



Emotion regulation and cognitive flexibility in undergraduate nursing students: A descriptive correlational study

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Abstract

Nursing students are exposed to numerous academic and clinical stressors that require effective psychological adaptation. Emotion regulation and cognitive flexibility are two important psychological constructs associated with coping and resilience; however, the relationship between these variables has received limited attention among Iranian nursing students. This study aimed to investigate the relationship between emotion regulation strategies and cognitive flexibility among undergraduate nursing students. In this descriptive correlational cross-sectional study, 82 second- to fourth-year undergraduate nursing students at Torbat Heydaryeh University of Medical Sciences, Iran, participated during the 2025–2026 academic year. Data were collected using the Emotion Regulation Questionnaire (ERQ) and the Cognitive Flexibility Inventory (CFI). Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 26. Spearman's rank-order correlation coefficient and independent-samples t-test were used for data analysis, and the level of statistical significance was set at $P < 0.05$. The mean total score of cognitive flexibility was 100.54 ± 13.58 , and the mean total score of emotion regulation was 45.34 ± 8.25 . A significant positive correlation was found between total emotion regulation and total cognitive flexibility ($\rho = 0.31$, $P = 0.004$). Cognitive reappraisal showed significant positive correlations with total cognitive flexibility ($\rho = 0.48$, $P < 0.001$) and the Alternatives subscale ($\rho = 0.57$, $P < 0.001$), whereas expressive suppression was not significantly associated with any dimension of cognitive flexibility. No significant gender differences were observed in the main study variables. The findings suggest that cognitive reappraisal is positively associated with cognitive flexibility among nursing students. Strengthening adaptive emotion regulation strategies may contribute to improved cognitive flexibility and better adaptation to educational and clinical challenges.

Keywords: Emotion regulation, Cognitive flexibility, Cognitive reappraisal, Nursing students, Correlational study

Introduction

The journey through undergraduate nursing education is a period of intense personal and professional transformation, characterized by a unique confluence of psychological and educational challenges (1). Globally, nursing students report significant levels of psychological distress, with some studies indicating a prevalence of over 70% (2). This burden stems from a demanding academic curriculum fraught with frequent examinations and high-stakes assessments, leading to moderate to high levels of academic stress (3). Concurrently, their immersion into clinical practice introduces a distinct set of stressors, including the fear of incompetence, the potential for error, and the complexities of interpersonal dynamics with patients and colleagues (3, 4). The profound emotional labor of confronting patient suffering and mortality further compounds this psychological load, raising existential questions and demanding a high degree of emotional fortitude (5). Navigating these pressures while striving to meet rigorous professional expectations places students at a heightened risk for adverse mental health outcomes, such as anxiety, depression, and emotional exhaustion (4, 6). Consequently, the capacity for effective psychological adaptation is not merely beneficial but essential for academic success, the prevention of burnout, and the development of a resilient professional identity capable of delivering compassionate and competent care.

Central to this adaptive process is the construct of emotion regulation, defined as the set of processes by which individuals influence the emotions they experience, when they experience them, and how they are expressed (7). The process model of emotion regulation, proposed by Gross, offers a robust framework for understanding these mechanisms, distinguishing between strategies based on their point of intervention in the emotion-generative timeline (Gross, 1998), (8). A key distinction lies between antecedent-focused strategies, which are deployed before an emotional response is fully formed, and response-focused strategies, which

manage an emotion after it has arisen. Cognitive reappraisal, an antecedent-focused strategy, involves reframing a potentially emotion-eliciting situation to alter its meaning and, therefore, its emotional impact (9). In contrast, expressive suppression, a response-focused strategy, involves inhibiting the outward display of an already-felt emotion (8).

The differential consequences of these strategies are well-documented and hold particular relevance for nursing students. A substantial body of international literature indicates that a habitual reliance on cognitive reappraisal is associated with a more adaptive psychological profile, including greater positive affect, better interpersonal relationships, and lower symptoms of depression and anxiety (8). Among students, it is linked to more positive achievement emotions and better academic performance (9, 10). Conversely, expressive suppression, while seemingly effective at concealing distress, often incurs significant psychological and cognitive costs. It fails to reduce the subjective experience of negative emotion and can paradoxically increase physiological arousal (11). Its reliance on cognitive resources can impair memory and social functioning, and its habitual use is linked to diminished positive affect, lower social support, and an increased risk for psychopathology (8, 12). For nursing students, who must process vast amounts of information and build therapeutic alliances under pressure, the cognitive and social toll of suppression can be particularly detrimental.

Alongside the ability to manage emotions, psychological adaptation in nursing hinges on a parallel cognitive capacity: cognitive flexibility. Defined as the ability to switch between different mental sets, tasks, or perspectives, cognitive flexibility is a core executive function that enables individuals to adjust their thinking and behavior in response to a dynamic environment (13, 14). In the unpredictable and often chaotic context of healthcare, this ability is indispensable. For nursing students, cognitive flexibility is foundational to the development of sophisticated

clinical reasoning—a dynamic and recursive cognitive process that allows for accurate patient assessment and sound decision-making. It supports the ability to generate alternative hypotheses, adapt care plans as patient conditions change, and learn from novel clinical encounters (15). Furthermore, cognitive flexibility is intrinsically linked to effective problem-solving and the use of flexible coping strategies, which are crucial for managing the myriad stressors of nursing education (16). Evidence consistently shows that higher levels of cognitive flexibility are associated with enhanced psychological well-being, better mental health outcomes, and more successful adaptation to academic life among nursing students (17, 18).

Theoretically, a compelling synergy exists between emotion regulation and cognitive flexibility, particularly in the case of cognitive reappraisal. The very act of reappraisal—of reinterpreting a situation to change its emotional resonance—is fundamentally an exercise in cognitive flexibility. It requires an individual to disengage from an initial, prepotent appraisal and flexibly generate alternative perspectives or meanings (19). This shared mechanism of perspective-shifting suggests that cognitive flexibility may function as a crucial underlying resource that enables the effective implementation of cognitive reappraisal (20). Empirical evidence from international studies supports this conceptual link, demonstrating a robust positive association between the habitual use of cognitive reappraisal and higher levels of cognitive flexibility (19). This relationship appears to be clinically significant, as cognitive flexibility has been shown to mediate the protective effects of reappraisal against anxiety and depression (19). Research conducted in Iran aligns with these findings, showing that adaptive emotion regulation strategies are negatively correlated with psychological distress and that interventions enhancing cognitive control can concurrently improve emotion regulation capacities (20, 21).

Despite the established importance of these psychological constructs and the theoretical basis

for their association, a significant gap persists in the literature. While the challenges faced by nursing students are globally recognized, the specific interplay between their emotion regulation strategies and cognitive flexibility remains underexplored, particularly within non-Western cultural contexts. This omission is especially salient in collectivist societies such as Iran, where cultural norms often prioritize social harmony and may encourage the suppression of individual emotional expression (22, 23). This cultural predisposition towards emotional control could have profound, yet unexamined, implications for the development and deployment of cognitive flexibility among Iranian nursing students (24). To date, no study has systematically investigated the relationship between cognitive reappraisal, expressive suppression, and cognitive flexibility within this specific demographic.

Understanding this relationship is critical for developing culturally sensitive and effective educational and psychological support systems for nursing students in Iran. Given the high-stress nature of their training and the vital role of cognitive flexibility in ensuring safe and effective patient care, identifying the regulatory strategies that foster or hinder this cognitive capacity is of paramount importance. Therefore, this study was designed to address this critical gap in the literature and provide foundational evidence in this area. This study aimed to investigate the relationship between emotion regulation strategies and cognitive flexibility among undergraduate nursing students.

Methods

Study Design

This descriptive-correlational cross-sectional study was conducted to examine the relationship between emotion regulation strategies and cognitive flexibility among undergraduate nursing students.

Setting and Participants

The study was carried out at the Faculty of Nursing and Midwifery, Torbat Heydariyeh

University of Medical Sciences, Iran, during the 2025–2026 academic year. The target population consisted of undergraduate nursing students enrolled in the second, third, and fourth academic years. First-year students were excluded because they had not yet entered clinical training settings and therefore had limited exposure to the emotional and cognitive demands associated with clinical nursing education.

All eligible students who met the inclusion criteria during the study period were invited to participate. A total of 82 students completed the study questionnaires and were included in the final analysis.

The inclusion criteria were enrollment in the undergraduate nursing program, being a second-, third-, or fourth-year nursing student, ability to complete the questionnaires independently, and willingness to participate in the study. Students who submitted incomplete questionnaires or reported severe psychiatric conditions that could substantially affect questionnaire completion were excluded from the study. Students who submitted incomplete questionnaires or reported severe psychiatric conditions that could substantially affect questionnaire completion were excluded from the analysis.

Data Collection

Data were collected using anonymous self-administered questionnaires. Before data collection, eligible students received information regarding the study objectives and procedures. Written informed consent was obtained from all participants. Participants completed a demographic questionnaire together with standardized measures of emotion regulation and cognitive flexibility. To minimize response bias, no identifying information was collected.

Measures

1. Demographic Characteristics

A researcher-developed demographic questionnaire was used to collect information regarding participants' age, gender, marital status, place of residence, and history of stressful experiences during the previous six months.

2. Emotion Regulation Questionnaire (ERQ)

Emotion regulation was assessed using the Emotion Regulation Questionnaire (ERQ) developed by Gross and John. The ERQ consists of 10 items measuring two emotion regulation strategies: Cognitive Reappraisal (6 items) and Expressive Suppression (4 items). Items are scored on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), with higher scores indicating greater use of the corresponding strategy (25). The ERQ has demonstrated satisfactory psychometric properties across different populations, including Iranian samples. In the present study, the overall internal consistency of the questionnaire was acceptable (Cronbach's $\alpha = 0.83$).

3. Cognitive Flexibility Inventory (CFI)

Cognitive flexibility was assessed using the Cognitive Flexibility Inventory (CFI) developed by Dennis and Vander Wal. The CFI consists of 20 items and evaluates three dimensions of cognitive flexibility: Alternatives, Control, and Alternatives for Human Behavior. Higher scores indicate greater cognitive flexibility (26). Previous studies have supported the validity and reliability of the Persian version of the inventory. In the present study, the instrument demonstrated good internal consistency reliability (Cronbach's $\alpha = 0.87$).

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics, including frequencies, percentages, means, standard deviations, and ranges, were used to summarize demographic characteristics and study variables.

The normality of continuous variables was assessed using the Shapiro–Wilk test. Because several study variables showed significant deviations from normality, Spearman's rank-order correlation coefficient was used to examine the relationships between emotion regulation strategies and cognitive flexibility dimensions.

Independent-samples t-tests were performed to compare emotion regulation and cognitive

flexibility scores between male and female students. Statistical significance was set at $P < 0.05$ for all analyses.

Ethical Considerations

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Participation was voluntary, and all participants provided informed consent before enrollment. Participants were assured that their responses would remain confidential and anonymous and that they could withdraw from the study at any stage without any academic consequences.

Results

Participant Characteristics

A total of 82 undergraduate nursing students participated in the present study. Participants were recruited from second-, third-, and fourth-year nursing students at Torbat Heydariyeh University of Medical Sciences. The mean age of participants was 21.84 years ($SD = 2.16$, range = 19–34). Among the participants, 42 (51.2%) were female and 40 (48.8%) were male. Most participants were single (91.5%), and 80.5% reported experiencing at least one stressful event during the previous six months.

Regarding living arrangements, 57.3% resided in dormitories, 36.6% lived with family, and the remaining participants lived independently or under other conditions. Descriptive characteristics of the sample are presented in Table 1.

Table 1. Demographic characteristics of participants (N = 82)

Variable	n	%
Gender		
Female	42	51.2
Male	40	48.8
Marital status	75	91.5
Single	7	8.5
Married		
Stressful experience during the previous 6 months	66	80.5
Yes	16	19.5
No		
Residence status	47	57.3
Dormitory	30	36.6
Family home	3	3.7
Independent	2	2.4
Other		

Descriptive Statistics of Emotion Regulation and Cognitive Flexibility

The descriptive statistics for the study variables are presented in Table 2. The mean total score of cognitive flexibility was 100.54 ± 13.58 , indicating a moderate-to-high level of cognitive flexibility among the participants. The highest

mean score among the cognitive flexibility subscales belonged to the “Alternatives” dimension (52.60 ± 7.36).

Regarding emotion regulation, the mean total score was 45.34 ± 8.25 . Cognitive reappraisal showed a higher mean score (28.44 ± 4.78) compared with expressive suppression (16.85 ± 4.72).

Table 2. Descriptive statistics of the study variables

Variable	Mean $\pm$ SD	Minimum	Maximum
Total cognitive flexibility	100.54 $\pm$ 13.58	64	127
Alternatives	52.60 $\pm$ 7.36	20	65
Control	38.32 $\pm$ 8.03	20	55
Human behavior alternatives	9.60 $\pm$ 2.26	2	14
Total emotion regulation	45.34 $\pm$ 8.25	20	62
Cognitive reappraisal	28.44 $\pm$ 4.78	12	38
Expressive suppression	16.85 $\pm$ 4.72	5	26

Normality Assessment

The Shapiro–Wilk test demonstrated that several variables deviated significantly from normal distribution, particularly the “Alternatives” subscale ($P < 0.001$), “Alternatives for Human Behavior” ($P < 0.001$), and total emotion regulation score ($P = 0.009$). Therefore, Spearman’s rank-order correlation was used for the primary correlational analyses.

Relationship between emotion regulation and cognitive flexibility

Spearman correlation analyses revealed significant positive associations between emotion regulation and cognitive flexibility dimensions (Table 3). A statistically significant positive correlation was found between total emotion regulation and total cognitive flexibility ($\rho = 0.31$, $P = 0.004$).

Among the emotion regulation strategies, cognitive reappraisal demonstrated the strongest relationships with cognitive flexibility variables. Cognitive reappraisal was strongly and positively correlated with the “Alternatives” subscale ($\rho = 0.57$, $P < 0.001$).

Furthermore, cognitive reappraisal showed a moderate positive correlation with “Alternatives for Human Behavior” ($\rho = 0.36$, $P < 0.001$) and a weaker but statistically significant association with the “Control” subscale ($\rho = 0.24$, $P = 0.029$).

In contrast, expressive suppression demonstrated weak and non-significant relationships with most dimensions of cognitive flexibility. No statistically significant relationship was observed between expressive suppression and the “Control” dimension ($\rho = -0.02$, $P = 0.858$).

Table 3. Correlation matrix between emotion regulation and cognitive flexibility variables

Variables	Alternatives	Control	Alternatives for Human Behavior	Total Cognitive Flexibility
Cognitive Reappraisal	0.57***	0.24*	0.36***	0.48***
Expressive Suppression	-0.08	-0.02	0.11	0.04
Total Emotion Regulation	0.42***	0.19	0.29**	0.31**

Values are reported as Spearman’s rho correlation coefficients.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

Gender Differences

Independent-samples t-tests were conducted to compare emotion regulation and cognitive flexibility scores between male and female students (Table 4). Female students showed slightly higher mean scores in total cognitive

flexibility (102.17 ± 12.41) compared with male students (98.82 ± 14.63). Similarly, female students had marginally higher scores in cognitive reappraisal. However, none of these differences reached statistical significance ($P > 0.05$).

Table 4. Comparison of study variables based on gender

Variable	Female Mean $\pm$ SD	Male Mean $\pm$ SD	t	P value
Total Cognitive Flexibility	102.17 $\pm$ 12.41	98.82 $\pm$ 14.63	1.12	0.266
Total Emotion Regulation	45.22 $\pm$ 8.01	45.48 $\pm$ 8.56	-0.14	0.886

Discussion

This descriptive-correlational study investigated the relationship between emotion regulation strategies and cognitive flexibility among undergraduate nursing students in Iran. The findings demonstrated a significant positive association between overall emotion regulation and cognitive flexibility. Among the examined emotion regulation strategies, cognitive reappraisal showed the strongest correlation with cognitive flexibility dimensions, particularly with the “Alternatives” subscale. In contrast, expressive suppression demonstrated weak and non-significant associations with most dimensions of cognitive flexibility. These findings provide important insights into the psychological characteristics that may support adaptation and resilience among nursing students in demanding academic and clinical environments.

The strong positive association between cognitive reappraisal and cognitive flexibility is theoretically and empirically meaningful. Cognitive reappraisal, conceptualized within Gross’s process model of emotion regulation, refers to the reinterpretation of emotionally evocative situations in order to modify their emotional impact (27). This process inherently requires the individual to shift perspectives, reconsider interpretations, and generate alternative cognitive frameworks. Therefore, the observed relationship between cognitive reappraisal and cognitive flexibility appears conceptually coherent. The particularly strong correlation between cognitive reappraisal and the “Alternatives” dimension of cognitive flexibility suggests that students who are more capable of reframing stressful experiences may also possess greater capacity for generating adaptive interpretations and alternative solutions. Similar findings have been reported in previous

international studies indicating that cognitive reappraisal is associated with adaptive coping, psychological resilience, and more effective problem-solving abilities among university students and healthcare trainees (28, 29).

From a practical perspective, this finding is highly relevant within nursing education. Nursing students are continuously exposed to emotionally challenging situations, including fear of making clinical mistakes, heavy academic workloads, communication difficulties, and stressful patient-care experiences. In such contexts, students who can cognitively reinterpret stressful events may be better able to adapt psychologically and maintain effective functioning. This interpretation is supported by evidence suggesting that cognitive flexibility contributes to adaptive coping under stress and facilitates adjustment in complex clinical environments (30). Moreover, evidence from Iranian healthcare settings has similarly demonstrated positive associations between cognitive flexibility, adaptive emotion regulation, and psychological growth following stressful experiences (31). The consistency between the present findings and both international and Iranian evidence strengthens the plausibility of the observed relationships.

In contrast, expressive suppression demonstrated weak and non-significant relationships with most dimensions of cognitive flexibility. This finding is consistent with Gross’s theoretical framework, which distinguishes suppression as a response-focused strategy that occurs after emotional activation (11). Unlike cognitive reappraisal, suppression primarily involves inhibiting outward emotional expression rather than modifying the underlying cognitive appraisal of the situation. Because suppression may consume cognitive and attentional resources, it has frequently been associated with less adaptive psychological outcomes, including

reduced cognitive efficiency and impaired social functioning (19, 32). Consequently, suppression may not facilitate the flexible cognitive processing required for generating alternative interpretations or adaptive behavioral responses.

However, the non-significant findings related to expressive suppression should also be interpreted within the Iranian sociocultural context. In collectivist cultures, emotional restraint and behavioral self-control are often socially valued characteristics associated with interpersonal harmony and professional maturity (22, 33). Within nursing education and clinical training environments in Iran, students may perceive emotional suppression as a socially acceptable or professionally necessary behavior, particularly in hierarchical clinical settings where emotional control is emphasized. Therefore, although expressive suppression may not contribute positively to cognitive flexibility, its cultural normalization may partially explain the absence of strong negative associations in the present study. Similar observations have been reported in cross-cultural studies suggesting that the psychological consequences of suppression may vary depending on sociocultural norms and contextual expectations (34, 35).

The present findings can also be interpreted through broader stress and coping frameworks. According to Lazarus and Folkman's transactional model, individuals' cognitive appraisal of stressful situations substantially influences emotional and behavioral responses (36). Students who possess stronger cognitive reappraisal abilities may be more likely to perceive stressful academic or clinical situations as manageable challenges rather than overwhelming threats. Cognitive flexibility may facilitate this adaptive appraisal process by enabling individuals to shift perspectives and identify multiple coping options. Such mechanisms are particularly important in nursing education, where students frequently encounter uncertainty, emotional pressure, and performance-related stressors. Previous studies among Iranian nursing students have reported high levels of academic stress, anxiety, and

emotional burden associated with clinical education (37-39). Therefore, psychological capacities such as cognitive reappraisal and cognitive flexibility may represent important protective factors that support emotional adaptation and academic persistence.

The educational implications of these findings are substantial. The observed association between adaptive emotion regulation and cognitive flexibility suggests that these capacities may be amenable to educational development rather than representing fixed personality characteristics. Consequently, nursing curricula may benefit from integrating structured educational approaches aimed at strengthening emotional and cognitive coping skills. Educational interventions focusing on emotional awareness, reflective thinking, stress management, and adaptive coping may help students better navigate emotionally demanding clinical situations. Previous studies have indicated that mindfulness-based interventions, reflective practice, and resilience-focused educational programs may improve adaptive emotional functioning and psychological well-being among nursing students and healthcare professionals (40-42).

In addition to curriculum-based interventions, the findings highlight the importance of accessible psychological support services for nursing students. Counseling and student support programs may help students identify maladaptive coping strategies and develop more adaptive approaches such as cognitive reappraisal. Interventions based on cognitive behavioral therapy, mindfulness-based stress reduction, and acceptance-based approaches have shown beneficial effects on emotional regulation, psychological flexibility, and stress management in student populations (43-45). Providing early psychological support may therefore contribute to improved academic adjustment and emotional well-being among nursing students.

The absence of statistically significant gender differences in emotion regulation and cognitive flexibility is another noteworthy finding. Although female students demonstrated slightly higher mean scores in cognitive flexibility, these

differences were not statistically significant. This finding may indicate that the psychological demands of nursing education similarly affect both male and female students, leading to relatively comparable emotional and cognitive adaptation patterns. However, given the relatively limited sample size, caution should be exercised in interpreting these findings, and future studies with larger samples may further clarify potential gender-related differences.

This study possesses several strengths. First, it simultaneously examined emotion regulation strategies and cognitive flexibility within the context of undergraduate nursing education, an area that remains relatively underexplored in Iranian research. Second, the use of established and psychometrically validated instruments strengthened the methodological rigor of the study. Third, the study contributes culturally contextualized evidence regarding psychological adaptation among nursing students within Iranian educational and clinical environments.

Limitations

Several limitations should also be acknowledged. The cross-sectional and correlational design precludes causal inference regarding the directionality of the observed relationships. It remains unclear whether adaptive emotion regulation enhances cognitive flexibility or whether cognitively flexible individuals are more likely to employ adaptive regulation strategies. Additionally, the study was conducted within a single university, which may limit the generalizability of findings to other nursing student populations. The reliance on self-report questionnaires may also increase susceptibility to response bias and social desirability effects.

Future research should employ longitudinal and interventional designs to better clarify the developmental and causal relationships between emotion regulation and cognitive flexibility among nursing students. Investigating whether targeted educational or psychological interventions can enhance these capacities and improve academic or clinical outcomes would be particularly valuable. Furthermore, future studies

may benefit from examining additional psychological constructs such as resilience, burnout, empathy, and clinical decision-making in relation to emotion regulation and cognitive flexibility. Comparative cross-cultural research may also further illuminate the influence of sociocultural norms on emotional regulation strategies among healthcare students.

Conclusion

The present study demonstrated a significant positive relationship between adaptive emotion regulation strategies, particularly cognitive reappraisal, and cognitive flexibility among undergraduate nursing students. Students who were more capable of cognitively reframing emotional experiences also demonstrated greater ability to generate alternative perspectives and adaptive responses. In contrast, expressive suppression showed limited association with cognitive flexibility dimensions. These findings highlight the close interrelationship between emotional and cognitive adaptation processes within nursing education and underscore the importance of supporting students' psychological coping capacities. Integrating emotional regulation training, reflective educational approaches, and accessible psychological support systems into nursing education may contribute to the development of more resilient, adaptable, and psychologically prepared future nurses.

Artificial Intelligence Statement

The authors used ChatGPT (OpenAI) solely for language editing and improvement of the manuscript's readability. All scientific content, study design, data analysis, interpretation of findings, and final approval of the manuscript were performed by the authors, who take full responsibility for the content of this article.

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