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The Mediating Role of Perceived Stress in the Relationship Between Sleep Quality and Psychological Resilience with Emotional Eating in Students

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ABSTRACT

The present study aimed to determine the mediating role of perceived stress in the relationship between sleep quality and psychological resilience with emotional eating in students. The research method was descriptive–correlational. The statistical population included all students of the Islamic Azad University, Rasht Branch, during the 2024–2025 academic year. A sample of 400 participants was selected through convenience sampling. Data were collected using the Salzburg Emotional Eating Scale (Meule et al., 2018), the Connor–Davidson Resilience Scale (Connor & Davidson, 2003), the Pittsburgh Sleep Quality Index (Buysse et al., 1989), and the Perceived Stress Scale (Cohen, 1983). The results showed that the indirect effect of sleep quality on emotional eating was −0.26, and the total effect of sleep quality on emotional eating was −0.276. Moreover, the indirect effect of psychological resilience on emotional eating was −0.29, while the total effect of psychological resilience on emotional eating was estimated at −0.282. The model also demonstrated a good fit. The findings highlight the importance of enhancing psychological resilience and improving sleep quality as effective strategies to reduce unhealthy behaviors such as emotional eating among students.

Keywords: perceived stress, sleep quality, psychological resilience, emotional eating

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Introduction

Emotional eating—defined as the tendency to consume food in response to emotional states rather than physiological hunger—has become a salient issue among university students, who are particularly vulnerable to maladaptive coping strategies due to academic pressures, lifestyle disruptions, and psychosocial challenges (1). The transition to adulthood often coincides with increased exposure to stressors and irregular sleep patterns, both of which have been strongly associated with emotional dysregulation and disordered eating behaviors (2, 3). Understanding the psychological mechanisms underlying emotional eating is

therefore critical for identifying preventive and intervention pathways that promote students' mental health and adaptive functioning.

Recent literature has highlighted the role of perceived stress as a significant predictor of emotional eating behaviors (4, 5). Elevated stress levels may impair self-regulation and trigger maladaptive coping mechanisms, such as overeating or binge-like patterns, to alleviate negative affect (6). This maladaptive cycle reinforces the emotional–behavioral link between psychological strain and unhealthy eating, contributing to obesity, mood disturbances, and metabolic dysfunctions (7). The stress–eating relationship is also closely tied to sleep quality, as sleep deprivation or poor sleep efficiency exacerbate stress sensitivity and emotional lability (8, 9). Consequently, students who experience insufficient or poor-quality sleep are at higher risk for emotional eating through both direct and indirect psychological mechanisms (2, 3).

Sleep quality, as a multidimensional construct encompassing sleep duration, latency, efficiency, and subjective restfulness, is essential for cognitive, emotional, and physiological regulation (8). Empirical evidence suggests that poor sleep quality increases negative affect and impulsivity, which in turn amplify emotional eating tendencies (10, 11). In a recent large-scale study, inadequate sleep was linked with higher food cravings and loss-of-control eating among adolescents, suggesting that sleep disruption undermines appetite regulation via stress-related pathways (2). Moreover, insufficient sleep impairs executive control and reward processing, reinforcing the drive for high-calorie "comfort foods" that transiently soothe distress but perpetuate unhealthy patterns (3).

The psychological resilience construct provides an essential buffer against these maladaptive outcomes. Resilience refers to an individual's capacity to adapt and recover from adversity, stress, and emotional disruption (12). High resilience facilitates effective coping, self-regulation, and emotional balance, thereby reducing the likelihood of stress-induced overeating (13). Studies during the COVID-19 pandemic demonstrated that resilience not only mitigated the psychological impact of uncertainty and isolation but also contributed to healthier lifestyle behaviors (12). In the context of eating behavior, resilience has been shown to negatively predict emotional eating and to mediate the relationship between psychological distress and dietary choices (14, 15). In university students, greater resilience is associated with enhanced cognitive reappraisal, better emotional regulation, and reduced susceptibility to external stressors (16, 17).

Evidence from cross-sectional and longitudinal studies indicates that the interplay between stress, resilience, and sleep quality is complex and bidirectional (18). Poor sleep impairs resilience and emotional control, while higher resilience can buffer the impact of sleep disturbances on mental health outcomes (18, 19). Similarly, chronic stress undermines both resilience and sleep quality, creating a feedback loop that perpetuates emotional dysregulation (20). A recent model proposed by Enayatian and colleagues (2024) confirmed that stress and maladaptive cognitive styles mediate the relationship between sleep quality and emotional exhaustion, underscoring stress perception as a key psychological mechanism in health-related behaviors.

The mediating role of perceived stress is particularly important in understanding emotional eating. Carpio-Arias et al. (2022) found that stress perception significantly predicts emotional eating in adults, independent of gender and BMI. Likewise, Ling and Zahry (2021) showed that stress affects dietary intake indirectly through emotional self-regulation deficits among university students. These findings align with Rahme et al. (2021), who validated emotional eating as a behavioral manifestation of affective coping deficits

linked to chronic stress exposure. Taken together, these results imply that stress operates as a central mediator in the pathways connecting psychological vulnerability and maladaptive eating.

Within this framework, sleep disturbances represent both a cause and a consequence of perceived stress (9, 21). Insufficient or irregular sleep elevates cortisol and other stress biomarkers, exacerbating emotional reactivity and appetite dysregulation (8). Empirical evidence supports that poor sleep quality predicts greater emotional eating and food cravings through heightened perceived stress and reduced resilience (2, 3). Conversely, interventions that enhance sleep hygiene and emotion regulation have been shown to attenuate stress-related eating patterns (22).

From a psychophysiological standpoint, the stress–sleep–eating triad is rooted in the dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis. Chronic stress increases cortisol secretion, which promotes appetite for energy-dense foods and interferes with sleep onset and maintenance (23). This neurobiological cascade explains why individuals with high perceived stress and poor sleep are more prone to emotional eating (24). Moreover, emotional eating temporarily reduces stress through dopaminergic reward activation, reinforcing the maladaptive cycle (7).

The construct of psychological resilience interacts with this process by moderating the effects of stress and poor sleep on eating behavior. Resilient individuals tend to exhibit better coping strategies, lower stress appraisal, and more adaptive emotion regulation, which collectively diminish the likelihood of stress-induced overeating (13, 25). As Güler and Şenel (2024) demonstrated among hospitality employees, resilience significantly predicted lower emotional eating tendencies under high occupational stress. Similarly, Robert et al. (2022) identified emotional eating as a mediator between resilience and dietary quality, suggesting that resilient individuals are better able to resist emotional cues for eating.

In Iranian populations, validation studies of emotional eating measures, such as the Salzburg Emotional Eating Scale, have confirmed their reliability and cultural applicability (26, 27). Ghafouri and colleagues (2022) reported satisfactory internal consistency and strong correlations with perceived stress and anxiety measures among Iranian adults. Furthermore, localized evidence indicates that perceived stress predicts emotional eating and that resilience plays a protective role in mitigating these effects (16, 20). These findings emphasize the need for culturally contextualized models that account for stress appraisal and emotional regulation within specific sociocultural frameworks.

The interconnection between sleep quality, resilience, and emotional eating also extends to broader health outcomes. Poor sleep and high stress contribute to fatigue, depressive symptoms, and academic burnout, which further amplify maladaptive coping patterns (22). Conversely, adequate sleep enhances self-regulatory resources that facilitate adaptive coping and healthy eating (3, 8). In recent studies among medical students, both resilience and cognitive emotion regulation were found to mediate the relationship between life stressors and sleep quality (18). Such evidence underscores that emotional eating is not an isolated behavior but a multifaceted response to interconnected psychological vulnerabilities.

Additionally, social and behavioral contexts—including social media exposure, screen time, and smartphone addiction—have emerged as external stressors that exacerbate sleep and eating dysregulation (9, 21). For example, excessive social media engagement before bedtime negatively affects sleep latency and emotional regulation, thereby heightening stress and emotional eating tendencies (9). These findings align

with broader behavioral models that conceptualize emotional eating as an avoidance-oriented coping mechanism in the face of psychological overload (28).

Cross-cultural studies also reveal that resilience may function differently depending on societal norms and coping expectations. In collectivist cultures, social support enhances resilience and buffers against stress-induced emotional eating (15, 29). Conversely, in contexts with greater individual responsibility for emotional regulation, personal coping resources become more critical (14). Accordingly, interventions that strengthen both personal resilience and social connectedness could serve as effective strategies for mitigating emotional eating in university populations.

Given these theoretical and empirical foundations, the present study investigates the mediating role of perceived stress in the relationship between sleep quality and psychological resilience with emotional eating among university students. This framework integrates cognitive–emotional and behavioral components, suggesting that perceived stress acts as a critical link between physiological regulation (sleep) and psychological adaptation (resilience). The research draws upon prior evidence indicating that both poor sleep quality and low resilience independently predict emotional eating, while perceived stress serves as an intermediary mechanism (4, 6, 19).

Furthermore, considering the unique challenges of the student population—including academic pressure, lifestyle instability, and social transition—exploring this model provides valuable insights for mental health promotion and behavioral interventions. By elucidating how stress mediates the influence of sleep and resilience on emotional eating, the study contributes to an integrative understanding of student well-being that bridges affective, cognitive, and behavioral dimensions (3, 7).

In summary, the literature consistently demonstrates that sleep quality, psychological resilience, and perceived stress are interrelated determinants of emotional eating.

Methods and Materials

Study Design and Participants

The present study employed a descriptive–correlational design using path analysis. The statistical population included all students of the Islamic Azad University, Rasht Branch, during the 2024–2025 academic year. According to the Krejcie and Morgan (1970) table, a sample size of 377 participants was estimated. Considering potential attrition and the elimination of incomplete questionnaires, a final sample of 400 students was selected using the convenience sampling method. The data collection instrument in this study was a field-based questionnaire.

Data Collection

Emotional Eating Questionnaire: The Salzburg Emotional Eating Scale (SEES) was developed by Meule et al. (2018) and consists of 20 items across four subscales: positive emotions (joy), negative low-arousal emotions (sadness), negative high-arousal emotions (anger and anxiety). Response options range from 1 (“I eat much less than usual”) to 5 (“I eat much more than usual”). Higher scores indicate a tendency to eat more when stressed, whereas lower scores indicate eating less when worried. In Meule et al. (2018), the instrument demonstrated acceptable internal consistency with a Cronbach’s alpha of .89. In Iran, Ghafoori et al. (2022) administered the questionnaire to 489 adults, confirming acceptable face and content

validity. The confirmatory factor analysis showed factor loadings above .50, indicating good model fit. Moreover, the questionnaire demonstrated moderate-to-high correlations with other measures of stress and emotional eating and low correlations with eating-related instruments (e.g., eating disorder pathology, perceived self-regulatory success in weight control). The Kaiser–Meyer–Olkin measure and Bartlett's test of sphericity in Meule et al. (2018) confirmed the suitability of the data for exploratory factor analysis. Internal consistency for each subscale exceeded .70.

Psychological Resilience Scale: The Connor–Davidson Resilience Scale (CD-RISC) was developed by Connor and Davidson (2003) after reviewing resilience research from 1979 to 1999. The psychometric properties of this scale were tested across six samples, including the general population, primary care patients, psychiatric outpatients, individuals with generalized anxiety disorder, and two groups of posttraumatic stress disorder patients. The instrument includes 25 items rated on a 5-point Likert scale ranging from 0 ("not true at all") to 4 ("true nearly all the time"), with total scores ranging from 0 to 100. Preliminary findings by Connor and Davidson (2003) supported the reliability and validity of the instrument, showing satisfactory internal consistency, test–retest reliability, and convergent and divergent validity. Exploratory factor analysis revealed five factors: personal competence/toughness, trust in one's instincts/tolerance of negative affect, positive acceptance of change/secure relationships, control, and spirituality (Connor & Davidson, 2003). The Persian version's reliability and validity were examined and confirmed in both clinical and nonclinical samples (Besharat, 2007), with a Cronbach's alpha of .89 and factor analysis validity of .87. In the study by Karimian-Abdar and Karimi-Afshar (2021), the reliability of this scale was reported as .91.

Sleep Quality Questionnaire: The Pittsburgh Sleep Quality Index (PSQI), developed by Buysse et al. (1989), measures sleep quality and helps distinguish between good and poor sleepers. This self-report tool assesses multiple domains, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Most items are multiple-choice, brief, and easy to understand. Each item is rated from 0 to 3, yielding a total score range of 0 to 21. The PSQI demonstrated validity of .86 and reliability of .89 in the original study. In the study by Enayatian et al. (2024), Cronbach's alpha for the total questionnaire was .81, indicating good reliability. Cronbach's alpha coefficients for subscales ranged from .76 to .80.

Perceived Stress Questionnaire: The Perceived Stress Scale (PSS) was developed by Cohen (1983) and has three versions with 4, 10, and 14 items designed to measure general perceived stress over the past month. The scale uses a 5-point Likert scoring format: 0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, and 4 = very often. Items 4, 5, 6, 7, 9, 10, and 13 are reverse-scored (never = 4 to very often = 0). Total scores range from 0 to 56, with higher scores reflecting higher perceived stress. In Cohen et al. (1983), internal consistency coefficients for subscales and total scores ranged from .83 to .86. In the study by Safaei and Shokri (2014), Cronbach's alphas for perceived self-efficacy, perceived helplessness, and total stress were .80, .60, and .76, respectively. In another study by Homayouni and Hosseini (2022), Cronbach's alpha was reported as .887.

Data Analysis

Data were analyzed using structural equation modeling (SEM) through Amos version 24.

Findings and Results

Descriptive demographic findings indicated that the majority of participants (78.8%) were female, while 85 individuals (21.3%) were male. Most participants held a bachelor's degree (59.3%), whereas the lowest frequency corresponded to associate degrees (4.3%). In addition, the majority of participants (86%) were married, and 56 individuals (14%) were single.

Table 1. Descriptive Indices of Research Variables

Variables	Mean	Standard Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
Sleep Quality	36.82	12.91	-0.491	0.122	-0.227	0.243
Psychological Resilience	63.18	14.63	-0.556	0.122	0.377	0.243
Emotional Eating	71.38	13.54	-0.478	0.122	-0.001	0.243
Perceived Stress	35.78	9.59	-0.434	0.122	-0.03	0.243

According to the results in the table, the mean and standard deviation of sleep quality were 36.82 and 12.91, respectively; those of psychological resilience were 63.18 and 14.63; those of emotional eating were 71.38 and 13.54; and those of perceived stress were 35.78 and 9.59.

The skewness and kurtosis coefficients for all variables fell within the acceptable range (−2 to +2), and their standard errors were also within the same limits, indicating that the data were normally distributed. Therefore, based on the Central Limit Theorem—which posits that larger sample sizes (over 30) yield distributions that approximate normality—it can be concluded that the data for all variables are either normal or close to normal.

Table 2. Pearson Correlation Coefficients Between Research Variables

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1															
2	0.57	1														
3	0.72	0.59	1													
4	0.59	0.39	0.55	1												
5	0.47	0.25	0.44	0.46	1											
6	0.38	*0.16*	0.35	0.45	0.38	1										
7	0.33	0.15	0.38	0.44	0.33	0.81	1									
8	0.38	0.20	0.34	0.41	0.31	0.76	0.84	1								
9	−0.37	*−0.16*	−0.31	*−0.17*	−0.28	−0.27	*−0.16*	*−0.13*	1							
10	−0.447	−0.22	−0.41	−0.30	−0.38	−0.41	−0.30	−0.33	−0.85	1						
11	−0.19	−0.097	−0.21	*−0.15*	*−0.15*	*−0.17*	*−0.15*	−0.24	−0.57	−0.73	1					
12	−0.34	−0.037	−0.24	*−0.20*	*−0.11*	*−0.19*	*−0.16*	−0.22	−0.58	−0.49	−0.40	1				
13	0.23	−0.030	−0.22	*−0.19*	*−0.18*	*−0.23*	*−0.19*	−0.33	−0.45	−0.51	−0.54	−0.47	1			
14	−0.34	−0.037	−0.24	*−0.20*	*−0.11*	*−0.19*	*−0.16*	−0.22	−0.40	−0.48	−0.51	−0.60	−0.59	1		
15	0.43	0.029	0.21	*0.24*	*0.10*	*0.15*	*0.17*	0.29	0.41	0.43	0.55	0.65	0.60	0.59	1	
16	0.43	0.029	0.21	*0.24*	*0.10*	*0.15*	*0.17*	0.29	0.41	0.43	0.55	0.65	0.40	0.50	0.66	1

1. Sleep Quality; 2. Subjective Sleep Quality; 3. Sleep Latency; 4. Sleep Duration; 5. Habitual Sleep Quality; 6. Sleep Disturbance; 7. Use of Sleep Medication; 8. Daytime Dysfunction; 9. Competence; 10. Trust in One's Instincts; 11. Positive Acceptance of Emotions; 12. Control; 13. Spirituality; 14. Joy; 15. Sadness; 16. Anger

The correlation analysis revealed that all variables were significantly correlated. Specifically, the Pearson correlation coefficients between each pair of variables were statistically significant at $p < .05$ and $p < .01$ levels, suggesting meaningful relationships among all measured constructs, including sleep quality components, resilience dimensions, emotional eating subscales (joy, sadness, anger), and perceived stress.

Given that the significance levels of all Pearson correlation coefficients were less than 0.05, it can be concluded that there are significant associations among all variables.

To test the validity of the proposed theoretical model and compute the effect coefficients, structural equation modeling (SEM) was employed. Figure 1 presents the research model based on standardized path coefficients.

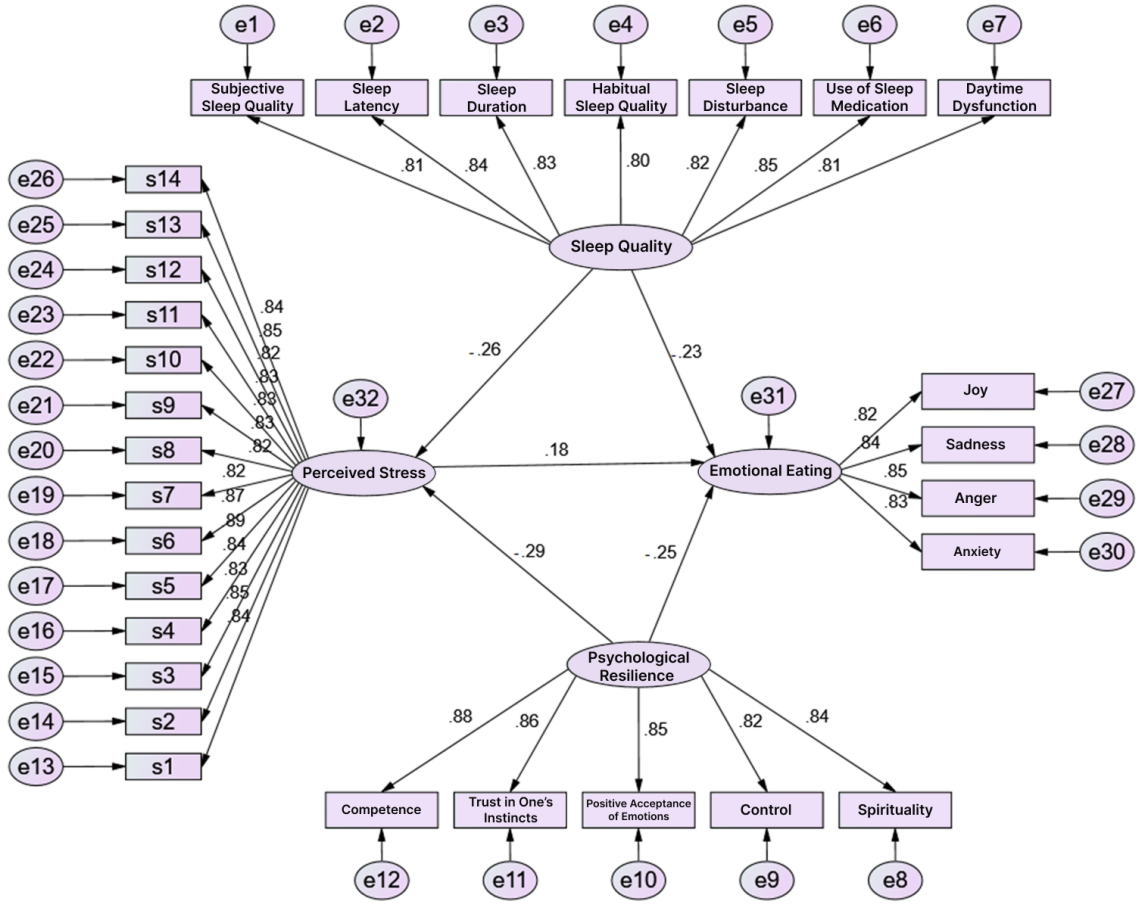

Figure 1. Research Model with Standardized Path Coefficients

To confirm the model and ensure the reliability of the obtained results, the model's goodness-of-fit indices were examined. Table 3 presents the indices used along with their obtained values.

Table 3. Results of Model Fit Indices

Examined Index	Symbol	Acceptable Range	Reference	Obtained Value
Chi-square / Degrees of Freedom	χ^2/df	< 3	Carmines & McIver (1981)	1.358
Root Mean Square Error of Approximation	RMSEA	< 0.08	Hair et al. (1998)	0.030
Comparative Fit Index	CFI	> 0.90	Bentler & Bonett (1980)	0.98
Incremental Fit Index	IFI	> 0.90	—	0.98
Goodness-of-Fit Index	GFI	> 0.80	Etezadi & Forouhmand (1996)	0.92

As shown in Table 3, the chi-square to degrees-of-freedom ratio (χ^2/df) was 1.358, which is less than 3, indicating a good fit. The RMSEA value was 0.030, which is below the acceptable threshold of 0.08.

Furthermore, the CFI, IFI, and GFI indices were all within acceptable limits (0.98, 0.98, and 0.92, respectively). Overall, based on these indicators, the model demonstrates a good fit.

Therefore, it can be concluded that the causal model examining the mediating role of perceived stress in the relationship between sleep quality and psychological resilience with emotional eating among students has an adequate and acceptable model fit.

Discussion and Conclusion

The results of this study demonstrated that perceived stress plays a significant mediating role in the relationship between sleep quality and psychological resilience with emotional eating among university students. Specifically, the findings indicated that lower sleep quality was associated with higher perceived stress, which in turn predicted elevated levels of emotional eating. Additionally, greater psychological resilience was linked to lower perceived stress and reduced emotional eating behaviors. The structural model exhibited excellent fit indices, confirming the adequacy of the hypothesized model in explaining the pathways among the studied variables. These findings suggest that perceived stress acts as a central psychological mechanism linking both physiological and emotional resources—namely sleep quality and resilience—to maladaptive eating behavior, aligning with contemporary theories on stress-induced emotional dysregulation and self-regulation deficits in emerging adults.

The negative association between sleep quality and emotional eating observed in this study supports prior research indicating that poor sleep contributes to increased emotional reactivity and impaired appetite regulation (2, 3). Poor sleep quality disrupts the hypothalamic–pituitary–adrenal (HPA) axis, leading to elevated cortisol levels and altered reward system functioning, which together heighten cravings for high-calorie and palatable foods (8). Consistent with this, studies among adolescents and young adults have shown that insufficient or irregular sleep is associated with higher levels of emotional eating and food cravings (10, 11). Zhou et al. (2024) further demonstrated that depression and physical inactivity mediate the relationship between poor sleep quality and emotional eating, suggesting a multifaceted psychosocial pathway. Similarly, the current findings reinforce the notion that impaired sleep undermines emotional regulation capacities, thereby increasing the likelihood of maladaptive eating in response to stress.

The results also revealed a significant inverse relationship between psychological resilience and emotional eating, which corroborates prior evidence suggesting that resilience serves as a protective factor against maladaptive coping behaviors. Individuals with higher resilience are better able to manage stress, maintain emotional stability, and utilize adaptive coping strategies, thereby minimizing reliance on food for emotional comfort (12, 13). In a study of hotel employees, resilience was found to negatively predict emotional eating even in high-stress occupational settings (30). Moreover, Milligan et al. (2024) reported that psychological resilience moderated the link between attentional deficits and loss-of-control eating in young adults, indicating that resilience acts as a stabilizing force in self-regulatory processes. The current findings align with these perspectives, underscoring resilience as a critical internal resource that buffers the effects of stress and enhances emotion regulation.

The mediating role of perceived stress identified in this study extends prior empirical findings highlighting stress as a central factor in emotional eating (4, 5). Perceived stress has been consistently associated with emotional dysregulation and maladaptive behavioral responses, particularly among students

exposed to academic and social pressures (6, 24). The current data support the hypothesis that elevated stress not only increases the tendency to eat in response to emotions but also mediates the impact of sleep and resilience on such behavior. These findings align with the cognitive–emotional framework proposed by Carpio-Arias et al. (2022), who found that perceived stress directly predicted emotional eating across diverse populations. Similarly, Ling and Zahry (2021) observed that emotional self-regulation mediates the link between perceived stress and dietary intake, confirming that stress impairs the capacity for controlled and mindful eating. Thus, the mediating effect identified in this research underscores stress as a crucial psychological bridge that connects physiological functioning (sleep quality) and emotional adaptability (resilience) with maladaptive eating patterns.

From a neurobiological standpoint, the observed relationships may be explained by the dysregulation of the HPA axis and related neuroendocrine pathways. Chronic stress elevates cortisol levels, which increases appetite and preference for high-sugar and high-fat foods, thereby promoting emotional eating (7). Simultaneously, stress interferes with the quality and architecture of sleep, which further aggravates emotional instability and impulse-driven behavior (8, 21). These physiological disruptions may create a reinforcing cycle wherein poor sleep heightens stress reactivity, which in turn amplifies emotional eating tendencies. The findings of the current study echo this reciprocal pattern, providing empirical support for integrated biopsychological models of stress-related eating.

The significant relationship between sleep quality and resilience observed in this study also aligns with prior evidence indicating that sleep and resilience are mutually reinforcing (18, 19). Adequate sleep contributes to emotional recovery and cognitive reappraisal, while resilience enhances adaptive coping and stress tolerance, which together foster healthier behavioral outcomes. Zhu et al. (2025) found that cognitive emotion regulation and resilience jointly mediated the relationship between life stressors and sleep quality among medical students, highlighting the interplay of emotional and cognitive factors. Likewise, Enayatian et al. (2024) confirmed that poor sleep quality was associated with emotional exhaustion through maladaptive cognitive styles, emphasizing stress as a mediating mechanism. These findings are consistent with the current study, which identifies perceived stress as the pathway linking sleep disturbances and emotional eating.

The current results also support prior studies conducted in Iran and similar cultural contexts, demonstrating the reliability and cross-cultural validity of these relationships. For instance, Ghafouri et al. (2022) validated the Persian version of the Salzburg Emotional Eating Scale and found significant correlations between stress, emotional eating, and related constructs in Iranian adults. Similarly, Homayouni and Hosseini (2022) found that perceived stress and health anxiety were inversely associated with quality of life, particularly during the COVID-19 pandemic. The convergence of these findings with international research suggests that stress-induced emotional eating is a robust phenomenon across cultural contexts and population groups.

Moreover, the results lend further support to the theoretical framework of self-regulation and affective coping. According to Evers et al. (2018), emotional eating can be conceptualized as a failure of emotional regulation, where individuals attempt to modulate negative emotions through food consumption. Poor sleep and heightened stress both undermine self-regulation capacities, whereas resilience enhances them (2, 15). Bazo Perez and Frazier (2024) also identified distinct pathways in which resilience mediates the impact of

psychosocial risk factors on disordered eating. The present study's findings are in line with these results, indicating that promoting resilience and improving sleep may indirectly reduce emotional eating by enhancing emotional control and reducing stress perception.

The model fit indices further reinforce the strength and stability of the relationships examined. The chi-square to degrees-of-freedom ratio, RMSEA, CFI, IFI, and GFI values all indicated an excellent model fit, confirming the adequacy of the hypothesized mediational model. This statistical robustness strengthens confidence in the theoretical claim that perceived stress serves as a key mechanism explaining how sleep quality and resilience interact to influence emotional eating. Such findings also parallel the results reported by Robert et al. (2022), who observed that emotional eating mediated the relationship between resilience and dietary patterns in the NutriNet-Santé study. Together, these results suggest that addressing stress perception may be an effective approach for mitigating emotional eating behaviors in university settings.

Additionally, this study's results highlight that the relationships among the studied variables are mutually reinforcing rather than isolated. Poor sleep leads to stress; stress exacerbates emotional eating; and emotional eating contributes to physiological strain and disturbed sleep, perpetuating a cyclical dynamic. Psychological resilience functions as an adaptive moderator that weakens the influence of stress on maladaptive outcomes (13). This pattern reflects the integrative health model, wherein emotional, cognitive, and behavioral processes interact within a unified regulatory system (9). The present findings therefore reinforce the importance of considering holistic interventions that address both psychological and behavioral domains.

Furthermore, the role of technological and lifestyle factors should not be overlooked. As shown by Ünal-Aydın (2025), smartphone addiction and bedtime procrastination negatively influence sleep quality, which subsequently impacts stress and emotional regulation. Langlais et al. (2025) similarly found that social media use mediates the relationship between relationship stress and subjective sleep quality. The current findings align with these results, indicating that stress derived from modern digital habits may indirectly contribute to emotional eating through disrupted sleep and emotional dysregulation.

Overall, the results of this study contribute to the growing body of literature emphasizing the interconnectedness of psychological resilience, sleep, and stress in shaping emotional eating behaviors. They also underline the necessity of developing prevention and intervention programs that target perceived stress as a modifiable mediating factor. Strengthening resilience through psychological skills training and promoting sleep hygiene could help mitigate emotional eating, particularly in vulnerable populations such as students and young adults (16, 29). The convergence of findings from both international and Iranian studies suggests that these relationships are universally relevant while remaining sensitive to contextual and cultural influences.

Despite its valuable contributions, this study has several limitations. First, the use of a cross-sectional design limits causal inferences; although the model implies directional relationships, temporal precedence cannot be firmly established. Second, the reliance on self-reported questionnaires introduces potential biases such as social desirability, recall inaccuracies, and subjective interpretation of items. Third, the study sample was drawn from a single university, which may restrict the generalizability of the findings to broader student populations. Additionally, potential confounding variables such as dietary restraint, body mass index, and socioeconomic status were not controlled for, which could influence the observed associations.

Finally, although validated instruments were employed, the absence of objective physiological measures (e.g., actigraphy for sleep, salivary cortisol for stress) limits the precision of the results.

Future research should employ longitudinal or experimental designs to verify causal pathways among sleep quality, perceived stress, resilience, and emotional eating. Integrating physiological indices with psychological self-reports could provide a more comprehensive understanding of the stress–sleep–eating relationship. Further studies could also examine moderating factors such as gender, personality traits, coping styles, or digital media usage to better capture individual variability. Cross-cultural comparisons would enhance the global applicability of findings, particularly by exploring how cultural norms around emotional expression and eating behaviors influence stress-related eating patterns. Finally, intervention-based studies that evaluate the effectiveness of resilience-building, mindfulness, or sleep-hygiene programs on reducing emotional eating would offer practical implications for health promotion in student populations.

From an applied perspective, universities and mental health practitioners should implement integrated well-being programs that address both emotional and behavioral components of student health. Educational workshops on stress management, resilience enhancement, and sleep hygiene can serve as preventive measures against maladaptive coping behaviors such as emotional eating. Counseling centers should adopt holistic approaches combining cognitive–behavioral strategies with psychoeducation on nutrition and lifestyle balance. Additionally, campus environments can promote healthier routines by reducing academic overload, fostering peer support networks, and facilitating mindfulness or relaxation activities. Encouraging adequate sleep, balanced diet, and emotional self-awareness will contribute to reducing stress-related eating behaviors and improving overall psychological well-being among students.

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Authors' Contributions

All authors equally contributed to this study.

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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