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Investigation of the Relationship between Metamemory, Metacognition, and Academic Vitality with Academic Procrastination among Students

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Abstract

The present study aimed to investigate the relationship between metamemory, metacognition, and academic vitality with academic procrastination among students. This research was applied in purpose and descriptive in nature, employing a correlational design. The statistical population consisted of all undergraduate male and female psychology students at Ayatollah Amoli Islamic Azad University (N = 552). Of the 552 eligible students, 180 were invited and 160 completed the questionnaires through voluntary convenience sampling and completed the Metamemory Questionnaire (Troyer & Rich, 2002) and the

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Metacognition Questionnaire (Cartwright-Hatton & Wells, 1997), virtually. Findings from Pearson's correlation coefficient revealed that metamemory, metacognition, and academic vitality had a significant negative relationship with academic procrastination ($p < 0.01$). Furthermore, the results of multiple regression analysis indicated that metamemory, with the highest beta value ($\beta = -0.439$, $p < 0.01$), was the strongest negative predictor of academic procrastination.

Keywords

Metamemory, Metacognition, Academic Vitality, Academic Procrastination

1. Introduction

Since students are the fundamental pillar of the educational system and play a key role in achieving its goals, attention to their education and training leads to greater growth and development of the system (Bashash, 2017). One major factor influencing students' academic progress is academic procrastination (Marzban, 2018). It is considered a behavioral problem, seen in many adults' daily activities (Hosseini & Amiri, 2015). Academic procrastination is the irrational tendency to postpone starting or completing academic tasks, where students decide to do their work but lack sufficient motivation (Ferrari, Jonson, & McCown, 1995), often leading to failure due to unnecessary activities (Hosseini & Amiri, 2015).

One determining factor correlated with academic procrastination is metamemory (Magno, 2018), a component of metacognition. It concerns a person's knowledge about memory abilities and strategies that support memory control (Panna & Kaszniak, 2005). Metamemory involves monitoring and managing one's memory and learning (Dunlosky & Bjork, 2008), focusing on beliefs about memory performance (Cohen & Conway, 2008).

Another construct studied in relation to academic procrastination is metacognition (Kaur & Kaur, 2016), which refers to knowledge about one's cognitive processes and using them to reach learning goals (Flavell, 1979). In other words, it is awareness of one's own thinking—"knowing about knowing". Metacognitive knowledge helps monitor learning progress (Rostami Sarmi, 2017).

Another related academic variable is academic vitality (Yao, 2019), which reflects learners' ability to adapt to academic pressure and challenges. Vitality is a psychological experience in which individuals feel energetic and alive (Baghaei, 2021). It enables students to overcome academic obstacles (Comerford, Batteson, & Tormey, 2015), and is linked to mental well-being and academic success (Martin, 2014). Supporting students' academic vitality is essential (Sheikhali Zadeh, 2018).

Accordingly, this research investigates the relationship between metame-

mory, metacognition, and academic vitality with academic procrastination in students.

One of the key issues in education, especially at the university level, is the widespread occurrence of procrastination behavior—academic procrastination—among students. The statement of the problem is that academic procrastination, as a persistent and growing challenge, negatively impacts students' academic performance, mental health, and personal development. It is influenced by various factors and typically involves delays in completing assignments and postponing responsibilities (Sadri Shamir, Karimiānpour, & Jalilian, 2018). Academic procrastination is the intentional delay in completing tasks, marked by a lack of motivation and eagerness. A study (Van Eerde, 2003) noted that procrastinators struggle to start and maintain academic work. Some view procrastination as a cognitive issue, others as behavioral or motivational (Asghari, 2014; Sontag & Stoeger, 2015; Khezai, 2012). It leads to anxiety, poor strategies, lack of confidence, mental disorders, low self-control, and decreased achievement motivation (Bozorgnia, 2014).

Metamemory is knowledge about one's memory system, including strategies to enhance memory performance and predict future outcomes (Flavell, 1979). It includes two main components, each related to a type of knowledge, and is considered a factor influencing academic outcomes. Individuals use metamemory skills before, during, and after learning to improve recall (Carroll & Korukina, 1999; Kirk, Filho, & Yuzawa, 2001; Abdolhosseini, 2016).

Metacognition involves awareness of one's cognitive processes and strategies for learning. It helps monitor progress, evaluate results, and assess mastery. It is often called "learning to learn" (Schraw & Moshman, 1995).

Academic vitality is a key trait for handling academic challenges. A study (Martin, 2014) defines it as the successful ability to manage academic obstacles. When someone acts spontaneously, they feel more energized, not tired (Duijn, Rosenstiel, Schats, Smallenbroek, & Dahmen, 2011). This sense of vitality is an indicator of mental health (Sadri Shamir, Karimiānpour, & Jalilian, 2018). Identifying factors that enhance academic vitality is essential (Mohammadi, 2017). These factors include psychological, school-related, and family-peer influences (Lester, 2013; Finch, Peacock, Lazdowski, & Hwang, 2015).

Metamemory, metacognition, and academic vitality significantly contribute to students' success (Al-Baddareen, Ghaith, & Akour, 2015; Costa & Faria, 2015); However, few studies have jointly examined their relationship with academic procrastination. Thus, investigating this relationship can help reduce procrastination through targeted strategies.

2. Methodology

The given study presents some information about the relationship between metamemory, metacognition, and academic vitality with academic procrastination among students. This research was applied in purpose and descriptive in nature,

employing a correlational design. The statistical population consisted of all undergraduate male and female psychology students at Ayatollah Amoli Islamic Azad University (N = 552). Of the 552 eligible students, 180 were invited and 160 completed the questionnaires, yielding a response rate of 88.9%. Because voluntary convenience sampling was used, the results may not generalize to all psychology students. Also, the data obtained from the questionnaires and analyzed using appropriate statistical methods. In the present sample, internal consistency was acceptable for all instruments: Academic Procrastination Questionnaire (α = 0.87), Metamemory Questionnaire (α = 0.91), Metacognition Questionnaire (α = 0.88), and Academic Vitality Questionnaire (α = 0.84). Previous research in Iranian student populations has supported the reliability and construct validity of these measures (e.g., Hossein Chari & Dehghani Zadeh, 2012; Abdolhosseini, 2016).

3. Data Analysis

In this chapter, the data obtained from the questionnaires were analyzed using appropriate statistical methods. The results are presented in three sections:

1) Demographic information
2) Descriptive analysis
3) Inferential analysis

In the present sample, internal consistency was acceptable for all instruments: Academic Procrastination Questionnaire (α = 0.87), Metamemory Questionnaire (α = 0.91), Metacognition Questionnaire (α = 0.88), and Academic Vitality Questionnaire (α = 0.84). Previous research in Iranian student populations has supported the reliability and construct validity of these measures (e.g., Hossein Chari & Dehghani Zadeh, 2012; Abdolhosseini, 2016).

The Academic Procrastination Questionnaire (27 items) uses a 5-point Likert scale (1 = never to 5 = always). Higher scores reflect greater procrastination. The Metamemory Questionnaire (20 items, 5-point scale) measures knowledge and control over memory. The Metacognition Questionnaire (30 items, 4-point scale) assesses metacognitive beliefs and regulation. The Academic Vitality Questionnaire (10 items, 5-point scale) evaluates energy and persistence in academic tasks. Scale scores were computed as the sum of item responses.

3.1. Demographic Information

3.1.1. Participants' Age

Table 1. Mean and standard deviation of participants' age (n = 160).

Maximum	Minimum	Std. Deviation	Mean
50	18	7.07	30.2

According to Table 1, the average age of the participants is 30 years and 2 months, with a minimum age of 18 and a maximum of 50.

3.1.2. Participants' Gender

Table 2. Gender distribution of the sample.

Gender	Frequency	Percentage
Male	68	43%
Female	92	57%

As shown in Table 2, 43% (n = 68) of participants were male and 57% (n = 92) were female.

3.2. Descriptive Analysis

3.2.1. Descriptive Statistics of Research Variables

Table 3. Mean and standard deviation of the research variables (n = 160).

Variable	Max	Min	Std. Deviation	Mean
Academic Procrastination	114	29	18.57	54.10
Metamemory	171	60	27.96	125.04
Metacognition	116	39	19.88	81.30
Academic Vitality	44	11	7.31	24.55

As shown in Table 3, the mean and standard deviation of academic procrastination are 54.10 ± 18.57, metamemory 125.04 ± 27.96, metacognition 81.30 ± 19.88, and academic vitality 24.55 ± 7.31.

3.2.2. Normality Test of Data Distribution

Before testing the research questions and hypotheses using parametric statistical tests, the assumption of normality was checked using skewness, kurtosis, and the Kolmogorov-Smirnov (K-S) test. Results are shown in Table 4.

Table 4. Skewness, Kurtosis, and Kolmogorov-Smirnov (K-S) test results.

Variable	Sig.	K-S	Kurtosis (K)	Skewness (SK)
Academic Procrastination	0.359	0.957	0.027	0.874
Metamemory	0.334	0.933	0.315	−1.06
Metacognition	0.464	0.996	−0.894	−0.264
Academic Vitality	0.334	0.933	−0.337	0.416

All skewness and kurtosis values are within the acceptable range (−2 to +2), and all K-S significance levels are greater than 0.05, confirming the normal distribution of variables. Therefore, parametric tests can be used.

3.3. Inferential Analysis

Hypothesis 1: There is a relationship between metamemory and academic procrastination among students.

To test this hypothesis, Pearson's product-moment correlation was used. Before testing the hypothesis, the assumption of linearity between the predictor and criterion variable was assessed.

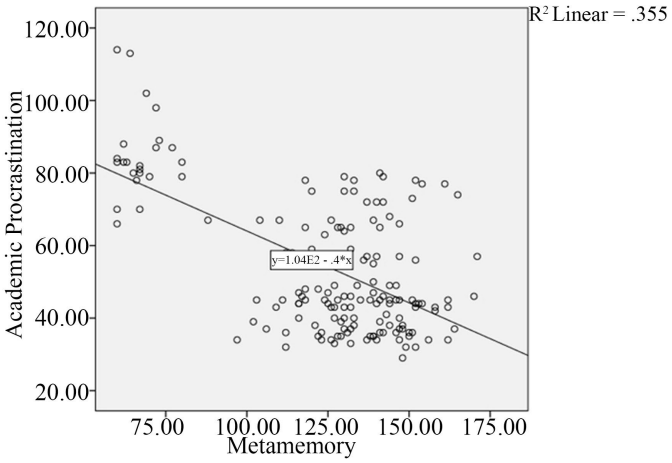

Figure 1. Linear relationship between metamemory and academic procrastination.

In Figure 1, the linear relationship assumption between metamemory and academic procrastination is presented and confirmed.

Table 5. Pearson correlation between metamemory and academic procrastination.

Predictor	Criterion	Correlation (r)	Significance (p)
Metamemory	Academic Procrastination	−0.596	0.001

As seen in Table 5, the correlation coefficient is statistically significant and negative ($r = -0.596$, $p < 0.01$), indicating that higher metamemory is associated with lower academic procrastination.

Hypothesis 2: There is a relationship between metacognition and academic procrastination.

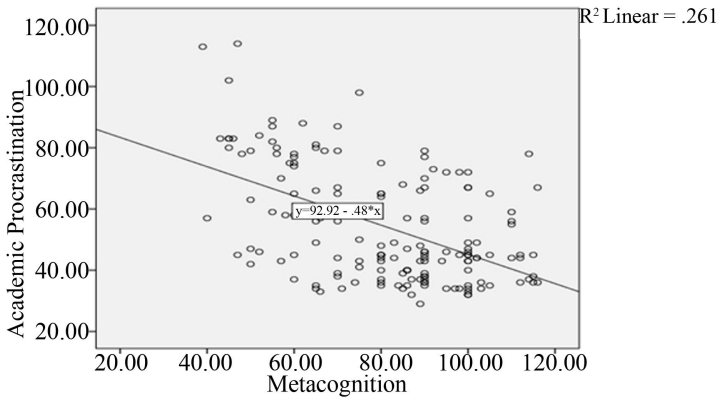

Figure 2. Linear relationship between metacognition and academic procrastination.

Figure 2 presents the linear relationship assumption between metacognition

and academic procrastination, which is confirmed.

Table 6. Pearson correlation between metacognition and academic procrastination.

Predictor	Criterion	Correlation (r)	Significance (p)
Metacognition	Academic Procrastination	−0.511	0.001

Table 6 shows the correlation is significant and negative (r = −0.511, $p < 0.01$), confirming that higher metacognition is associated with less procrastination.

Hypothesis 3: There is a relationship between academic vitality and academic procrastination.

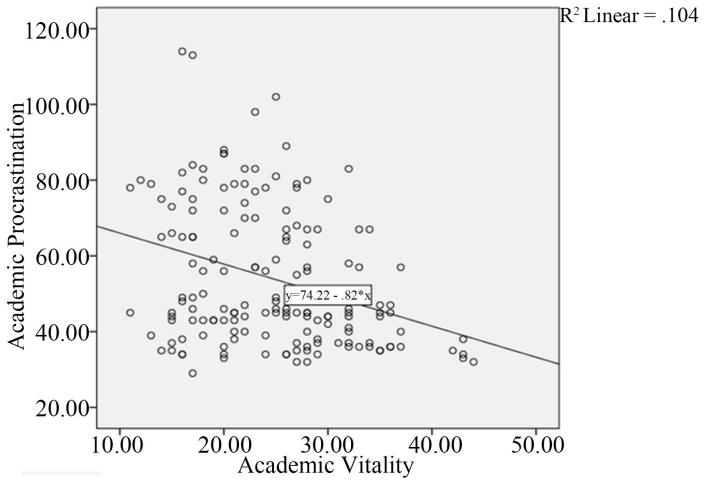

Figure 3. Linear relationship between academic vitality and academic procrastination.

Figure 3 confirms the assumption of a linear relationship between academic vitality and academic procrastination.

Table 7. Pearson correlation between academic vitality and academic procrastination.

Predictor	Criterion	Correlation (r)	Significance (p)
Academic Vitality	Academic Procrastination	−0.322	0.001

Table 7 indicates the correlation is significant and negative (r = −0.322, $p < 0.01$), supporting the hypothesis that higher academic vitality reduces procrastination.

Hypothesis 4: The contribution of metamemory, metacognition, and academic vitality in predicting academic procrastination is different.

A multiple regression analysis (enter method) was used. Assumptions of independence of errors and multicollinearity were tested.

3.3.1. Independence of Errors

Durbin-Watson = 1.72 (acceptable range: 1.5 - 2.5), so the assumption is met.

3.3.2. Multicollinearity Check

Table 8 presents the tolerance and VIF values for the variables, with all values

falling within acceptable ranges (tolerance > 0.1, VIF < 10), indicating no significant multicollinearity. It also shows the Pearson r correlation coefficients among the predictors.

Table 8. Multicollinearity and error independence.

Variable	Tolerance	VIF	Pearson r
Metamemory	0.830	1.20	-
Metacognition	0.840	1.19	0.392 (with metamemory)
Academic Vitality	0.958	1.04	0.386 (with metamemory); 0.354 (with metacognition)

Table 9. Regression summary.

Model	R	R^2	Adjusted R^2	Std. Error (SEE)
1	0.694	0.482	0.472	13.50

Table 9 summarizes the regression analysis, showing an R-value of 0.694 and an R-squared (R^2) of 0.482. The Adjusted R-squared value of 0.472 indicates that the predictors account for roughly 47% of the variance in academic procrastination, with a Standard Error of the Estimate (SEE) of 13.50.

Table 10. ANOVA for regression model.

Source	SS	df	MS	F	Sig.
Regression	26434.03	3	8811.34	48.40	0.001
Residual	28418.37	156	182.20		
Total	54852.40	159			

Table 10 summarizes the ANOVA for the regression model, showing an F-value of 48.40 (df = 3, 156) with a significance value of 0.001. This indicates that the overall model is statistically significant, confirming the joint predictive power of the variables.

Table 11. Regression coefficients.

Predictor	B	Std. Error	Beta	t	*p*
(Constant)	126.09	6.15	—	20.51	0.001
Metamemory	−0.292	0.042	−0.439	−6.94	0.001
Metacognition	−0.289	0.059	−0.309	−4.92	0.001
Academic Vitality	−0.490	0.150	−0.193	−3.28	0.001

In Table 11, Metamemory, with the largest beta ($\beta = -0.439$, $p < 0.01$), is the strongest negative predictor of academic procrastination. Metacognition ($\beta = -0.309$) and academic vitality ($\beta = -0.193$) also significantly and negatively predict procrastination.

4. Discussion

First Hypothesis: There is a relationship between metamemory and academic procrastination. As shown in Chapter 4, metamemory had a significant negative correlation with academic procrastination (**Table 4** and **Table 5**), consistent with findings by some studies (Carroll & Korukina, 1999; Kirk et al., 2001; Abdolhosseini, 2016; Pourtaheri et al., 2014; Fort et al., 2014; Magno, 2018).

A study (Flavell, 1979), introduced metamemory as knowledge and control over memory. Another study (Weed, Ryan, & Day, 1990), described metamemory as: 1) knowledge of person, task, and strategic variables influencing recall; 2) self-regulation; and 3) training effects combining executive control and metacognitive processes. These two components reflect stable knowledge about memory and the ability to monitor and regulate it. Understanding these factors improves memory strategy use and performance monitoring, enhancing academic self-efficacy, planning, and motivation (Flavell, Miller, & Miller, 2002; Efklides, 2008, 2009).

Second Hypothesis: There is a relationship between metacognition and academic procrastination. Chapter 4 confirmed a significant negative correlation between metacognition and procrastination (**Tables 4-6**), aligning with some studies (Magno, 2018; Marzban, 2018; Vahidi & Baratali, 2017; Salehi & Mirzakhani, 2014; Alavi Langeroudi et al., 2014; Houshmandja et al., 2014).

Metacognitive knowledge enables students to choose effective strategies, monitor their performance, and adapt their approaches to achieve goals, reducing anxiety and procrastination. Metacognitive processes such as planning, reviewing, and regulation foster self-regulated learning and reduce academic problems (Bryant, 2012; Butler & Winne, 1995).

Metacognitive knowledge includes awareness of how personal, task-related, and strategic factors influence learning. Teachers can support this by encouraging awareness of progress and evaluation of thinking processes (Dunlosky & Bjork, 2008; Flavell et al., 2002; Efklides, 2008, 2009).

Third Hypothesis: There is a relationship between academic vitality and academic procrastination. Chapter 4 showed a significant negative relationship between academic vitality and procrastination (**Tables 4-7**), supported by some studies (Barzegar Bafrouei et al., 2015; Ghadampour et al., 2015; Baghaei, 2021).

Academic vitality boosts interest, motivation, and effort, encouraging students to overcome academic challenges. It enhances adaptability, goal-setting, and meaning in education, reducing procrastination (Abbasian & Dehghan, 2015; Barzegar Bafrouei et al., 2015; Ghadampour et al., 2015).

Fourth Hypothesis: The contribution of the predictor variables in predicting academic procrastination is different. Regression analysis showed that metamemory had the strongest negative beta, followed by metacognition and academic vitality (**Tables 4-11**). These findings align with previous research and confirm that all three variables significantly predict lower academic procrastination.

In summary, higher levels of metamemory, metacognition, and academic vitality contribute to reduced academic procrastination. These factors enhance memory

regulation, strategy use, self-monitoring, and resilience, leading to improved academic performance and reduced delay behaviors.

The cross-sectional and correlational nature of this study prevents any causal conclusions. Future longitudinal or experimental research is needed to examine whether strengthening metamemory, metacognition, and academic vitality reduces procrastination over time. Moreover, our findings should be considered within broader models of self-regulated learning and motivation, which emphasize the interplay of cognitive, metacognitive, and motivational factors in academic behavior.

5. Conclusion

This research was conducted to investigate the relationship between metamemory, metacognition, and academic vitality with academic procrastination among students. The research is applied in purpose and descriptive in nature with a correlational design. The statistical population included all undergraduate male and female psychology students at Ayatollah Amoli Islamic Azad University (N = 552). According to a study (Green, 1991), for each variable entering the regression equation, a sample size of 20 to 50 participants is sufficient. Therefore, for three predictor variables and one criterion variable (total of 4 variables), a sample size of 160 was selected through voluntary convenience sampling. Participants completed the Academic Procrastination Questionnaire (Solomon & Rothblom, 1984), Metamemory Questionnaire (Troyer & Rich, 2002), Metacognition Questionnaire (Cartwright-Hatton & Wells, 1997), and Academic Vitality Questionnaire (Hossein Chari & Dehghani Zadeh, 2012), virtually.

Research questions are as follows:

- Is there a relationship between metamemory and academic procrastination?
- Is there a relationship between metacognition and academic procrastination?
- Is there a relationship between academic vitality and academic procrastination?
- Do metamemory, metacognition, and academic vitality differ in predicting academic procrastination?

The findings showed significant relationships between the three predictor variables and academic procrastination. Among them, metamemory was the strongest negative predictor.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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