastinate less, and lower procrastination in turn leads to better academic adjustment.

Hypothesis 3 (H3): Perceptions of institutional support and engagement with university activities positively and directly predict students' overall academic adjustment. Students who receive strong institutional

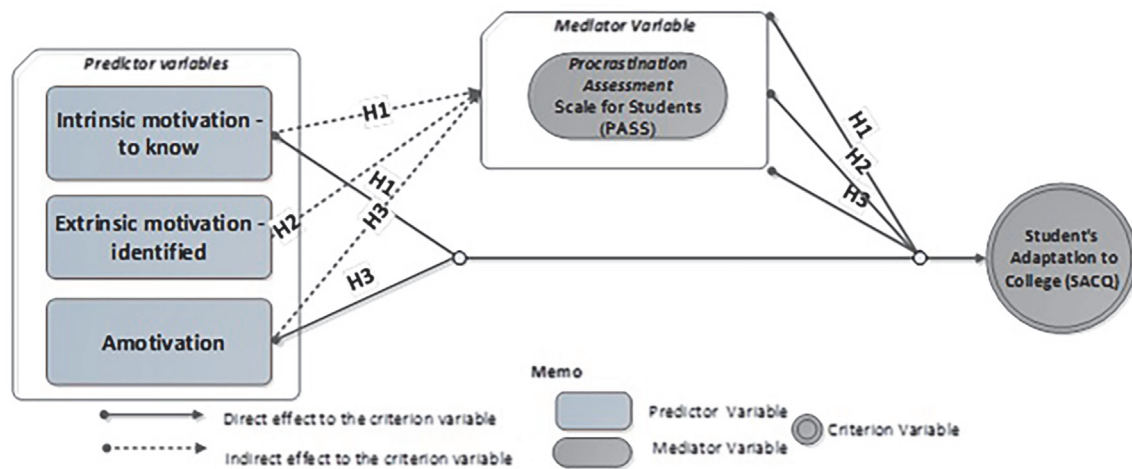


Figure 1. The conceptual model.

support and are more engaged in university activities adapt more successfully to university life.

Method

Participants

We collected the data between January and April 2024 using a questionnaire administered to a random sample of students through collaboration with the administrative offices of the universities involved in the study. We created an online questionnaire using Microsoft Survey Form and provided the link to the administrative offices of the participating institutions. These offices then distributed the questionnaire link to their student bodies via official university communication channels, such as email or student portals. The sample included students from three public and one private academic institution in Greece as well as a public academic institution in Cyprus. Participants included 284 adolescents aged 18–28 (M age = 21.2, SD = 1.7). The sample consisted of 36.2% male and 63.4% female students, with most (79.2%) reporting that their hometown location differed from their university location. Almost half of the respondents (48.6%) indicated their enrolled university department was their first choice, while most (75.4%) stated they were satisfied with the teaching methods and curriculum (see Table 1).

Procedure

Participants who were undergraduates from universities in Attica and provincial areas completed the questionnaires online using Microsoft Survey Form, facilitated by university administrations. Participation was anonymous, voluntary, and conducted in accordance with ethical guidelines and principles, adhering to data protection regulations.

The research conducted in this study received ethical approval from the PGRAOC Ethics Committee on 16 October 2023 (Approval Code: PGR-AOC-2023-10PD23). This approval ensured that the study adhered to ethical standards in research involving human participants, maintaining the integrity of the research process and safeguarding the well-being of the participants.

Measures

The Academic Motivation Scale

The Academic Motivation Scale (AMS, AMS-C-28; Vallerand et al., 1992) is a 28-item Likert-scale measure designed to assess motivation toward education. Tsorbatzoudis et al. (2001) translated and adapted it into Greek. The scale consists of seven subscales that evaluate three types of intrinsic motivation (to know, accomplish things, and experience stimulation), three types of extrinsic motivation (external regulation, introjected regulation, and identified regulation), and amotivation. Response options for each statement were rated on a 7-point Likert scale, ranging from 0 (*does not correspond at all*) to 7 (*corresponds exactly*). Higher scores in each subcategory indicated a strong presence of that type of academic motivation (Fairchild et al., 2005). Cronbach's α for intrinsic motivation was .89, for extrinsic motivation .73, and for amotivation .86.

Procrastination Assessment Scale Questionnaire

Procrastination was measured using the Procrastination Assessment Scale Questionnaire (PASS) (Solomon & Rothblum, 1984), which Chatzidimou (1994) had adapted

Table 1. Variable definitions and values. Descriptive statistics, construct reliability ($N = 284$)

Variables	Values and coding	Percentage/average/SKewness and KYRtosis	Cronbach's α
Participants' characteristics			
Age	Ranging 18–28	11.2 years ($SD = 1.7$, $SK = 1.32$, $KYR = 2.74$)	
Gender	1, Male 0, Female	38.0% 62.0%	
The hometown location is the same as the university location	1, Yes 0, No	20.8% 79.2%	
The enrolled department was my first choice	1, Yes 0, No	48.6% 51.4%	
Grade point average (GPA)	Scale [0–10]	7.33 ($SD = 1.58$, $SK = -0.26$, $KYR = -0.81$)	
Satisfied with the way of teaching and the curriculum	1, Yes 0, No	75.4% 24.6%	
Criterion variable			
Students' Adaptation to College (SACQ total score)	Sum of 66 Likert scales 1–9 Range [9–594]	$M = 380.95$ ($SD = 64.37$, $SK = -0.17$, $KYR = -0.23$)	.931
Predictor variables			
Intrinsic motivation – to know (subscale mean score from Academic Motivation Scale – AMS-C 28)	Mean of 4 Likert scales 1–7	$M = 5.06$ ($SD = 1.75$, $SK = -0.97$, $KYR = -0.11$)	.891
Extrinsic motivation – identified (subscale mean score from Academic Motivation Scale – AMS-C 28)	Mean of 4 Likert scales 1–7	$M = 5.35$ ($SD = 1.52$, $SK = -0.78$, $KYR = -0.15$)	.731
Amotivation (subscale mean score from Academic Motivation Scale – AMS-C 28)	Mean of 4 Likert scales 1–7	$M = 1.60$ ($SD = 1.16$, $SK = 0.73$, $KYR = 0.19$)	.861
Mediator variable			
Procrastination Assessment Scale for Students (PASS mean score)	Sum of 5 Likert scales 1–5 Ranging [5 to 25]	$M = 12.48$ ($SD = 4.70$, $SK = 0.53$, $KYR = -0.19$)	.876

into Greek. This self-report questionnaire evaluates the frequency of students' procrastination behaviors. The Greek version of the PASS assesses academic procrastination across five specific academic tasks: (1) writing term papers; (2) studying for examinations; (3) academic-administrative tasks; (4) course attendance; and (5) school activities in general. Responses were recorded on a 5-point Likert scale, ranging from 1 (*never procrastinate*) to 5 (*always procrastinate*). This study used only the initial questions from each subscale, as suggested by Vlachopanou and Karagiannopoulou (2022a, 2022b, 2023). Cronbach's α was .88.

The Student Adaptation to College Questionnaire

The Student Adaptation to College Questionnaire (SACQ; Baker & Siryk, 1989), translated and adapted into Greek by Gkatona (2007), is a self-report measure consisting of 67 items, with nine response options in Likert format (ranging from 1 = *completely disagree* to 9 = *completely agree*). It

evaluates four dimensions: academic adaptation, institutional adaptation, social adaptation, and personal-emotional adaptation. Respondents describe their most recent college experiences. Cronbach's α was .93.

Statistical Analysis

This study utilized path analysis, a powerful procedure that combines multiple regression analysis models to assess the relationships specified in the theoretically driven model. The technique of path analysis was developed in the 1920s by the geneticist Sewall Wright for applications in biological sciences (Wright, 1926). It was later modified for use in econometrics and became popular from the 1970s onward in disciplines such as psychology, political science, and education. Path analysis has gained popularity in the study of social phenomena because it can verify theoretical hypotheses.

The applicability of the conceptual model, presented in Figure 1, was tested using real-case data by applying three distinct path regression models with AMOS software. These models investigate Hypotheses 1, 2, and 3. Each of the three

path-analysis models used in this study are no different from a multiple linear regression model of the dependent variable Y_1 on the dependent variable X_1 and the mediator X_2 as represented by $\hat{y} = \alpha + \beta_{Y_1/X_1/X_2} \times \beta_{Y_1/X_1/X_2}$ (1). In this case, path analysis helps separate the direct and indirect effects of independent variables on the dependent variable. More specifically, the coefficient $\beta_{Y_1/X_1/X_2}$ estimates the direct effect of X_1 on Y_1 , holding the effects of X_2 constant. If we then regress X_1 on X_2 , we obtain the equation $x_{2est} = \alpha_2 + \beta_{X_2/X_1} \cdot x_2$ (2), where the coefficient β_{X_2/X_1} estimates the effect of X_1 on X_2 . Finally, if we replace X_2 in equation (1) with x_{2est} , we obtain $\hat{y}_{est} = \alpha_1 + \beta_{Y_1/X_1/X_2} (\alpha_2 + \beta_{X_2/X_1} \cdot x_2) + \beta_{Y_1/X_2/X_1} \cdot x_2$ (3). In (3), the coefficient $\beta_{Y_1/X_2/X_1}$ estimates the direct effect of X_2 on Y_1 as the coefficient $\beta_{Y_1/X_1/X_2} (\alpha_2 + \beta_{X_2/X_1} \cdot x_2)$ of (3), estimates the indirect effect of X_2 on Y_1 through X_1 . Thus, the indirect effects are estimated by multiplying the coefficient of the pathways through which each effect is transferred. Furthermore, the total effect of X_1 on Y_1 through X_2 results from the sum of the direct and indirect effects. In this case of path analysis, the coefficients β are called “path coefficients.”

To test Hypothesis 1, which posited that students’ academic motivation (intrinsic and extrinsic) would positively predict their academic adjustment, we used three academic motivational subscales as predictor variables: “Intrinsic motivation – to know,” “Extrinsic motivation – identified,” and “Amotivation.” We used the Student Adaptation to College score as the criterion variable in each model, which allowed us to determine the direct effects of these types of motivation on academic adjustment.

Hypothesis 2 suggested that academic procrastination would mediate the relationship between academic motivation and academic adjustment, with higher levels of procrastination associated with poorer adjustment outcomes. In the path regression models, we included the Procrastination Assessment Scale for Students as the mediator variable. By examining the mediating role of procrastination, we assessed whether and how academic motivation indirectly affected academic adjustment through procrastination behaviors.

Finally, Hypothesis 3 proposed that external life events influence students’ academic adjustment. We evaluated the impact of these factors, while representing them in the models as covariates, examining the relationship between motivation, procrastination, and adjustment. Although not explicitly detailed in the original hypotheses section, we incorporated the impact of these external variables into the comprehensive analysis to provide a more nuanced understanding of student adaptation processes.

By applying these path regression models, we aimed to validate the conceptual framework and provide empirical

support for the hypotheses. This analysis not only elucidated the direct and indirect effects of academic motivation and procrastination on academic adjustment, but also highlighted the complex interplay between these factors, offering valuable insights for developing targeted interventions to support student success in higher education.

The Interpretation of the FIT Indices

Various tests and indices have been proposed to test the goodness of fit of a path-analysis model. However, a common procedure is as follows: first apply the classical goodness-of-fit test χ^2 – (Chi-square test), which is used here to test the fit of a path-analysis model to the empirical data. It tests whether the population covariance matrix (Σ) is equivalent to the sample covariance matrix S , that is, whether the hypothesis $H_0: \Sigma = S$ is statistically significant. A rejection of H_0 indicates the model’s poor fit to the data, whereas failure to reject H_0 indicates the model’s good fit to the data. However, this test can only be satisfactorily applied when the sample is relatively small. With large samples, the χ^2 value is always large, which indicates the model’s unsatisfactory fit to the empirical data. This problem can be alleviated by using the normalized χ^2 goodness-of-fit test – (normalized Chi-square – χ^2/df); when its value is less than 3, the model’s fit to the empirical data is considered satisfactory. However, since both tests are considered problematic (they depend on the sample size), the use of three main indices is also recommended: comparative fit index (CFI), root mean square error of approximation (RMSEA), and the Tucker-Lewis index (TLI).

The CFI assesses the fit of the proposed model relative to the independence model. The value of the index varies in the interval [0.0, 1.0], while the closer its value is to unity, the better the model fits the data. In general, index values greater than 0.9 indicate an acceptable model.

RMSEA estimates the potential lack of fit of the model relative to the saturated model. In addition, this index considers the number of estimated parameters and thus remains relatively unaffected by sample size. Regarding the evaluation of RMSEA values, the following rule applies: RMSEA values equal to 0 indicate perfect model fit, values less than or equal to .05 are associated with good model fit, values between .05 and .08 with adequate fit, and values between .08 and .10 with moderate adjustment. Finally, the values of the index greater than .10 are unacceptable.

The TLI index assesses the model’s fit relative to the independence model, is unaffected by the number of model parameters, and can be interpreted similarly to the CFI. However, the TLI index can also take values less than 0, indicating that the model is “the worst possible.”

Table 2. Fit measures for the path models

	Chi-square test (χ^2)	Degrees of freedom (df)	χ^2/df	Tucker Lewis index (TLI)	Comparative fixed index (CFI)	Mean squared error of approximation (RMSEA)
Model 1	86,817	33	2.63	0.809	0.860	0.156
Model 2	86,817	33	2.63	0.836	0.777	0.147
Model 3	86,817	33	2.63	0.837	0.877	0.348
Acceptable range			<3	>0.800	>0.800	<0.069

Results: Pathways to Students' Adaptation to University Environment

Results concerning the goodness of fit indices are given in Table 2 and suggest an adequate fit of each model to the data. Table 3 displays standardized and unstandardized total, direct, and indirect path coefficients and the p -values. All paths and correlations are significant at either .05 or .01 level, providing evidence supporting the hypotheses stated above, resulting in the conclusion that certain factors shape the distribution of students' adaptation to the university environment.

If we attempt to describe the results, in the order of significance of the factors, we note the following regarding Model 1: The effect of *intrinsic motivation – to know* on *student adaptation to college* was fully mediated via the *procrastination assessment scale*. As Figure 2 illustrates, the regression coefficient between *intrinsic motivation – to know* and *procrastination assessment scale* and the regression coefficient between the *procrastination assessment scale* and *student adaptation to college* were significant (see Table 3).

More specifically, *intrinsic motivation – to know* has a direct and positive effect on the student's adaptation to the university ($b = 0.33, p < .01$), in the sense that the higher the students' knowledge acquisition motivation, the more they adapt to the university. In addition, the *intrinsic motivation – to know* exerts an indirect effect on adaptation to the university, through its negative correlation with academic procrastination ($b = -0.48, p < .1$), while this procrastination is in turn related to reduced adaptation to the university ($b = -0.40, p < .01$). This means that students who display high internal motivation to acquire knowledge tend to adapt to the university environment and student life, and that they additionally tend to display reduced academic procrastination, while the latter further increases adaptation to university and student lifestyle. Therefore, the overall effect of intrinsic acquisition motivation on students' adjustment to the university is 0.55, as calculated by the sum of the direct (0.33) and the indirect effects ($-0.45 \times -0.40 = 0.19$) mentioned above. Thus, H1 is partially confirmed, establishing that students adapted to the university environment are

more likely to have high *intrinsic motivation – to know* and low procrastination.

The results concerning Hypothesis 2 reveal that *extrinsic motivation – identified* mostly affects student adaptation indirectly through procrastination to the university environment. Indeed, it was found (see Figure 3) that extrinsic motivation had a low and nonsignificant direct effect on adaptation ($b = 0.02, p = .672$). However, an indirect negative effect is revealed through procrastination and equals -0.13 (0.23×-0.56). This study reveals that extrinsically motivated university students exhibit lower levels of adjustment and higher levels of procrastination. Notably, procrastination amplifies the negative impact on adjustment, indicating an indirect effect of extrinsic motivation on the university environment. This finding supports H2, that extrinsic motivation does not directly affect adjustment.

Finally, as claimed under H3, amotivation had a direct negative effect on student adaptation ($b = -0.36, p < .001$) and a direct positive effect on procrastination levels ($b = 0.20, p < .001$), followed by a negative direct effect of the procrastination scale on student adaptation ($b = -0.49, p < .001$). In the case of the amotivation scale, the positive value of the coefficient means that amotivated students enrolled at the university seem to have higher procrastination levels than motivated students. They thus tend to show lower adaptation levels. For this path, the indirect effect is -0.10 ($0.20 \times -0.49, p < .01$). Furthermore, an interpretation of the direct negative effect of amotivation on student adaptation ($b = -0.36, p < .001$) could be that amotivated students per se tend to face lower adaptation levels on the university environment. These results demonstrate a total direct as well as an indirect effect equal to -0.46 (-0.36×-0.098) between students' amotivation levels and their adaptation to the university environment. These results align with the predictions of H3 (see Figure 4 and Table 3).

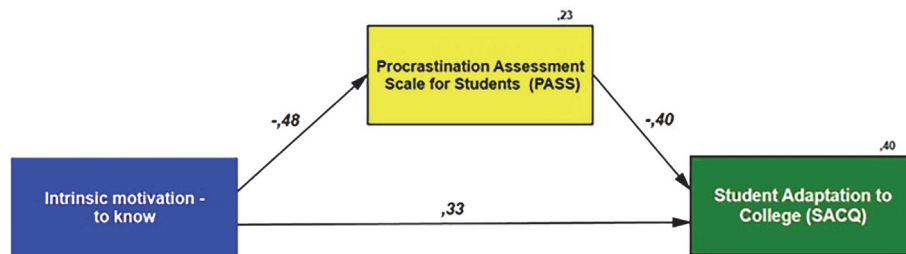
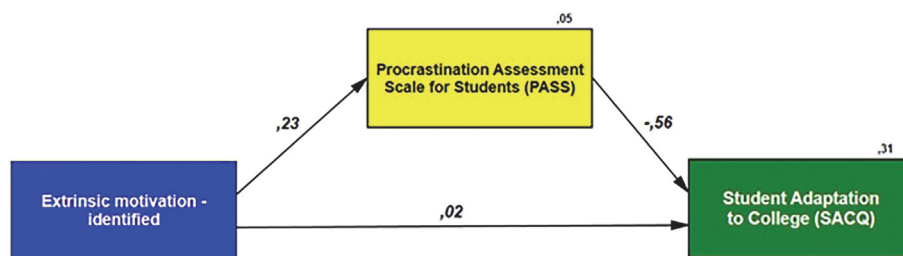
Discussion

This study aimed to evaluate a predictive model of academic adjustment among undergraduate students. This model was founded on SDT with the inclusion of academic

Table 3. Direct, indirect, and total standardized effects for the three path models

			Standardized beta coefficients		
Variable		Variable	Total effect	Direct effect	Indirect effect (via PASS)
Model 1					
Students' Adaptation to College	←	Intrinsic motivation – to know Procrastination Assessment Scale for Students	.55 (19.22)*	.33 (12.15)* −.40 (−5.49)*	.19 (7.08)*
Procrastination Assessment Scale for Students	←	Intrinsic motivation – to know		−.48 (−0.29)*	
Model 2					
Students' Adaptation to College	←	Extrinsic motivation – Identified Procrastination Assessment Scale for Students	−.11 (−4.58)	.02 (12.15) .230 (.711)*	−.13 (−5.49)*
Procrastination Assessment Scale for Students	←	Extrinsic motivation – Identified		−.563 (−7.772)*	
Model 3					
Students' Adaptation to College	←	Amotivation Procrastination Assessment Scale for Students	−.46 (−25.39)	.36 (−20.1)* −.36 (0.71)*	−.01 (−5.33)*
Procrastination Assessment Scale for Students	←	Amotivation		−.49 (−6.68)*	

Note. * $p < .05$.

**Figure 2.** Model 1: The PATH model for the effect of intrinsic motivation – to know on student adaptation to college.**Figure 3.** Model 2: The PATH model for the effect of extrinsic motivation – identified on student adaptation to college.

procrastination. This study sought to explore how intrinsic motivation, extrinsic motivation, and amotivation could predict academic adjustment through the mediating role of procrastination. While previous research examined the effects

of academic motivation on procrastination and adjustment within the university setting, this study is unique in integrating SDT and procrastination into a cohesive model to explain academic adjustment in university students.

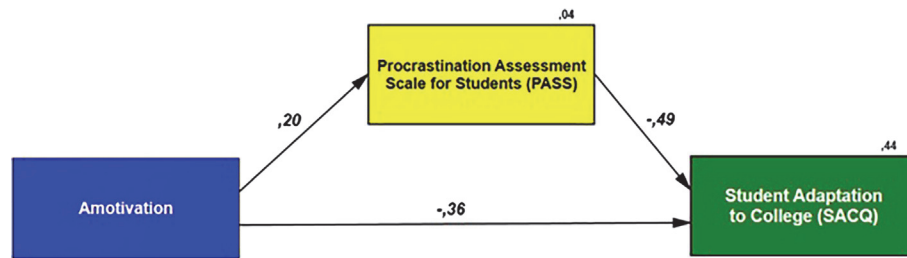


Figure 4. Model 3: The PATH model for the effect of amotivation on student adaptation to college.

Intrinsic Motivation and Academic Adjustment

As hypothesized (H1), intrinsic motivation plays an important role in improving student adjustment. The direct positive effect indicates that students with higher levels of intrinsic motivation tend to adapt more effectively to the academic environment. This finding aligns with previous studies, which suggest that students driven by an internal desire to learn and acquire knowledge are more likely to experience positive academic behaviors and outcomes, such as higher engagement, better performance, and greater satisfaction with university life (Deci & Ryan, 2016; Zheng, 2024).

Additionally, intrinsic motivation indirectly enhances academic adjustment by reducing academic procrastination. The negative relationship between intrinsic motivation and procrastination suggests that students with high internal motivation are less likely to delay academic tasks, positively affecting their ability to adapt to university life. This pathway emphasizes the dual role of intrinsic motivation, both as a direct enhancer of adjustment and as a mitigating factor against procrastination, which has been found to impede academic adjustment (Rahimi & Vallerand, 2021).

These findings underscore the importance of fostering intrinsic motivation within educational environments, as it not only boosts immediate academic success but also helps students avoid behaviors (like procrastination) that hinder long-term adaptation and engagement. This highlights the role of educators in promoting internal motivators for learning, encouraging curiosity, and providing opportunities for students to pursue personal interests within their studies.

Extrinsic Motivation and Academic Adjustment

To address the reviewer's comment, it is important to clarify that identified regulation is a form of extrinsic motivation where students engage in activities because they personally

value them – not merely because of external pressures or rewards. This contrasts with external regulation, where external rewards or punishments drive behavior.

Contrary to the initial expectations outlined in H2, extrinsic motivation – particularly identified regulation – showed a more subtle effect on academic adjustment. While the direct impact of extrinsic motivation on adjustment was small and nonsignificant, it indirectly affected adaptation through procrastination. Specifically, higher levels of extrinsic motivation were associated with lower procrastination, which in turn had a small positive effect on academic adjustment. These findings challenge previous assumptions that extrinsic motivation would directly affect adjustment. The results align with existing literature (Grund & Fries, 2018), which suggests that identified regulation, characterized by engaging in academic tasks for personal valued reasons, does not necessarily promote the deep engagement required for optimal academic adjustment. This form of motivation is distinct from external regulation, which focuses more on external rewards and pressures. Extrinsic motivation may encourage task completion but does not generate the personal commitment required for students to fully adapt to the academic environment. Therefore, while extrinsic motivation can help reduce procrastination, it appears insufficient in driving comprehensive academic adjustment. This finding highlights the importance of fostering intrinsic, rather than purely extrinsic, motivators within educational settings to achieve a more meaningful and lasting impact on students' adaptation and engagement with academic life.

Amotivation and Academic Adjustment

As hypothesized in H3, amotivation had a strong negative effect on student adjustment to the university environment. Amotivated students, lacking intrinsic and extrinsic motivation, struggle to adapt to the academic environment. This aligns with SDT, which associates amotivation with disengagement, a lack of direction, and negative academic and psychological outcomes (Howard et al., 2021). This effect is both direct and indirect through increased procrastination. Students experiencing amotivation lack direction

and purpose, leading to higher levels of procrastination and, subsequently, poorer adjustment results. This aligns with SDT, which associates amotivation with disengagement and negative academic and psychological effects (Howard et al., 2021).

Interestingly, while amotivation is linked to poorer academic adjustment, it was found to have a weak impact on procrastination, contrary to the initial expectations. This suggests that amotivated students are not necessarily more prone to procrastination. Instead, their lack of motivation appears to directly hinder their academic adjustment by diminishing their capacity to engage with academic tasks and adapt to university life. These findings support previous research (Quito-Calle & Cosentino, 2024), which indicates that amotivated students tend to have poorer academic outcomes and overall well-being.

Implications for Theory and Practice

The findings of this study have significant implications for both theory and practice. The integration of SDT and procrastination in the context of academic adjustment provides a nuanced understanding of how different types of motivation affect student adaptation. The results support the theoretical framework of SDT, particularly the role of intrinsic motivation in fostering positive academic behaviors and the detrimental impact of amotivation on adaptation.

From a practical perspective, these findings suggest that interventions to enhance student adjustment should focus on boosting intrinsic motivation. Educators and administrators can foster a more supportive environment that encourages curiosity, self-directed learning, and personal interest in academic tasks. Programs that emphasize the development of internal motivation and self-determined behaviors may help reduce procrastination and improve students' overall adaptation to university life.

Moreover, while extrinsic motivation can help students manage short-term academic tasks, it is less effective in promoting deeper engagement and long-term adjustment. Therefore, relying on external rewards alone may not be sufficient to help students thrive in the academic environment. Instead, a balanced approach that includes strategies to build intrinsic motivation, alongside the appropriate use of extrinsic incentives, would be more beneficial for student success.

Conclusion

One of the main contributions of the present study is that it extends the research on SDT by examining how self-determined motivation predicts academic adjustment out-

comes through academic procrastination. The findings emphasize the significant role of intrinsic motivation in enhancing academic adjustment among undergraduate students. This is particularly important because undergraduate students, unlike school children, are not required to attend university and often do so out of personal desire and internal motivation. The results show that students with higher intrinsic motivation adapt better to the academic environment, while those with amotivation face challenges in their adjustment.

The study also highlights the complex role of procrastination, which becomes more relevant when students' motivations for studying are extrinsic. In such cases, students are more prone to procrastination and may focus on more enjoyable, nonacademic activities instead of their academic responsibilities. These findings contribute to a deeper understanding of how different types of motivation influence both procrastination and academic adjustment, thereby offering new insights into the academic behaviors of university students (Cerino, 2014; Svartdal et al., 2020).

Limitations

While the study offers valuable insights, several limitations must be acknowledged. First, the cross-sectional design limits the ability to establish causal relationships between motivation, procrastination, and academic adjustment. A longitudinal design would allow for tracking changes in these variables over time, providing a clearer understanding of how motivation and procrastination influence academic adjustment across different stages of university life. This would offer more robust conclusions regarding the directionality and long-term effects of these relationships, as changes in motivation and procrastination may vary as students progress through their academic journey (Caruana et al., 2015).

Second, the reliance on self-report data introduces the possibility of bias. Participants may have provided socially desirable responses or inaccurately assessed their motivation or procrastination, which could affect the validity of the results (Latkin et al., 2017). Additionally, the gender imbalance of the sample, with fewer male participants, limits the generalizability of the findings. Future research should aim to include a more gender-balanced sample to ensure that the findings are more representative of the broader student population and allow for an examination of potential gender differences in academic motivation and adjustment.

Finally, the study was conducted at a single timepoint, preventing an understanding of how students' motivation and procrastination fluctuate across different stages of their academic journey, which could affect their adjustment in various ways.

Future Research

Future studies should address the limitations of this research by employing longitudinal designs to explore how intrinsic motivation, procrastination, and academic adjustment evolve. Tracking these variables across multiple academic semesters could reveal dynamic interactions between motivation types and procrastination behaviors, offering a clearer understanding of their long-term effects on student adaptation (Honicke & Broadbent, 2016).

Moreover, future research should examine the role of social support networks – including peers, family, and faculty – in shaping students' motivation and academic behaviors. Investigating how perceived social support shapes intrinsic motivation and procrastination could provide valuable insights into the external factors that contribute to or hinder academic adjustment.

Additionally, it would be useful to explore gender differences in academic motivation and procrastination, particularly given the limitations of the current sample. Understanding how male and female students may experience and respond to motivational factors could enhance the development of targeted interventions to improve academic adjustment for all students.

By addressing these areas, future research can further advance the field, offering more comprehensive insights into the complex relationships between motivation, procrastination, and adjustment, and informing strategies to promote academic success and well-being among university students.

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History

Received August 2, 2024

Accepted December 11, 2024

Published online February 14, 2025

Open Science

Data are available from the corresponding author upon request.

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