THE ROLE OF SELF-REGULATION SKILLS IN LINKING GROWTH MINDSET AND LONELINESS TO PSYCHOLOGICAL WELLBEING AMONG MEDICAL STUDENTS

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Abstract

Objectives: *This study aimed to (1) examine the relationship of growth mindset and stress with psychological wellbeing among medical students, (2) assess the mediating role of self-regulation skills in this relationship, and (3) evaluate the combined influence of growth mindset and stress on psychological wellbeing through self-regulation skills.*

Methods: *A quantitative, correlational research design was employed. Data were collected from 374 medical students through a self-administered online questionnaire. The study utilized standardized instruments: Growth Mindset Scale, Perceived Stress Scale, Self-Regulation Questionnaire–Short Version, and the Ryff Psychological Wellbeing Scale. SPSS version 25 was used to perform descriptive statistics, Pearson correlations, mediation analysis (using Hayes' PROCESS macro), and multiple regression analysis.*

Results: *Growth mindset was positively correlated with psychological wellbeing (r = .47, p < .01) and negatively correlated with stress (r = −.38, p < .01). Stress was inversely related to wellbeing (r = −.43, p < .01). Mediation analysis confirmed that self-regulation partially mediated the relationships between both growth mindset and stress with psychological wellbeing. Multiple regression analysis revealed that growth mindset (β = .30), stress (β = −.31), and self-regulation (β = .34) significantly predicted psychological wellbeing (R² = .54, p < .001).*

Conclusion: *The findings highlight self-regulation skills as a critical psychological mechanism that buffers the negative effects of stress and enhances the positive influence of growth mindset on mental wellbeing. Targeted interventions focusing on mindset and behavioral self-regulation may support emotional resilience and promote mental health in medical education.*

INTRODUCTION

The psychological wellbeing of medical students has become an increasing global concern due to the intense academic, emotional, and social challenges that characterize medical education. As students navigate the demanding environment of medical training, they are often exposed to elevated levels of stress, which can significantly impair their mental health, reduce academic performance, and compromise long-term professional development (Guerrero-López et al., 2023; Mahdavi, Valibeygi, Moradi, & Sadeghi, 2023). Psychological wellbeing, a multidimensional construct encompassing emotional, cognitive, and social functioning, is critical for students' success both during and after their education(Balashov, 2022). In this context, stress emerges as a central psychological concern, having been consistently linked to depression, anxiety, burnout, and diminished empathy among medical students (Capdevila-Gaudens, García-Abajo, Flores-Funes, García-Barbero, & García-Estañ, 2021; Rudnik, Sobczak, Sawicki, & Zdun-Ryżewska, 2025). While stress is an inevitable component of medical training, individual psychological traits can influence how students cope with and respond to stressors. One such trait is growth mindset, which refers to the belief that abilities and intelligence can be cultivated through effort, learning, and perseverance (Richardson et al., 2021). Students who adopt a growth mindset tend to be more resilient, exhibit adaptive coping mechanisms, and interpret failure as a valuable learning opportunity rather than a sign of inadequacy (WARUNWUTTHI & Wattananonsakul, 2022). As a result, they are generally better equipped to manage academic challenges and maintain their psychological wellbeing.

Complementing this cognitive trait is the behavioral capacity of self-regulation—the ability to monitor, control, and direct one's thoughts, emotions, and actions toward achieving long-term goals (Begum, 2025) In high-pressure settings such as medical schools, self-regulation allows students to maintain emotional balance, resist impulsive reactions, and focus on purposeful actions that align with their goals (Tangney, Boone, & Baumeister, 2018). Research has shown that higher self-regulation skills are associated with lower stress levels and improved mental health outcomes among students (Shin, Jang, & Ihm, 2025). Despite this, limited research has examined how self-regulation functions as a mediating mechanism linking growth mindset and stress to psychological wellbeing, particularly among medical students who face unique stressors related to clinical training, academic competition, and emotional fatigue.

Previous studies have largely focused on the independent effects of growth mindset and stress on mental health, often in broader student populations rather than in medical education settings (Richardson et al., 2021; Zhang & Zhang Sr, 2024). As such, the interplay between these psychological constructs remains insufficiently understood in the medical student context. Specifically, there is a lack of comprehensive models that examine how self-regulation might mediate the relationship between mindset and stress on the one hand, and psychological wellbeing on the other.

This study seeks to fill this critical gap by investigating how growth mindset and perceived stress collectively influence psychological wellbeing through the mediating role of self-regulation. Understanding this interaction can offer deeper insights into the mechanisms that protect medical students from psychological distress and inform the development of interventions aimed at enhancing resilience, emotional intelligence, and academic coping strategies. By integrating cognitive beliefs, emotional responses, and behavioral regulation into a unified framework, this research contributes to a more holistic understanding of student wellbeing in medical education. Ultimately, findings from this study may guide the creation of targeted mental health programs, policy reforms, and educational strategies that foster healthier learning environments for future healthcare professionals.

Therefor study has following objectives;

1.　　To examine the relationship of growth mindset and loneliness with psychological wellbeing among medical students.

2.　　To assess the mediating role of self-regulation skills in the relationship of growth mindset and loneliness with psychological wellbeing.

3.　　To evaluate the combined influence of growth mindset and loneliness on psychological

wellbeing through self-regulation skills among medical students.

METHODOLOGY

This study adopted a quantitative, correlational design aimed at investigating the role of self-regulation skills in mediating the relationship between growth mindset and stress with psychological wellbeing among medical students. The research was carried out over a six-month period from January 2024 to June 2024. Participants were recruited from medical colleges using a convenience sampling method, resulting in a final sample of 374 students. All participants were currently enrolled in a medical program (either undergraduate or postgraduate) and had completed at least one semester of training. Individuals with self-reported psychiatric illness, those currently undergoing psychological treatment, or those who submitted incomplete questionnaires were excluded from the study. Ethical clearance was obtained prior to data collection, and informed consent was secured from all participants. Data collection was conducted online via a self-administered survey distributed through institutional email lists and social media platforms. Participation was entirely voluntary, with assurances of anonymity and confidentiality.

The study utilized four standardized psychometric instruments to assess key psychological constructs.

1. **Growth mindset** was measured using an adapted version of the Growth Mindset Scale developed by Sigmundsson and Haga, (2024), which evaluates the belief in the malleability of intelligence and abilities. Items were rated on a 5-point Likert scale, with higher scores indicating a stronger endorsement of growth-oriented beliefs (Sigmundsson & Haga, 2024). The scale has demonstrated high internal consistency in previous research and showed a Cronbach's alpha of 0.87 in the current study.

2. **Perceived stress** was assessed using the 10-item Perceived Stress Scale (PSS) by Townsend & Medvedev, (2025), used to evaluate the degree to which individuals appraise situations in their lives as stressful. Items are scored on a 5-point scale ranging from "never" to "very often," with higher scores reflecting greater stress levels (Townsend & Medvedev, 2025). The PSS exhibited good reliability in the present study with a Cronbach's alpha of 0.89.

3. **The Self-Regulation Questionnaire–Short Version (SRQ-S)** developed by Valculikova et al., (2022), use to assesses individuals' ability to control behavior, emotions, and cognition in the pursuit of long-term goals. It includes items on goal setting, impulse control, and emotional regulation, rated on a 5-point scale (Vaculíková, Kočvarová, Kalenda, Neupauer, Vukčević, & Włoch, 2022). Internal reliability in this study was acceptable, reflecting consistent measurement of the construct.

4. **Psychological wellbeing** was measured using the Ryff Psychological Wellbeing Scale (Ryff, Keyes, & psychology, 1995), which captures six dimensions of wellbeing: autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance. Respondents rated each item on a 5-point scale, with higher scores indicating better psychological wellbeing. The scale showed high internal consistency in this study, with a Cronbach's alpha of 0.90.

Data were analyzed using IBM SPSS version 25. Descriptive statistics were computed to summarize participants' demographic and psychological profiles. Pearson correlation coefficients were used to examine bivariate relationships between variables. Mediation analysis was conducted using the PROCESS macro (Model 4) by Hayes to test whether self-regulation skills mediated the relationship between growth mindset, stress, and psychological wellbeing. Finally, multiple regression analysis was performed to evaluate the combined predictive strength of all independent variables on psychological wellbeing. A significance level of $p < .05$ was set for all statistical tests.

RESULTS

Table 1: Descriptive Statistics and Reliability of Study Variables (N = 374)

Variable	Mean	SD	Min	Max	Cronbach's α
Growth Mindset (GM)	3.82	0.65	1.8	5.0	0.87
Stress (st)	2.94	0.71	1.4	4.9	0.89
Psychological Wellbeing (PWB)	3.76	0.58	2.1	4.9	0.90

The descriptive statistics in Table 1 provide a general overview of the core study variables among the 374 medical students. The mean score for growth mindset was 3.82 (SD = 0.65), indicating that, on average, students reported a moderately high belief in their ability to improve and grow through effort and learning.

The mean stress level was 2.94 (SD = 0.71), suggesting that students experienced a moderate level of perceived stress. Psychological wellbeing had a mean of 3.76 (SD = 0.58), which also reflects a moderate to high level of overall wellbeing among participants. Reliability analysis showed strong internal consistency across all three scales:

Growth Mindset (α = .87), Stress (α = .89), and Psychological Wellbeing (α = .90), demonstrating that the instruments used were psychometrically sound and suitable for the sample.

Table 2: Pearson Correlation Between Variables

Variables	1 (GM)	2 (LON)	3 (PWB)
1. Growth Mindset	1		
2. stress	-0.38**	1	
3. Psychological WB	0.47**	-0.43**	1

Table-2 presents the Pearson correlation coefficients, which reveal significant relationships between the main variables. Growth mindset was found to have a moderate positive correlation with psychological wellbeing (r = .47, p < .01), suggesting that students who believe in the potential for self-improvement are more likely to report better psychological health. In contrast, stress exhibited a moderate negative correlation with psychological wellbeing (r = –.43, p < .01), implying that higher levels of perceived stress are associated with poorer mental health. Additionally, there was a negative correlation between growth mindset and stress (r = –.38, p < .01), indicating that students with a stronger growth mindset tend to perceive lower levels of stress. All correlations were statistically significant at the .01 level, confirming meaningful associations among the constructs.

Table 3: Mediation Analysis Using Self-Regulation Skills as a Mediator

Path	Effect	SE	95% CI (LL–UL)	Sig.
Growth Mindset → Self-Regulation skill (SRS)	0.35	0.04	0.27 – 0.44	***
stress → Self-Regulation skill (SRS)	-0.28	0.05	-0.38 – -0.17	***
Self-Regulation Skill → Psychological Wellbeing	0.39	0.06	0.28 – 0.50	***
Growth Mindset → Psychological Well-Being (Direct, after SRS)	0.15	0.05	0.05 – 0.25	**
stress → Psychological Well-Being (Direct, after SRS)	-0.22	0.06	-0.34 – -0.10	***

Path	Effect	SE	95% CI (LL–UL)	Sig.
Growth Mindset → SRS → Pyschological well-being (Indirect Effect)	0.14	0.03	0.08 – 0.20	***
stress → SRS → PWB (Indirect Effect)	-0.11	0.03	-0.17 – -0.06	***

The mediation analysis summarized in Table 3 examined the role of self-regulation skills as a mediator in the relationship between growth mindset, stress, and psychological wellbeing. The path from growth mindset to self-regulation was positive and statistically significant (B = 0.35, p < .001), indicating that students with a growth mindset are more likely to possess higher self-regulation abilities. Conversely, the path from stress to self-regulation was negative (B = –0.28, p < .001), showing that students experiencing greater stress tend to have lower self-regulation capacity. Self-regulation skills significantly predicted psychological wellbeing (B = 0.39, p < .001), suggesting that enhanced self-regulation contributes positively to students' mental health. After accounting for the mediator, the direct effects of both growth mindset (B = 0.15, p < .01) and stress (B = –0.22, p < .001) on psychological wellbeing remained significant but were reduced, supporting the presence of partial mediation. The indirect effect from growth mindset to wellbeing via self-regulation (B = 0.14, 95% CI = 0.08–0.20) and from stress to wellbeing via self-regulation (B = –0.11, 95% CI = –0.17 to –0.06) were both significant, confirming that self-regulation skills partially mediate the impact of growth mindset and stress on psychological wellbeing among medical students.

Table 4: Multiple Regression Model – Predicting Psychological Wellbeing

Predictor	B	SE	B	t	p
Growth Mindset (GM)	0.28	0.05	0.30	5.60	< .001
stress (st)	-0.33	0.06	-0.31	-5.50	< .001
Self-Regulation (SRS)	0.39	0.06	0.34	6.50	< .001
R^2 = .54					

Table 4 presents the results of the multiple regression analysis, which assessed the combined predictive influence of growth mindset, stress, and self-regulation on psychological wellbeing. The overall model was significant and explained 54% of the variance in psychological wellbeing (R^2 = .54), indicating a strong explanatory power. All three predictors were statistically significant. Growth mindset positively predicted wellbeing (B = 0.28, β = 0.30, p < .001), reaffirming its beneficial role in mental health. Stress negatively predicted wellbeing (B = –0.33, β = –0.31, p < .001), further emphasizing its detrimental impact. Self-regulation emerged as the strongest predictor (B = 0.39, β = 0.34, p < .001), highlighting its central role in promoting psychological wellbeing. These findings suggest that while both mindset and stress influence wellbeing, self-regulation skills are a key psychological asset that may buffer against stress and enhance adaptive functioning in medical students.

DISCUSSION
The aim of this study was to examine the role of self-regulation skills in mediating the relationship between growth mindset and loneliness with psychological wellbeing among medical students. Given the increasing psychological demands on medical students, this study sought to provide a more nuanced understanding of how certain cognitive and behavioral traits could buffer against stress and improve overall wellbeing. Specifically, it explored whether having a growth mindset and better self-regulation skills could enhance psychological wellbeing and mitigate the adverse effects of stress and loneliness in a medical training environment.

The descriptive findings revealed that participants exhibited moderately high levels of growth mindset and psychological wellbeing, along with moderate levels of perceived stress. These findings are consistent with earlier reports which indicate that medical students, despite being highly motivated, are exposed to a substantial degree of academic and emotional stressors (Abdulghani, AlKanhal, Mahmoud, Ponnamperuma, & Alfaris, 2011; Yusoff, Hadie, & Yasin, 2021). The reliability indices of the instruments used in this study were all high, supporting the psychometric robustness of the scales. Pearson correlation analysis showed that growth mindset was positively associated with psychological wellbeing and negatively associated with perceived stress. These results affirm the findings of study conducted by Zeng et al., 2016, who reported that students with a strong belief in the malleability of their abilities tend to experience greater resilience and emotional stability (Zeng, Hou, & Peng, 2016). The negative correlation between stress and wellbeing also aligns with extensive prior research emphasizing that stress is a significant predictor of reduced life satisfaction, emotional dysfunction, and academic burnout among medical students (Wang, Sun, & Wu, 2022). Moreover, the negative correlation between growth mindset and stress suggests that students who believe in effort-based growth are less likely to appraise challenges as threats, a pattern similarly reported in studies by Fisher et al., (2023) demonstrated that stress and growth mind set are linked in negative direction (Fischer, Fox, & Yoon, 2023).

The mediation analysis revealed that self-regulation significantly mediated the relationship between growth mindset, stress, and psychological wellbeing. Growth mindset had a strong positive impact on self-regulation, which in turn positively predicted wellbeing. This is supported by Yang et al., (2025), demonstrated that students who actively engage in metacognitive and motivational regulation tend to be more resilient in the face of academic demands (Yang, Wei, & Liu, 2025). Similarly, the negative effect of stress on self-regulation confirms that overwhelming stress can undermine cognitive and emotional control, as observed in earlier research by Usan et al., (2020), reported that students experiencing high stress show reduced goal orientation and emotional regulation abilities (Usán Supervía, Salavera Bordás, & Murillo Lorente, 2020).

Additionally, the direct paths from growth mindset and stress to psychological wellbeing remained significant even after accounting for the mediating role of self-regulation, which suggests that self-regulation only partially mediates these relationships. The significant indirect paths indicate that growth mindset not only directly enhances wellbeing but also does so indirectly by strengthening self-regulation skills. These results are consistent with the conceptual framework proposed by Shahmari et al., (2025) who argued that self-control and regulation serve as key mechanisms for achieving psychological balance, particularly in high-stress settings (Shahmari, Dashti, Jafari, & Belil, 2025).

The regression analysis further demonstrated that all three variables—growth mindset, stress, and self-regulation—jointly accounted for a substantial portion (54%) of the variance in psychological wellbeing. Notably, self-regulation emerged as the strongest predictor, which underscores its foundational role in emotional adjustment and resilience. This is in line with previous findings by (Brown, Miller, & Lawendowski, 1999) who emphasized that self-regulation is not only linked to academic success but also plays a critical role in mitigating psychological distress. The strong predictive power of self-regulation suggests that training students in self-regulatory strategies could be a valuable addition to medical education curricula. The findings of this study contribute to the growing body of literature emphasizing the psychological competencies that protect medical students from burnout and emotional exhaustion. While growth mindset equips students with adaptive cognitive frameworks, it is through self-regulation that these beliefs are transformed into sustained psychological wellbeing. These insights have direct implications for mental health interventions, suggesting that programs targeting both cognitive restructuring (e.g., fostering growth mindset) and behavioral training (self-regulation skills) may be effective in improving students' mental health and academic performance.

CONCLUSION

This study provides meaningful insights into the psychological dynamics affecting medical students by

exploring how growth mindset and stress (originally designed for loneliness) interact with self-regulation skills to influence psychological wellbeing. The findings revealed that students with a stronger growth mindset tend to experience lower stress and higher psychological wellbeing, while elevated stress levels are associated with diminished wellbeing. Most critically, self-regulation skills emerged as a significant mediating factor, not only buffering the detrimental effects of stress but also amplifying the positive influence of growth mindset on wellbeing. These results underscore the importance of fostering both cognitive beliefs and behavioral competencies in medical education settings. While growth mindset equips students with a resilient approach to challenges, it is through self-regulation that these beliefs are translated into adaptive behavior, emotional balance, and long-term psychological health. The significant predictive power of self-regulation in the regression model further highlights its central role in promoting student wellbeing, even more than mindset alone. The implications of these findings are both theoretical and practical. Theoretically, this study contributes to the growing literature on integrated cognitive-behavioral frameworks of mental health in high-stress academic settings. Practically, the results suggest that interventions aimed at cultivating self-regulation skills—such as goal-setting, emotional control, and impulse management—alongside efforts to instill a growth-oriented mindset may be particularly effective in enhancing the psychological wellbeing of medical students.

LIMMITATIONS AND RECOMMENDATIONS OF THE STUDY

Despite its valuable contributions, this study has several limitations that should be acknowledged. First, the use of a cross-sectional, self-reported questionnaire design limits the ability to draw causal inferences among the studied variables. Temporal changes and developmental trajectories in growth mindset, stress levels, and self-regulation skills over time cannot be captured in such a design. Second, the reliance on convenience sampling from a limited number of medical colleges may restrict the generalizability of the findings to broader populations of medical students across different regions and academic systems.

Additionally, social desirability bias may have influenced participants' responses, particularly concerning psychological wellbeing and self-regulation. Lastly, while the study focused on stress as a key psychological variable, it originally aimed to explore the role of loneliness, which may have required different measurement tools and theoretical framing for a more direct analysis.

Future research should employ longitudinal designs to examine how growth mindset and self-regulation evolve and interact over time to influence psychological wellbeing, particularly during key transitional phases of medical training. Expanding the sample size and diversifying the study population to include students from different educational institutions, cultural backgrounds, and training stages will enhance external validity. Experimental or interventional studies introducing targeted training in self-regulation and mindset-building could provide robust evidence on the efficacy of such programs in improving student wellbeing. From a practical standpoint, medical education policymakers and academic institutions should consider integrating structured workshops, mentorship programs, and curriculum elements that cultivate self-regulatory competencies and promote adaptive cognitive frameworks such as growth mindset. These initiatives can serve as preventative strategies against stress-induced mental health issues and foster a healthier, more resilient future healthcare workforce.

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