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The Relationship between Metacognitive Strategies with Academic Engagement According to the Mediating Role of Achievement Goals and Gender Moderation in Students

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A B S T R A C T

Purpose: The present study aimed to investigate the relationship between metacognitive strategies and academic engagement, considering the mediating role of achievement goals and gender moderation in students.

Methods and Materials: The descriptive research method was correlation type. The statistical population included all the students of Maysan University in Iraq in the 2023-2024 academic year, and 300 of them were selected by available sampling and responded to research tools including School Engagement Scale (Fredericks & Blumenfeld, 2004), the State Metacognition Invertory (O'Neill and Abedi, 1996), and Achievement Goals Questionnaire (Elliott and McGregor, 1988). Data were analyzed using Pearson's correlation coefficient and structural equation modeling and SPSS26 and PLS 3.2.8 software.

Findings: The results of the path analysis test showed that metacognitive strategies did not have a significant direct relationship with academic engagement. Still, indirectly and through the mediation of achievement goals, they had an effect on academic engagement, in such a way that Orientational progress goals led to an increase in academic engagement, and avoidance achievement goals led to a decrease in academic engagement. Also, gender played a moderating role in the relationship between metacognitive strategies and academic engagement.

Conclusion: According to the results of this study, teaching metacognitive strategies can increase students' academic engagement through a positive impact on their achievement goals.

Keywords: *Metacognitive Strategies, Academic Engagement, Achievement Goals, Students*

1. Introduction

Improving students' academic success has always been a fundamental challenge for higher education institutions, parents, and policymakers. Researchers have also made efforts over the years to identify and examine the various factors influencing academic achievement (Gebregergis et al., 2024). In the meantime, academic engagement serves as a protective factor against challenges and contributes to problem-solving (Jung & Ryu, 2023). Academic

engagement refers to the amount of energy a learner invests in carrying out their academic activities, as well as the level of effectiveness and efficiency achieved (Chaya, 2022). Academic engagement can significantly contribute to enhancing students' progress, as committed students who have a positive attitude toward the learning process usually make greater efforts to master the course content (Finn & Zimmer, 2012). Academic engagement consists of three components: cognitive (including various cognitive and metacognitive strategies used by learners for learning), motivational (including value and emotion), and behavioral (including learners' behaviors, efforts, perseverance, and seeking help from others when dealing with tasks) (Catalano, 2017; Lee & and Shute, 2010). Learners without motivation do not employ appropriate strategies or persist in activities (Zhang et al., 2022). Learning strategies are divided into two categories: cognitive strategies, which involve mental activities such as receiving, selecting, organizing information, and linking new topics to memory (Narimani et al., 2015); and metacognitive strategies, which refer to the skills students use to monitor, regulate, and control their own thinking and learning (Lee & Mak, 2018; Teng, 2020; Teng & and Huang, 2023; Teng & and Qin, 2024).

Metacognitive knowledge refers to an individual's beliefs about themselves and others as learners, as well as the requirements of the learning process. It includes personal knowledge, task knowledge, and strategic knowledge. Personal knowledge pertains to self-awareness and understanding others; task knowledge involves the information necessary to complete a task; and strategic knowledge refers to the strategies used to achieve a goal (Kashani Vahid et al., 2024; Swanson, 2024). Metacognitive regulation refers to the conscious monitoring and control of cognitive and emotional processes. The components of metacognition include metacognitive knowledge (declarative) and metacognitive control or self-regulated learning (procedural). Metacognitive control is goal-directed and managed by the learner (Rivas et al., 2022).

As previously mentioned, one of the cognitive dimensions of academic engagement is the use of self-regulation strategies. Therefore, it is likely that academic engagement is related to metacognitive strategies, since a learner who uses metacognitive strategies possesses accurate self-awareness and self-knowledge regarding their learning style, strengths and weaknesses, beliefs, motivation, and has a strong understanding of various strategies along with the ability to apply and transfer them (Chung et al., 2021). Metacognitive strategies integrate cognitive and metacognitive abilities into a comprehensive and simultaneous whole, enhancing the learner's true self-awareness of knowledge within a unified world (Mitsea & Drigas, 2019). Some previous studies have indicated a significant relationship between metacognitive strategies and motivation as well as academic engagement (Esmaili Rad et al., 2022; Ghaderi Hesari & Mahmoodi, 2024; Kokabi Rahman et al., 2023; Mohammadi et al., 2022). However, other studies have not shown a significant direct relationship between these variables (Hemati et al., 2019; Mazloumian & Ebrahimi, 2023)

Metacognitive strategies enhance general learning behaviors such as effort, persistence, and behavioral engagement. In this context, metacognitive strategies are considered a component of motivational regulation strategies. These strategies comprise three dimensions: planning, monitoring, and evaluation (Schraw & Dennison, 1994; Zhang & Zhang, 2019; Zhang & and Zou, 2024). Among these strategies, planning refers to the selection of strategies and the allocation of necessary resources to effectively complete a task or achieve a specific goal (Qin & Jun Zhang, 2019). Evaluation refers to assessing progress toward a goal, which may lead to revising or modifying the original plan, increased monitoring, and further assessment (Harris et al., 2009). Therefore, it is possible that metacognitive strategies, by directing learners toward achievement goals, can enhance motivation and academic engagement. This is because achievement goals are defined as the purpose of behavior related to competence. In this sense, they connect one of the basic human needs—competence—to one of the core values of society—success (Butera et al., 2024). Studies have also shown a positive relationship between achievement goals and metacognition (Mazloumian & Ebrahimi, 2023; Zheng & Leong, 2025). The study by (Schwinger & Stiensmeier-Pelster, 2012) showed that the use of a proximal goal-setting strategy enhances learning-effort management, which in turn directly contributes to academic achievement. Schwinger and Otterpohl (2017) examined the effects of seven motivational regulation strategies on learning effort. Their results indicated that the proximal goal-setting strategy (similar to the planning strategy) had a greater impact on learning effort than any other strategy. Therefore, their findings consistently demonstrated that the use of proximal goal-setting is a strong predictor of general learning behaviors (Schwinger & Otterpohl, 2017). Achievement goals are considered antecedents of academic emotions and reflect

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students' reasons for engaging in learning tasks (Anderman & Patrick, 2012). Numerous studies have indicated that achievement goals mediate the relationships among cognitive, psychological, and academic variables(khanifar et al., 2023; Limpo & Alves, 2017; Rouhi et al., 2021; Sun et al., 2022).

Achievement goals are individual preferences for different types of goals that people strive to attain in academic settings, and they represent an important component of a meaning-based system grounded in self-theory (Elliot & McGregor, 2001). Achievement goal theories suggest that the goals students pursue may explain their learning behaviors, thereby influencing academic outcomes (Senko et al., 2011). Achievement goals can guide students' academic behavior and play a key role in linking their beliefs about success to their academic progress. These goals lead to greater engagement with learning tasks and persistence in completing them (Payne et al., 2007). On the other hand, perseverance, effort, and consistency of interest—which are central to the concept of grit—require sustained work through challenges toward specific goals and reduce the likelihood of abandoning tasks. This may help explain potential relationships with various motivational and self-regulatory processes (Muenks et al., 2017; Von Culin et al., 2014). Achievement goals can be considered as a mediating variable in the relationship between metacognitive strategies and academic engagement. Previous studies have also indicated the impact of achievement goals on academic engagement (khanifar et al., 2023; Mazloumian & Ebrahimi, 2023; Rouhi et al., 2021).

In addition, research has shown gender differences in academic engagement, indicating that girls tend to be more successful and show greater engagement in school compared to boys. However, they also report lower levels of subjective well-being (Kessels & and Van Houtte, 2022; Lam et al., 2012; Zahed et al., 2019).

Despite the significance of the aforementioned variables and their impact on students' ability to overcome academic challenges, no study has simultaneously examined the relationships among these variables—particularly in the context of Iraq. Moreover, previous research that has explored these relationships individually has yielded inconsistent findings. Therefore, conducting the present study to investigate the relationship between metacognitive strategies and academic engagement, while also examining the mediating role of achievement goals and the moderating role of gender, is essential. This could help identify the factors that contribute to enhancing students' academic performance. Therefore, this study aimed to answer the following question: What is the effect of metacognitive strategies on academic engagement, and what are the mediating role of achievement goals and the moderating role of gender in this relationship?

2. Methods and Materials

2.1. Study Design and Participants

Given the objective of the study, the research method was descriptive and correlational in nature, conducted through structural equation modeling. In this study, the relationship between a predictor variable and a criterion variable was examined, with the mediation of one variable and the moderation of another. The statistical population consisted of all students at the University of Maysan in Iraq during the 2023–2024 academic year. Since the methodology of structural equation modeling is largely similar to certain aspects of multivariate regression, the principles for determining sample size in multivariate regression analysis can also be applied for determining sample size in structural equation modeling (Hooman, 2005). Giles (2013) suggested that an acceptable sample size for conducting correlational research is between 15 to 20 participants per correlation (Giles, 2013).Therefore, considering the number of correlational relationships and predictor variables in this study, a sample size of 240 participants was deemed sufficient. However, to account for potential attrition, 300 students were selected using a convenience sampling method from the target population. They completed the questionnaires, and the data were analyzed using statistical methods. The data collection instruments are described as follows.

2.2. Measures

2.2.1. School Engagement Scale(SESQ)

The Academic Engagement Scale was developed by Fredricks and Blumenfeld (2004). It consists of 15 items and three subscales: behavioral (items 1 to 4), emotional (items 5 to 10), and cognitive (items 11 to 15). The questionnaire uses a Likert-type scale ranging from 1 (never) to 5 (always). Fredricks and colleagues (2004) reported a reliability coefficient of 0.86 for this scale (Fredricks et al., 2004). Awang-Hashim and Murad Sani (2008) also demonstrated in their study that the subscales have acceptable goodness-

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of-fit indices, with reliability coefficients for each subscale reported to be above 0.70. The factor loadings of all the items on this scale ranged from 0.50 to 0.80 and were statistically significant at the 0.50 level (Awang Hashim & Murad Sani, 2008). In another study, the Cronbach's alpha coefficients for each of the subscales were reported to be 0.63, 0.71, and 0.66, respectively (Zare Pak Ziabari & Dabiri, 2023). In the present study, the Cronbach's alpha was 0.78.

2.2.2. State Metacognition Invertory

This questionnaire was developed by O'Neil and Abedi in 1996, with three principles in mind: brevity, validity, and capability. The participants included students from grades 8 to 12 as well as associate degree students. The questionnaire was designed to measure higher-order thinking or metacognitive skills. It consists of 20 items, with five items allocated to measure each component. Results from exploratory factor analysis identified four components: metacognitive awareness (items 1, 5, 9, 13, 17), cognitive strategy (items 3, 7, 11, 15, 19), planning (items 4, 8, 12, 16, 20), and self-monitoring (items 2, 6, 10, 14, 18). he measurement scale of the Metacognitive State Questionnaire is sequential and similar to a Likert scale, but its range varies from 1 (strongly disagree) to 4 (strongly agree). The highest possible score is 80, and the lowest possible score is 20. The developers assessed its reliability using the internal consistency method, reporting Cronbach's alpha coefficients of 0.91 for the entire questionnaire and between 0.82 and 0.87 for the subscales. In the study by Salarifar and Pakdaman (2012), reliability was also assessed using Cronbach's alpha, with coefficients reported as 0.79 for metacognitive awareness, 0.83 for cognitive strategy, 0.81 for planning, 0.82 for self-monitoring, and 0.94 for the overall metacognitive scale (Salarifar, 2010). In the present study, the Cronbach's alpha coefficient was calculated to be 0.79.

2.2.3. Achievement Goals Questionnaire (AGQ)

This questionnaire was initially developed by Elliot and McGregor (2001) based on the 2×2 framework of achievement goals, and later revised by Elliot and Murayama (2011). It contains 12 items and includes four subscales: mastery-approach orientation, mastery-avoidance orientation, performance-approach orientation, and performance-avoidance orientation. The items are rated on a 5-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5). To determine the validity of the questionnaire, the original developers used factor analysis and internal consistency methods. The internal consistency coefficients (Cronbach's alpha) for the mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goal orientations were reported as 0.87, 0.84, 0.96, and 0.82, respectively. The results of factor analysis confirmed the presence of four factors in the questionnaire, which together explained 81.5% of the total variance. The Cronbach's alpha coefficients for the subscales of mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance were reported as 0.87, 0.89, 0.92, and 0.83, respectively, indicating good reliability of the questionnaire(Elliot & McGregor, 2001). Hemati et al. (2019) also reported Cronbach's alpha coefficients of 0.82, 0.76, 0.85, and 0.77 for the subscales of mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals, respectively, suggesting acceptable reliability. To assess the validity of this scale, confirmatory factor analysis was used, which supported its validity (N. Hemati et al., 2019). In the present study, Cronbach's alpha was 0.87 for approach goals and 0.78 for avoidance goals.

2.3. Data Analysis

In order to analyze the research data, SPSS version 26 and PLS version 3.2.8 software were used. Data analysis was conducted using correlation coefficients and variance-based structural equation model with a partial least squares (PLS) approach."

3. Findings and Results

The descriptive findings of the study revealed that 59.8% of the research sample were male and 40.2% were female; therefore, it can be concluded that the majority of the participants were male. In terms of age, 46.5% of the participants were between 19 and 20 years old, while 53.5% were between 21 and 22 years old, indicating that most of the sample fell within the 21–22 age range. Regarding marital status, 90.4% of the participants were single and 9.6% were married, suggesting that the majority of the sample were single. Furthermore, the results showed that 38.2% of the students were studying Physics, 25.2% were in Arabic, 24.9% in English, and 11.6% in Mathematics. Table 1 presents the means, standard deviations, and correlations among the research variables.

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Table 1

Descriptive Statistics and Correlation Matrix

Research Variables	Mean	Std. Deviation	1	2	3	4
Metacognitive Strategies	62.21	8.44	1			
Approach Goals	22.56	4.64	0.196**	1		
Avoidance Goals	22.96	3.82	-0.351**	-0.273**	1	
Academic Engagement	48.58	6.53	**0.324**	0.254**	-0.308**	1

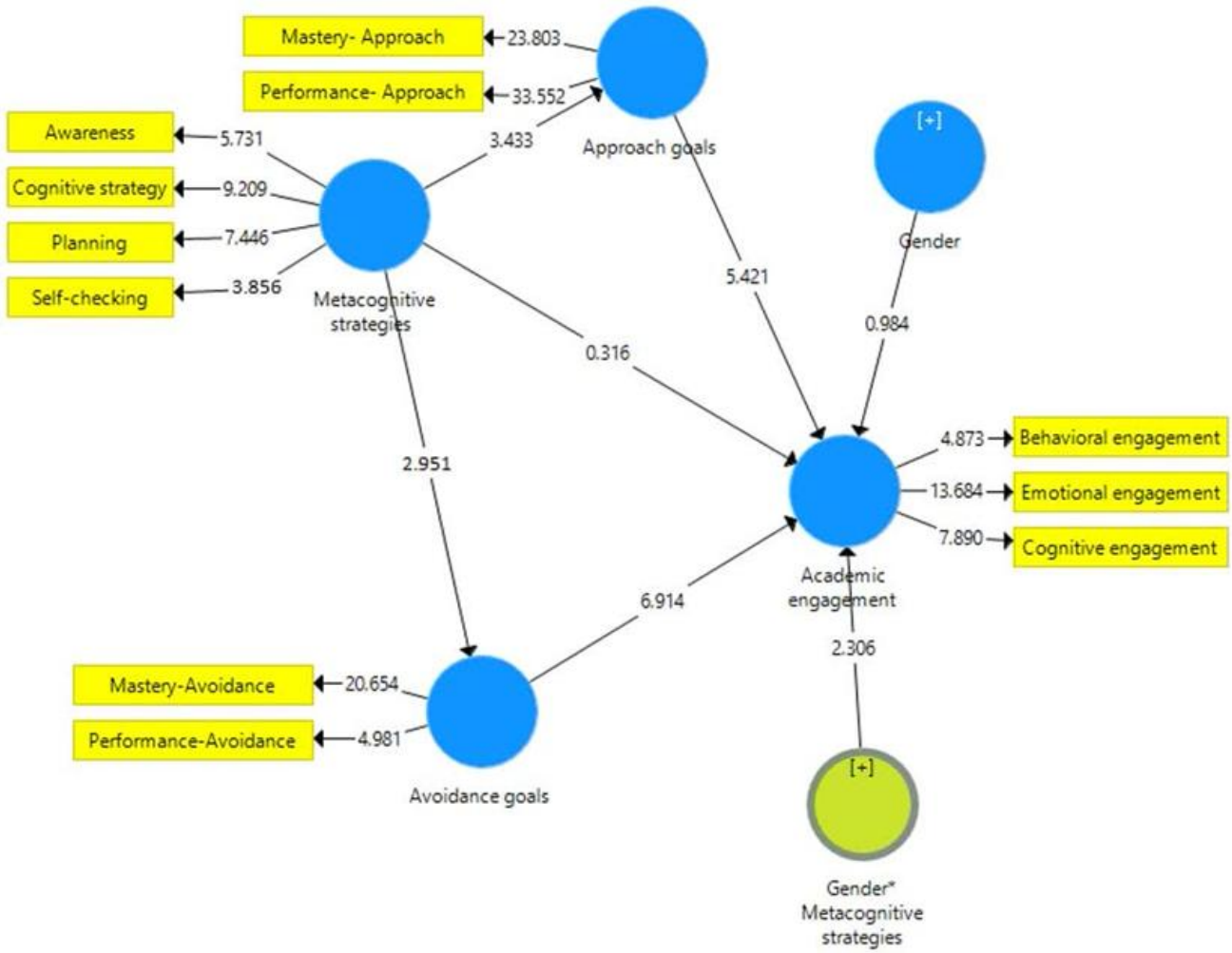
**p<0.01

Table 1 presents the means, standard deviations, and correlations among the study variables. The results of Pearson's correlation coefficient indicate a significant positive relationship between metacognitive strategies and academic engagement (r = .324) as well as between metacognitive strategies and Approach goals (r = .196) (p < .01). Additionally, there is a significant negative relationship between metacognitive strategies and avoidance goals (r = -.351) (p < .01).

To test the validity of the theoretical model and calculate the path coefficients, structural equation modeling. was performed using SmartPLS software. The bootstrap procedure was employed to assess the significance of the path coefficients and factor loadings.

Figure 1

The tested model of the research variables based on t-values



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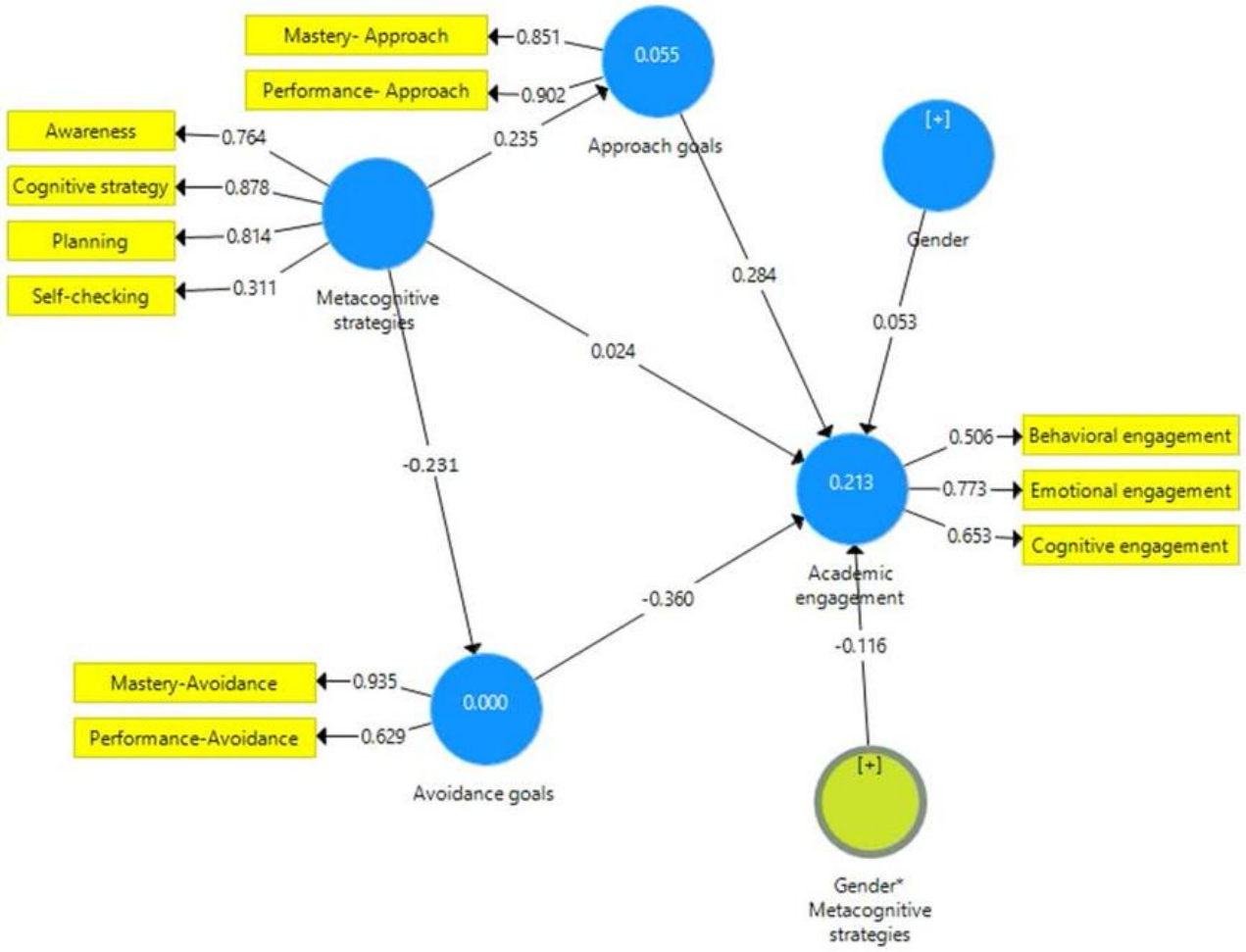
As shown in Figure 1, the t-values for all paths—except for the relationship between metacognitive strategies and academic engagement—are greater than 1.96, which is significant at the 0.05 level and indicates significant relationships among the research variables. The calculated t-value between metacognitive strategies and academic engagement is (t = 0.252), for metacognitive strategies and approach goals (t = 5.424), for metacognitive strategies and avoidance goals (t = 2.951), for a Approach goals and academic engagement (t = 5.424) and for avoidance goals and academic engagement (t = 6.709). These values indicate the absence of a significant relationship between metacognitive strategies and academic engagement and a significant relationship between the other research variables.

Figure 2

The tested model of the research variables based on path coefficients



In Figure 2, the path coefficients, which indicate the strength of the relationships, can be observed. The magnitude of the path coefficient reflects the strength and power of the relationship between two variables. Based on the path coefficients, it can be said that metacognitive strategies, with a path coefficient of 0.235, have an effect on approach goals, and with a path coefficient of -0.231, have an effect on avoidance goals. It is worth noting that the numbers inside the circles for the endogenous variables represent the R^2 values. The R^2 coefficient values indicate how much of the variance in the dependent variable (academic engagement) is explained by the other research variables (metacognitive strategies, approach goals, avoidance goals, and gender). According to the R^2 values in Figure 2, it can be said that 5.5% of the variance in approach goals, 1% of the variance in avoidance goals, and 21.3% of the variance in academic engagement are explained by metacognitive strategies. A summary of the structural equation modeling results is presented in Table 2.

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Table 2

Results of the Structural Equation Model for the Research Variables

Variables	Path Coefficient (β)	Squared Path Coefficient	t-value	Significance (p-value)
Metacognitive Strategies → Academic Engagement	0.024	0.044	0.316	0.801
Metacognitive Strategies → Approach goals	0.235	0.055	3.433	0.001
Metacognitive Strategies → Avoidance Goals	-0.231	0.053	2.951	0.003
Metacognitive Strategies → Approach goals → Academic Engagement	0.284	0.080	5.421	0.001
Metacognitive Strategies → Avoidance Goals → Academic Engagement	-0.360	0.130	6.914	0.001
Metacognitive Strategies × Gender → Academic Engagement	-0.116	0.014	2.306	0.028

The findings from Table 2 indicate that the relationship between metacognitive strategies and academic engagement (β = 0.21, t = 2.52) was not statistically significant. However, the relationship between metacognitive strategies and approach goals (β = 0.236, t = 3.365) was positive and significant, while the relationship between metacognitive strategies and avoidance goals (β = -0.231, t = 2.951) was negative and significant. The indirect effect of metacognitive strategies on academic engagement through the mediating role of approach goals (β = 0.283, t = 5.424) and through avoidance goals (β = -0.361, t = 6.709) was also statistically significant. Given that the direct effect of metacognitive strategies on academic engagement was not significant, it can be concluded that mastery and avoidance goals fully mediate this relationship. Furthermore, gender played a moderating role in the relationship between metacognitive strategies and academic engagement (β = -0.119, t = 2.198).

In evaluating a model using the structural equation modeling approach, the first factor that must be considered is the unidimensionality of the model indicators. This means that the indicators should load significantly onto a single latent variable with a high factor loading. For this purpose, the factor loading should be greater than 0.60. It is important to note that a factor loading less than 0.30 is considered low and should be excluded from the set of indicators. This process is typically done manually by removing indicators with loadings less than 0.40. In the present model, factor loadings were calculated, and all items yielded factor loadings above 0.30.

Table 3

Reliability and Validity Indices of Measurement Models and Structural Model Evaluation

Constructs	Cronbach's Alpha	Composite Reliability	Convergent Validity (AVE)	Discriminant Validity (Fornell-Larcker)	R^2 (Coefficient of Determination)	Q^2 Criterion
Metacognitive Strategies	0.702	0.802	0.529	0.727		
Approach goals	0.702	0.869	0.769	0.877	0.055	0.077
Avoidance Goals	0.777	0.770	0.635	0.797	0.001	0.005
Academic Engagement	0.702	0.784	0.527	0.653	0.213	0.073

As shown in Table 3, all variables in the model demonstrate high composite reliability. Both composite reliability and Cronbach's alpha for all variables exceed 0.70, indicating that the model has a good fit with respect to these two reliability criteria. According to Fornell and Larcker, a threshold of 0.70 is considered acceptable for these indices. Furthermore, the convergent validity criterion, which reflects the average variance extracted (AVE) between a construct and its indicators, shows values above 0.50 for all variables. This confirms the adequacy of convergent validity and indicates a good model fit for the measurement model—meaning that each latent variable is able to explain more than half of the variance in its observed indicators. Therefore, the measurement model used in this study demonstrates satisfactory quality. Additionally, all Q^2 values are greater than zero, indicating that the model possesses acceptable predictive relevance overall and performs well in forecasting the respective constructs.

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4. Discussion and Conclusion

The present study aimed to investigate the relationship between metacognitive strategies and academic engagement, considering the mediating role of achievement goals and the moderating role of gender among students at the University of Misan in Iraq. The findings indicated that metacognitive strategies did not have a significant direct effect on academic engagement, but they did influence achievement goals by increasing approach goals and reducing avoidance goals. Moreover, an increase in approach goals was associated with higher academic engagement, while an increase in avoidance goals led to decreased academic engagement. Therefore, metacognitive strategies exerted an indirect effect on academic engagement, with achievement goals serving as a mediating factor in this relationship.

Additionally, gender played a moderating role, as academic engagement differed between male and female students. Overall, the model estimation demonstrated a good fit and was supported by the results. The research findings indicating the non-significant direct effect of metacognitive strategies on academic engagement are consistent with the studies by (Mazloumian & Ebrahimi, 2023) and (Hemati et al., 2019), and inconsistent with the studies by (Ghaderi Hesari & Mahmoodi, 2024), (Kokabi Rahman et al., 2023), (Mohammadi et al., 2022) and (Esmaili Rad et al., 2022). This can be explained by the fact that the goal of metacognitive strategies is to influence learners' motivation and engagement (Chung et al., 2021; Shi, 2017). The importance of these strategies lies in students' independence and their ability to choose appropriate learning methods tailored to their abilities. Therefore, the level of academic engagement among students may increase rapidly due to their improved ability to learn academic content more effectively and efficiently. However, there may be multiple reasons why, in this study, there is no significant correlation between metacognitive strategies and academic engagement among students. For example, differences in the instruments used to assess metacognitive awareness, as well as cultural differences and educational systems across societies, may alter the impact of metacognitive skills on academic engagement. For instance, in Iran, learning is more based on memorization, whereas in Western societies, meaningful learning is preferred (Hemati et al., 2019). The diversity of individual characteristics among students—such as intrinsic motivation, learning styles, and ability levels—can reduce the impact of metacognitive strategies on academic engagement. Additionally, the proper implementation of these strategies, along with external factors such as social support and environmental pressures, also plays an important role in their effectiveness. The diversity of the participants' academic disciplines is another contributing factor, as metacognitive strategies may be effective for some fields of study but not for others. Moreover, none of the cognitive and motivational variables alone can explain students' learning and academic performance; rather, it is the interaction among these variables that matters (Schunk & Zimmerman, 2011). Purposeful use of metacognitive strategies can help students channel their efforts more effectively and enhance their academic engagement; however, aimless or unguided use of these strategies may lead to decreased motivation and academic engagement.

The research findings regarding the effect of metacognitive strategies on achievement goals were consistent with the studies by (Mazloumian & Ebrahimi, 2023), (Esmaili Rad et al., 2022) and (Zheng & Leong, 2025). This can be explained by the fact that metacognitive strategies involve planning, monitoring, and evaluating one's learning processes, which contribute to deeper understanding and better connection with the material (Schraw & Dennison, 1994; Zhang & Zhang, 2019; Zhang & and Zou, 2024). Planning involves selecting strategies and allocating the necessary resources to achieve a goal (Qin & Jun Zhang, 2019); monitoring analyzes the effectiveness of these strategies, and evaluation identifies progress toward the goal, leading to revisions and adjustments of plans (Harris et al., 2009). The study by Schwinger and Otterpohl (2017) showed that short-term goal setting has a greater impact on learning effort, and the use of these strategies is a strong predictor of general learning behaviors (Schwinger & Otterpohl, 2017). These strategies not only make students' tasks more effective but also regulate and enhance their cognitive processes. Planning helps in selecting appropriate strategies and optimizing resource allocation, enabling students to achieve their specific goals.

Students who possess metacognitive skills have greater ability to control their thoughts and regulate their cognition. This sense of competence helps them remain optimistic about mastering their environment and future. Whenever necessary, they adjust their strategies and continuously establish a logical connection between new learning and their prior knowledge in order to reach their goals (Mirhosseini et al., 2018). Overall, these individuals tend to have greater motivation for self-improvement and personal growth. Therefore, metacognitive strategies help students

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better understand and regulate their thinking processes. This increased self-awareness enables them to find appropriate solutions when facing challenges and problems, rather than avoiding them. It also helps them set clearer goal orientations and develop precise plans to achieve them. Additionally, through the use of metacognitive strategies, students can set goals that align with their abilities and limitations. Moreover, metacognitive strategies provide students with tools to manage anxiety and stress. Reducing anxiety allows students to pursue their goals with greater confidence and avoid avoidance goals.

The findings of the study regarding the mediating role of achievement goals (both Approach goals and avoidance goals) in the relationship between metacognitive strategies and academic engagement, as well as the impact of achievement goals on academic engagement, were consistent with the results of studies by (Mazloumian & Ebrahimi, 2023) and (Rouhi et al., 2021). This can be explained by the fact that metacognitive strategies help students clearly define their goals and develop detailed plans to achieve them. This process enhances their motivation to strive for and pursue these goals, leading to ongoing monitoring and evaluation of the learning process. Such self-monitoring reveals students' strengths and weaknesses and facilitates their improvement, which in turn fosters greater motivation for learning and progress. Furthermore, metacognitive strategies strengthen students' confidence in their abilities and provide them with the necessary tools to solve problems and overcome challenges. Students who make greater use of these strategies typically adopt approach goals and seek to acquire new knowledge and solve problems in innovative ways (Elliot & McGregor, 2001; Pintrich, 2000). In contrast, students who pursue avoidance goals tend to focus more on avoiding failure and difficulties, a mindset that can negatively impact their academic engagement (Zimmerman & Schunk, 1989). approach goals, on the other hand, encourage students to put in greater effort and concentrate on achieving success and mastering tasks. Perseverance, effort, and consistency of interest—which are central components of academic engagement—require sustained effort and overcoming challenges in pursuit of clear goals, thereby reducing the likelihood of giving up. This explains the connection with motivational and self-regulatory processes (Muenks et al., 2017; Von Culin et al., 2014). Avoidance goals typically focus on preventing failure rather than striving for success and continuous improvement, which often leads to anxiety, worry, and a decline in motivation (Elliot & McGregor, 2001; Huang, 2011; Stan & Oprea, 2015).

The research findings regarding the moderating role of gender in the relationship between metacognitive strategies and academic engagement were consistent with the studies by (Lam et al., 2012), (Zahed et al., 2019), and (Kessels & and Van Houtte, 2022). This can be explained by the fact that, as noted in the aforementioned studies, girls generally tend to have greater motivation to complete assignments and achieve academic success. This may be due to more precise planning, stronger self-monitoring, and the use of more effective learning strategies. Such differences may be related to personality traits, aptitude, parenting behaviors, and social pressures. Schools and families often have higher expectations for girls' academic progress, and these pressures can enhance their academic engagement. Because of these expectations and their tendency to use more effective learning strategies, girls are more inclined toward approach goals and tend to be more successful in their studies. (Yu & McLellan, 2019) pointed out that boys tend to show less behavioral engagement and interaction in school compared to girls. Additionally, the study by (Huikku et al., 2022) found that while boys may have higher expectations for learning, in the absence of appropriate strategies, they may adopt avoidance goals, leading to a decline in academic engagement.

The limitations of the present study include the use of non-random convenience sampling and the lack of homogeneity in participants' socioeconomic status, which may have influenced the results. Moreover, this was a cross-sectional study conducted during the 2023–2024 academic year on students at the University of Misan in Iraq. Therefore, caution should be exercised when generalizing the findings to other time periods and locations.

It is recommended that future studies be conducted at different times and in various settings using cluster random sampling to include individuals with diverse demographic and cultural characteristics. Based on the findings of this study, it is also suggested that in order to enhance academic engagement, instructors, educational administrators, and other stakeholders pay greater attention to students' needs and gender-specific characteristics. Furthermore, educational programs aimed at improving achievement goals through the teaching of metacognitive strategies—tailored to students' gender—should be developed and implemented, even beginning at younger ages for school students.

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Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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