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Modeling Academic Well-Being Based on Self-Regulated Learning and Critical Thinking with the Mediating Role of Academic Motivation in Female Upper Secondary Students with Maladaptive Mobile Phone Dependence

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A B S T R A C T

Objective: The objective of this study was to model academic well-being based on self-regulated learning and critical thinking, with the mediating role of academic motivation, among female upper secondary school students with maladaptive mobile phone dependence.

Methods and Materials: This applied study employed a correlational design using structural equation modeling. The statistical population consisted of all female students enrolled in the second cycle of upper secondary education in Tabriz during the 2023–2024 academic year. Using Cochran's formula and an accessible sampling method, 376 students identified as maladaptive mobile phone users through a screening questionnaire were selected. Data were collected using standardized instruments measuring maladaptive mobile phone dependence, academic well-being, academic motivation, self-regulated learning, and critical thinking. Descriptive statistics were used to summarize the data, and Pearson correlation coefficients were calculated to examine initial relationships among variables. Structural equation modeling was conducted using AMOS software to test the proposed model and to estimate direct and indirect effects.

Findings: Structural equation modeling indicated an acceptable fit of the proposed model to the data ($\chi^2/df = 1.68$, CFI = 0.95, TLI = 0.94, RMSEA = 0.042). Self-regulated learning had significant direct effects on academic motivation ($\beta = 0.44$, $p < .001$) and academic well-being ($\beta = 0.26$, $p < .001$). Critical thinking also showed significant direct effects on academic motivation ($\beta = 0.37$, $p < .001$) and academic well-being ($\beta = 0.20$, $p = .002$). Academic motivation exerted a strong direct effect on academic well-being ($\beta = 0.49$, $p < .001$). In addition, academic motivation partially mediated the relationships

between self-regulated learning and academic well-being, as well as between critical thinking and academic well-being.

Conclusion: The findings highlight the central role of academic motivation in linking self-regulated learning and critical thinking to academic well-being, suggesting that strengthening cognitive regulation and higher-order thinking skills can enhance students' academic well-being, particularly among those with maladaptive mobile phone dependence.

Keywords: *academic well-being; self-regulated learning; critical thinking; academic motivation; maladaptive mobile phone dependence*

1. Introduction

Academic well-being has emerged in recent years as one of the central constructs in educational psychology, particularly in response to growing concerns about students' psychological adjustment, motivation, engagement, and adaptive functioning within academic contexts. Unlike traditional outcome-oriented indicators such as grades or test performance, academic well-being reflects students' subjective experiences of meaning, satisfaction, vitality, and emotional balance in relation to school demands and learning processes. Empirical evidence consistently shows that academic well-being is closely associated with academic persistence, engagement, mental health, and long-term educational success, making it a key indicator of both educational quality and student development (Kinnunen et al., 2016; Tuominen-Soini et al., 2012; Widlund et al., 2018). In contemporary educational systems, especially at the upper secondary level, increasing academic pressures, competitive environments, and technological transformations have intensified the need to understand the psychological mechanisms that promote or undermine students' academic well-being.

Within this framework, adolescence represents a particularly sensitive developmental period for academic well-being. Upper secondary school students face heightened academic expectations, identity formation challenges, and critical educational transitions that shape their future trajectories. Research conducted across diverse educational contexts indicates that declines in academic well-being during this period are associated with increased burnout, disengagement, emotional distress, and maladaptive coping behaviors (Deniz et al., 2022; Ghadampour et al., 2018; Khodapanah & Tamannaie Far, 2024). Female students, in particular, often report higher levels of academic stress and emotional vulnerability, which may differentially affect their motivational processes and learning strategies. Consequently, identifying the personal and cognitive resources that foster academic well-being among female upper secondary students is of both theoretical and practical importance.

One of the most robust predictors of academic well-being identified in the literature is self-regulated learning. Self-regulated learning refers to learners' active involvement in planning, monitoring, and evaluating their cognitive, motivational, and behavioral processes during learning. Students who effectively regulate their learning are better able to manage academic demands, persist in the face of challenges, and maintain adaptive motivational patterns. Numerous studies have demonstrated positive associations between self-regulated learning strategies and academic engagement, reduced academic burnout, and enhanced academic well-being (Norouzi et al., 2021; Rezapour Mirsaleh & Shakeri, 2018; Safarzadeh & Jayervand, 2019). In particular, cognitive and metacognitive regulation enable students to experience greater control over learning tasks, which in turn contributes to positive emotional experiences and a sense of competence within the academic environment.

In parallel, critical thinking has gained increasing attention as a higher-order cognitive skill essential for academic adaptation in complex learning environments. Critical thinking involves the ability to analyze information, evaluate evidence, reflect on assumptions, and make reasoned judgments. Educational researchers argue that students with stronger critical thinking dispositions are better equipped to cope with ambiguity, academic challenges, and evaluative demands, which may protect them against academic stress and disengagement (Emesi et al., 2024; Liu et al., 2023; Ren et al., 2020). Empirical findings suggest that critical thinking is positively related to academic achievement, learning engagement, and emotional resilience, highlighting its potential contribution to academic well-being (Almulla, 2023; Mirchooli, 2020; Mohkam Kar et al., 2024).

Despite the documented importance of self-regulated learning and critical thinking, the mechanisms through which these cognitive resources influence academic well-being are not fully understood. Academic motivation has

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been proposed as a central mediating process in this relationship. Academic motivation encompasses the internal and external forces that energize, direct, and sustain students' engagement in learning activities. Self-determination-oriented research emphasizes that intrinsically motivated students tend to experience higher satisfaction, persistence, and well-being, whereas controlled or extrinsic forms of motivation are often associated with pressure and emotional exhaustion (Hakami & Shokri, 2015; Komlosi-Ferdinand, 2020). Recent studies indicate that self-regulated learning strategies foster academic motivation by enhancing students' autonomy, perceived competence, and goal clarity (Amani et al., 2023; Azeem & Zubair, 2021). Similarly, critical thinking skills may strengthen academic motivation by promoting meaningful learning, intellectual curiosity, and a sense of purpose in academic tasks (Namaziandost et al., 2023; Teng & Yue, 2023; Toprak et al., 2024).

The mediating role of academic motivation between cognitive variables and academic well-being has received growing empirical support. For instance, studies have shown that motivation partially explains how self-regulation contributes to academic engagement and well-being outcomes (Arbazi & Fouladchang, 2022; Babosalam et al., 2022; Jarsozeh et al., 2023). Similarly, causal and structural models have demonstrated that motivational self-regulation and achievement motivation serve as key pathways linking higher-order cognitive skills to academic vitality and emotional adjustment (Jarsouzeh et al., 2023; Talebzadeh Shushtari & Boyeri, 2024). These findings suggest that examining academic motivation as a mediating variable provides a more nuanced understanding of the processes underlying academic well-being.

In addition to these psychological and cognitive factors, contemporary educational research has increasingly highlighted the role of technology use in shaping students' academic experiences. While mobile phones offer significant educational opportunities, excessive and maladaptive use has been associated with reduced academic engagement, impaired self-regulation, and emotional difficulties. Maladaptive mobile phone dependence has been linked to academic procrastination, decreased motivation, and lower academic well-being, particularly among adolescents (Balideh et al., 2025; Deniz et al., 2022; Vaiskarrami et al., 2020). Female students may be especially vulnerable to the negative academic consequences of problematic mobile phone use due to its interaction with emotional regulation and social comparison processes. Therefore, investigating academic well-being in samples characterized by maladaptive mobile phone dependence provides critical insight into risk and protective factors within modern learning contexts.

Within the Iranian educational context, several studies have examined academic well-being and its correlates, emphasizing variables such as academic hope, emotional support, engagement, and positive psychological interventions (Abbasi et al., 2021; Ghadampour et al., 2018; Haseli Songhori & Salamti, 2024). However, relatively few studies have simultaneously modeled self-regulated learning and critical thinking as predictors of academic well-being while explicitly testing the mediating role of academic motivation, particularly among female upper secondary students. Moreover, existing research has often relied on bivariate analyses rather than comprehensive structural models that can capture direct and indirect relationships among multiple variables.

Addressing this gap is especially important given recent evidence suggesting that academic well-being is a multidimensional construct shaped by complex interactions among cognitive, motivational, and contextual factors (Khosravi Pour et al., 2024; Widlund et al., 2018; Yosefi Afrashte et al., 2021). Structural equation modeling offers a powerful methodological approach for testing such complex models, allowing for the simultaneous examination of direct and mediated pathways. By integrating self-regulated learning, critical thinking, and academic motivation within a single explanatory framework, a more comprehensive understanding of academic well-being can be achieved.

Furthermore, focusing on female students in the second cycle of upper secondary education is particularly justified given the heightened academic demands and developmental transitions experienced at this stage. Prior research indicates that interventions targeting self-regulation, motivation, and critical thinking are especially effective during adolescence, when cognitive and motivational systems are still malleable (Hakami & Shokri, 2015; Mohkam Kar et al., 2024; Namaziandost et al., 2023). Understanding the natural structural relationships among these variables can inform the design of targeted educational and psychological interventions aimed at enhancing academic well-being and reducing the negative effects of maladaptive mobile phone dependence.

In light of the theoretical background and empirical evidence reviewed, there is a clear need for an integrative model that explains academic well-being based on self-regulated learning and critical thinking, while accounting for

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the mediating role of academic motivation in a population of female upper secondary students with maladaptive mobile phone dependence. Such a model can contribute to the existing literature by clarifying underlying mechanisms, extending prior findings through structural modeling, and providing practical implications for educators, school psychologists, and policymakers.

Accordingly, the aim of the present study was to model academic well-being based on self-regulated learning and critical thinking, with the mediating role of academic motivation, among female upper secondary school students with maladaptive mobile phone dependence.

2. Methods and Materials

2.1. Study Design and Participants

The present study was an applied research project conducted within a correlational framework using structural equation modeling to examine the relationships among self-regulated learning, critical thinking, academic motivation, and academic well-being, while considering maladaptive mobile phone dependence as a contextual condition. The statistical population consisted of all female students enrolled in the second cycle of upper secondary education in the city of Tabriz during the 2023–2024 academic year. According to official statistics released by the East Azerbaijan Department of Education, this population comprised 18,425 students. Given the large size of the population, the Cochran sampling formula was used to estimate an adequate sample size. Based on this calculation, a sample of 376 students was selected using an accessible sampling method. Prior to final inclusion, students were screened using the maladaptive mobile phone dependence questionnaire, and only those identified as maladaptive users were retained in the sample. Participation was voluntary, and data collection was conducted in coordination with school administrators, ensuring confidentiality and informed consent in accordance with ethical research standards applicable to educational research involving minors.

2.2. Measures

Data were collected using a set of standardized self-report questionnaires with established psychometric properties. Maladaptive mobile phone dependence was assessed using the 21-item scale developed by Genaro and colleagues in 2007, which is grounded in ten psychological indicators derived from diagnostic criteria for psychological disorders. This instrument does not include subscales and is scored on a six-point Likert continuum ranging from “never” to “always,” with higher scores indicating more excessive and problematic use. Scores above 75 indicate maladaptive or excessive use, while scores below 25 reflect low use. The original developers reported strong internal consistency, and Iranian validation studies have demonstrated high reliability using Cronbach’s alpha as well as acceptable test–retest reliability and split-half validity.

Academic well-being was measured using the Academic Well-Being Questionnaire developed by Tuominen-Sweeney and colleagues in 2012, designed to capture school-related psychological well-being. This 31-item self-report instrument evaluates four dimensions: school value, school-related burnout, academic satisfaction, and engagement in schoolwork. Items are rated using a combination of five-point and seven-point Likert scales, with total scores ranging from 31 to 209, where higher scores reflect higher levels of academic well-being. The original scale demonstrated acceptable to high internal consistency across subscales, and its Persian version has been validated in Iranian student samples, showing satisfactory overall reliability and internal correlations among dimensions.

Academic motivation was assessed using the Harter Academic Motivation Scale in its revised Likert-based form, adapted by Lepper and colleagues. This questionnaire consists of 33 items designed to assess intrinsic and extrinsic academic motivation without using the original bipolar forced-choice format. Responses are provided on a five-point Likert scale. Iranian studies have reported excellent internal consistency for this instrument, with Cronbach’s alpha coefficients indicating high reliability for use with student populations.

Self-regulated learning was measured using the Academic Self-Regulation Questionnaire developed by Bouffard and colleagues in 1995. This 14-item instrument assesses self-regulation through two dimensions: cognitive strategies and metacognitive strategies, rated on a five-point Likert scale from strong disagreement to strong agreement. Total scores range from 14 to 70, with higher scores indicating greater use of self-regulated learning strategies. Both the original and Iranian validation studies have confirmed satisfactory internal consistency and acceptable convergent validity with related learning strategy measures.

Critical thinking was assessed using the Ricketts Critical Thinking Questionnaire developed in 2003. This 33-item scale comprises three subscales—creativity, maturity, and commitment—and is rated on a five-point Likert scale. Total

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scores classify individuals into weak, moderate, or strong levels of critical thinking. Prior Iranian studies have reported high reliability coefficients using Cronbach's alpha as well as acceptable test–retest correlations, supporting the use of this instrument with secondary school students.

2.3. *Data Analysis*

Data analysis was conducted using both descriptive and inferential statistical methods. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize demographic characteristics and main study variables. Prior to inferential analysis, assumptions related to normality, multicollinearity, and missing data were examined. Pearson correlation coefficients were used to assess the preliminary relationships among self-regulated learning, critical thinking, academic motivation, academic well-being, and maladaptive mobile phone dependence. Structural equation modeling was employed to test the proposed conceptual model and to evaluate the direct and indirect pathways among variables, with academic motivation specified as a mediating variable. AMOS software was used to estimate model parameters, assess overall model fit, and examine mediation effects. In addition, moderation analysis was conducted to explore the role of maladaptive mobile phone dependence in influencing the strength of relationships among the core study variables. Model fit was evaluated using standard goodness-of-fit indices, and statistical significance was determined at conventional alpha levels.

3. Findings and Results

Table 1 presents the descriptive statistics of the main study variables and their dimensions, including academic well-being, academic motivation, self-regulated learning, and critical thinking. The table reports the mean scores and standard deviations for each dimension, providing an initial overview of the central tendency and variability of the data among female upper secondary students with maladaptive mobile phone dependence.

Table 1

Descriptive Statistics of the Study Variables

Variable	Dimension	Mean	Standard Deviation
Academic Well-Being	School Value	24.35	5.31
	School Burnout	28.46	3.37
	Academic Satisfaction	11.15	2.14
	School Engagement	27.06	3.52
Academic Motivation	Intrinsic Motivation	66.36	11.62
	Extrinsic Motivation	52.59	6.92
Self-Regulated Learning	Cognitive Strategies	14.65	2.54
	Metacognitive Strategies	13.35	2.42
Critical Thinking	Commitment	40.67	6.72
	Maturity	27.73	6.26
	Creativity	35.52	5.12

As shown in Table 1, the descriptive results indicate that among the dimensions of academic well-being, school burnout had the highest mean score, followed by school engagement and school value, while academic satisfaction showed the lowest mean, suggesting relatively greater variability in students' perceived satisfaction with their academic experiences. In terms of academic motivation, intrinsic motivation demonstrated a higher mean score than extrinsic motivation, indicating a stronger internal motivational orientation among the participants. For self-regulated learning, the mean scores of cognitive and metacognitive strategies were relatively close, reflecting a balanced use of both types of strategies in the learning process. Finally, within the critical thinking construct, the commitment dimension exhibited the highest mean, followed by creativity and maturity, suggesting that students reported higher levels of perseverance and responsibility in thinking compared to other critical thinking components. Overall, the standard deviations across variables indicate moderate dispersion, supporting the suitability of the data for subsequent inferential and structural equation modeling analyses.

Prior to conducting the inferential analyses and structural equation modeling, the main statistical assumptions were examined to ensure the appropriateness of the data for advanced multivariate analysis. The normality of the

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observed variables was assessed through the inspection of skewness and kurtosis indices, which were found to fall within acceptable ranges, indicating no substantial deviation from univariate normality. Multicollinearity among the predictor variables was evaluated by examining correlation coefficients and variance inflation factors, and the results showed that intercorrelations did not exceed critical thresholds, confirming the absence of problematic multicollinearity. The presence of outliers was checked using standardized scores and Mahalanobis distance, and no influential multivariate outliers were identified. In addition, missing data were minimal and randomly distributed, and therefore were handled using appropriate estimation procedures within the modeling software. Collectively, these results confirmed that the assumptions required for correlation analysis and structural equation modeling were adequately met, allowing the proposed model to be tested with confidence.

Table 2

Goodness-of-Fit Indices for the Structural Equation Model

Fit Index	Value
Chi-Square (χ^2)	412.87
Degrees of Freedom (df)	246
χ^2/df	1.68
GFI	0.93
AGFI	0.91
CFI	0.95
TLI	0.94
RMSEA	0.042

As shown in Table 2, the structural equation model demonstrated an acceptable to good fit to the observed data. The chi-square value was 412.87 with 246 degrees of freedom, yielding a χ^2/df ratio of 1.68, which is below the recommended threshold of 3 and indicates an adequate parsimonious fit. The goodness-of-fit index (GFI = 0.93) and adjusted goodness-of-fit index (AGFI = 0.91) both exceeded the conventional cutoff value of 0.90, supporting the adequacy of the model. Incremental fit indices also confirmed good model fit, with the comparative fit index (CFI = 0.95) and Tucker–Lewis index (TLI = 0.94) surpassing the recommended minimum of 0.90. In addition, the root mean square error of approximation (RMSEA = 0.042) indicated a close approximate fit of the model to the population covariance matrix. Collectively, these indices suggest that the proposed structural model fits the data well and is suitable for interpreting the estimated path coefficients.

Table 3

Direct, Indirect, and Total Effects among the Study Variables in the Structural Model

Path	b	S.E.	β	p
Self-Regulated Learning → Academic Motivation	0.47	0.06	0.44	< .001
Critical Thinking → Academic Motivation	0.39	0.05	0.37	< .001
Academic Motivation → Academic Well-Being	0.52	0.07	0.49	< .001
Self-Regulated Learning → Academic Well-Being (Direct)	0.28	0.06	0.26	< .001
Critical Thinking → Academic Well-Being (Direct)	0.21	0.05	0.20	.002
Self-Regulated Learning → Academic Well-Being (Indirect)	0.24	0.05	0.22	.001
Critical Thinking → Academic Well-Being (Indirect)	0.20	0.04	0.18	.003
Self-Regulated Learning → Academic Well-Being (Total)	0.52	0.08	0.48	< .001
Critical Thinking → Academic Well-Being (Total)	0.41	0.07	0.38	< .001

As presented in Table 3, self-regulated learning showed a significant positive direct effect on academic motivation (b = 0.47, β = 0.44, p < .001), indicating that higher levels of cognitive and metacognitive regulation were associated with stronger academic motivation. Similarly, critical thinking exerted a significant direct effect on academic motivation (b = 0.39, β = 0.37, p < .001). Academic motivation, in turn, had a strong and significant direct effect on academic well-being (b = 0.52, β = 0.49, p < .001), confirming its central role in the model. In addition to these indirect pathways, self-

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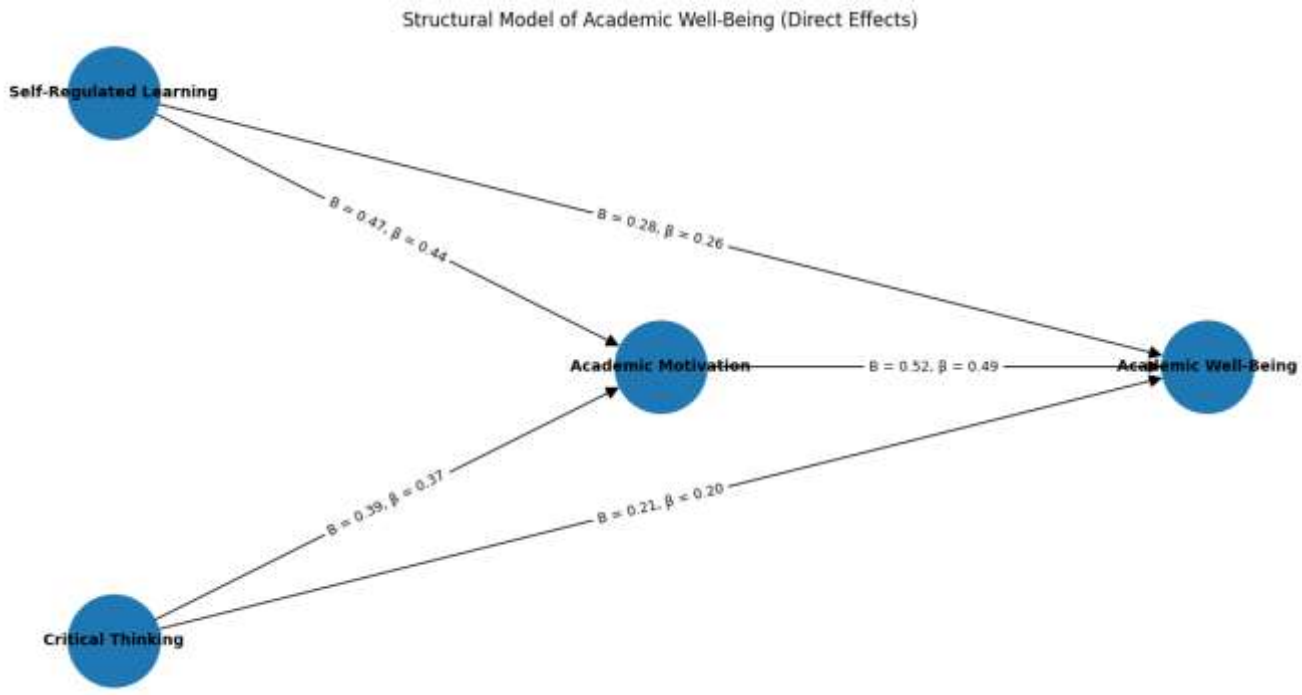
regulated learning (b = 0.28, β = 0.26, p < .001) and critical thinking (b = 0.21, β = 0.20, p = .002) also demonstrated significant direct effects on academic well-being. The indirect effects of self-regulated learning (b = 0.24, β = 0.22, p = .001) and critical thinking (b = 0.20, β = 0.18, p = .003) on academic well-being through academic motivation were both statistically significant, indicating partial mediation. When total effects were considered, self-regulated learning (b = 0.52, β = 0.48, p < .001) and critical thinking (b = 0.41, β = 0.38, p < .001) emerged as substantial predictors of academic well-being. Overall, these findings support the hypothesized mediating role of academic motivation and confirm the structural relationships proposed in the conceptual model.

Figure 1

Standardized Coefficients Model—Overall Model



4. Discussion

The present study aimed to model academic well-being based on self-regulated learning and critical thinking, with the mediating role of academic motivation, among female upper secondary school students with maladaptive mobile phone dependence. The findings of the structural equation modeling provided strong empirical support for the proposed conceptual model and revealed several theoretically meaningful patterns. Overall, the results indicated that self-regulated learning and critical thinking exert both direct and indirect effects on academic well-being, while academic motivation plays a substantial and partially mediating role in these relationships.

One of the key findings of the study was the significant direct effect of self-regulated learning on academic well-being. This result suggests that students who actively employ cognitive and metacognitive strategies, plan their learning activities, monitor their progress, and regulate their academic behaviors experience higher levels of academic well-being. This finding is consistent with prior research demonstrating that self-regulated learners tend to report greater engagement, lower academic burnout, and more positive emotional experiences in educational settings (Norouzi et al., 2021; Rezapour Mirsaleh & Shakeri, 2018; Safarzadeh & Jayervand, 2019). From a theoretical perspective, self-regulated learning enhances students' sense of control and autonomy, which are central psychological needs linked to well-being. In the context of maladaptive mobile phone dependence, effective self-regulation may also function as a protective factor by helping students manage distractions, reduce procrastination, and maintain focus on academic goals, thereby supporting their academic well-being (Balideh et al., 2025; Vaiskarrami et al., 2020).

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The findings further showed that critical thinking had a significant direct effect on academic well-being. This result underscores the importance of higher-order cognitive skills in shaping students' subjective academic experiences. Students with stronger critical thinking dispositions are better able to analyze academic challenges, evaluate information, and adopt reflective approaches to learning, which can reduce feelings of helplessness and academic stress. This finding aligns with previous studies reporting positive associations between critical thinking and academic adjustment, engagement, and achievement (Emesi et al., 2024; Liu et al., 2023; Ren et al., 2020). In line with constructivist learning theory, critical thinking enables students to construct meaning from learning experiences, which contributes to deeper engagement and a more positive perception of academic life (Almulla, 2023). For students experiencing maladaptive mobile phone dependence, critical thinking may also facilitate more conscious and reflective technology use, indirectly supporting academic well-being.

A central contribution of the present study lies in demonstrating the mediating role of academic motivation in the relationship between self-regulated learning, critical thinking, and academic well-being. The results indicated that self-regulated learning significantly predicted academic motivation, which in turn exerted a strong positive effect on academic well-being. This pattern supports motivational theories suggesting that self-regulation fosters intrinsic motivation by enhancing students' perceived competence, autonomy, and goal clarity (Amani et al., 2023; Azeem & Zubair, 2021). When students feel capable of managing their learning processes, they are more likely to develop sustained motivation, experience enjoyment in learning, and perceive academic activities as meaningful, all of which contribute to higher academic well-being (Hakami & Shokri, 2015; Komlosi-Ferdinand, 2020).

Similarly, the indirect effect of critical thinking on academic well-being through academic motivation highlights motivation as a key psychological mechanism linking cognitive skills to well-being outcomes. Students with stronger critical thinking abilities may find learning tasks more intellectually stimulating and purposeful, which enhances their academic motivation. This finding is consistent with studies showing that critical thinking is associated with mastery-oriented goals, academic vitality, and reduced demotivation (Namaziandost et al., 2023; Talebzadeh Shushtari & Boyeri, 2024; Toprak et al., 2024). The partial mediation observed in the model indicates that while self-regulated learning and critical thinking directly contribute to academic well-being, a substantial portion of their effects is transmitted through motivational processes. This result corroborates earlier causal and structural models emphasizing the central role of motivation in academic well-being (Babosalam et al., 2022; Jarsouzeh et al., 2023; Jarsozeh et al., 2023).

The strong direct effect of academic motivation on academic well-being observed in this study further reinforces the pivotal role of motivation in students' academic lives. Motivated students are more likely to persist in the face of academic challenges, engage deeply with learning tasks, and experience positive emotions related to school. This finding is consistent with extensive evidence linking academic motivation to engagement, satisfaction, and reduced academic burnout (Hakami & Shokri, 2015; Haseli Songhori & Salamti, 2024; Yosefi Afrashte et al., 2021). In environments characterized by high academic demands and pervasive technology use, motivation may serve as a critical buffer against stress and disengagement, particularly for female students who may experience heightened emotional and academic pressures.

The present findings also extend prior Iranian and international research on academic well-being by integrating self-regulated learning and critical thinking within a single explanatory framework. While previous studies have examined these variables separately, the current model demonstrates their simultaneous and interrelated contributions to academic well-being through motivational pathways. This integrative approach is consistent with multidimensional models of academic well-being that emphasize the interplay of cognitive, motivational, and contextual factors (Khosravi Pour et al., 2024; Tuominen-Soini et al., 2012; Widlund et al., 2018). Moreover, focusing on female upper secondary students with maladaptive mobile phone dependence provides novel insight into a high-risk group that has received relatively limited attention in prior modeling studies.

From a practical standpoint, the findings suggest that interventions aimed at enhancing academic well-being should not focus solely on reducing maladaptive behaviors such as excessive mobile phone use, but also on strengthening internal cognitive and motivational resources. Programs that foster self-regulated learning strategies, promote critical thinking skills, and support adaptive academic motivation may be particularly effective in improving students' academic well-being and resilience. This implication is consistent with intervention studies demonstrating the effectiveness of educational programs

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targeting academic well-being, motivation, and cognitive skills (Abbasi et al., 2021; Jarsouzeh et al., 2023; Mohkam Kar et al., 2024).

5. Conclusion

In summary, the findings of the present study provide robust empirical support for a structural model in which self-regulated learning and critical thinking contribute to academic well-being both directly and indirectly through academic motivation. By elucidating these pathways in a population of female upper secondary students with maladaptive mobile phone dependence, the study advances theoretical understanding of academic well-being and offers valuable directions for educational practice and intervention design.

6. Limitations & Suggestions

Despite the strengths of the present study, several limitations should be acknowledged. First, the correlational design of the research precludes definitive causal conclusions, even though structural equation modeling was employed. Second, the use of self-report instruments may have introduced response biases such as social desirability or common method variance. Third, the sample was limited to female upper secondary students in one city, which may restrict the generalizability of the findings to other populations, age groups, or cultural contexts. Finally, maladaptive mobile phone dependence was considered as a contextual characteristic of the sample rather than being explicitly modeled as a moderator within the structural model.

Future studies are encouraged to employ longitudinal or experimental designs to examine causal relationships among self-regulated learning, critical thinking, academic motivation, and academic well-being over time. Expanding the research to include male students, different educational levels, and diverse geographical regions would enhance the generalizability of the findings. Additionally, future research could explicitly test the moderating role of maladaptive mobile phone dependence or other contextual variables such as school climate and family support. Incorporating qualitative methods may also provide deeper insight into students' lived experiences of academic well-being and motivation.

Educational policymakers and practitioners should consider designing school-based programs that explicitly teach self-regulated learning strategies and critical thinking skills while simultaneously nurturing students' academic motivation. Teachers can integrate reflective learning activities, goal-setting exercises, and problem-based learning approaches into classroom instruction to enhance these competencies. School counselors and psychologists may also develop targeted interventions for students with maladaptive mobile phone use, focusing on strengthening internal regulatory and motivational resources rather than solely emphasizing behavioral control. Such comprehensive approaches may contribute to sustainable improvements in academic well-being among upper secondary school students.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

This article is derived from the first author's doctoral dissertation. All authors equally contributed to this article.

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