ISSN:1738-6764, eISSN:2093-7504

Structural Relationships among Mindfulness, Achievement Emotions, and Academic Performance in Nursing Students: Mediating Effects of Achievement Emotions

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https://doi.org/10.5392/IJoC.2025.21.4.150

Manuscript Received 3 September 2025; Received 26 December 2025; Accepted 26 December 2025

Abstract: *Achievement emotions significantly influence students' well-being, learning quality, and academic performance. This study addresses the overlooked achievement emotions in nursing by investigating their relationship with mindfulness and academic performance, with an emphasis on the mediating effects of achievement emotions. This study employed a cross-sectional design involving 203 nursing students in a university in C province. Participants responded to a survey designed to assess their level of mindfulness, achievement emotions, and academic performance. Structural relationships among mindfulness, achievement emotions, and academic performance were tested using data-driven and computational analyses, including structural equation modeling (SEM) with Mplus 8. In addition, path analysis with bootstrapping was conducted to validate the hypothesized pathways and to examine the mediating effects of achievement emotions. Mindfulness was positively related to positive achievement emotions and negatively related to negative achievement emotions. While positive achievement emotions enhanced academic performance, negative achievement emotions had an adverse effect. However, mindfulness did not directly influence academic performance. Notably, achievement emotions served as a complete mediator in the association between mindfulness and academic performance. The results suggest that mindfulness benefits nursing students' academic performance by amplifying positive achievement emotions and diminishing negative ones. The mediation effect highlights the importance of achievement emotions in nursing education, highlighting the necessity of educational programs that enhance students' emotional experiences. These findings can serve as a crucial foundation for designing initiatives fostering mindfulness, achievement emotions, and effective learning among nursing students.*

Keywords: Mindfulness; Achievement Emotions; Academic Performance; Nursing Students; Nursing Education

1. Introduction

Achievement emotions are a distinct category of emotions that arise in response to activities related to achievement or the outcomes of those activities [1]. In the academic setting, achievement emotions play a crucial role in shaping students' overall well-being, influencing their motivation, engagement, and ultimately, their learning experiences and academic success [1, 2]. Given their significance, research on achievement emotions has grown considerably in the field of education. However, despite this growing body of literature, studies specifically examining achievement emotions in nursing education remain relatively limited. This gap is particularly concerning because nursing students frequently report elevated stress levels as a result of their rigorous coursework and the challenges of clinical training, which frequently lead to heightened negative emotions [3-5]. If such stress and negative emotional states are not managed effectively, they can have detrimental consequences, not only for students' mental and physical health but also for their academic performance and overall educational outcomes [3], [6, 7].

Academic performance is one of central educational outcomes in nursing because it is closely tied to students' academic adaptation, progression in the curriculum, and readiness for increasingly complex clinical learning [3], [6]. Academic performance is also shaped by multiple modifiable factors beyond cognitive ability, including students' affective experiences, stress responses, and coping resources [3], [6]. In particular, when students experience positive emotions, they are better able to manage stress, strengthen their coping abilities, and ultimately improve academic performance [3], [6], [8]. In contrast, persistent stress and negative emotions experienced by nursing students can have long-term detrimental effects, not only on their well-being and academic success but also on the quality of patient care they will provide as future healthcare professionals. This highlights the critical need for comprehensive strategies aimed at fostering effective stress management and emotional regulation throughout nursing education [6]. Moreover, as society moves further into an era of advanced artificial intelligence (AI), many routine nursing tasks, such as core nursing skills, may increasingly be performed by AI. Consequently, the role of future nurses is expected to shift toward responsibilities that require distinctively human qualities, such as demonstrating empathy and delivering compassionate, patient-centered care [6]. In parallel, the digital era heightens the need for objective, data-centric evidence to guide nursing education content and intervention design. Therefore, it is increasingly important to clarify data-supported mechanisms linking key psychological resources to learning outcomes. Cultivating empathy requires the capacity to initially recognize and regulate personal emotions, emphasizing the importance of focused research on the specific emotional experiences of nursing students [3].

Mindfulness, recognized as an effective approach to emotional regulation, refers to the deliberate and nonjudgmental observation of one's present-moment experiences [9]. This process involves deliberately focusing on present experiences while using self-regulation to maintain and guide that attention [9]. Individuals who possess higher levels of mindfulness tend to participate in behaviors that align with their intrinsic values and personal interests [10]. An expanding body of literature has demonstrated that mindfulness yields numerous psychological, cognitive, and physiological benefits; these include fostering positive emotions, enhancing self-esteem, and improving subjective well-being while also mitigating negative psychological states such as depression, anxiety, neurotic tendencies, and negative emotions [10, 11]. From an achievement emotion perspective, mindfulness may be particularly relevant because it facilitates present-focused awareness and an accepting stance toward internal experiences, which can influence students' emotional responses during achievement-related activities and evaluations [10, 11].

In the field of nursing research, numerous studies have highlighted the beneficial effects of mindfulness in alleviating stress, anxiety, depression, and burnout, while promoting self-efficacy, happiness, and empathy among both nurses and nursing students [12, 13]. Specifically, mindfulness has been found to enhance positive emotions while diminishing negative emotions in both nurses [14] and nursing students [15], suggesting that mindfulness may shape achievement-related emotional experiences in academically demanding contexts. Recent studies focusing on nursing students further suggest that mindfulness is an important factor influencing how they emotionally react to academic achievement—enhancing positive achievement emotions while reducing negative ones [3]. Achievement emotions, in turn, are closely linked to academic performance: positive emotions support persistence and effective learning, whereas negative emotions can disrupt concentration and motivation, ultimately impairing academic outcomes [3], [6]. Additionally, research has indicated that higher levels of mindfulness contribute to improved academic performance among nursing students potentially through enhanced attentional control, reduced stress-related cognitive interference, and greater engagement in learning activities [3, 4], [16]. Given that academic performance is a key determinant of future employment opportunities, nursing students may experience heightened sensitivity to their academic success compared to students in other fields [17]. Therefore, examining the impact of mindfulness within the domain of nursing education is particularly valuable for both academic and professional development.

In summary, this study seeks to address a gap in nursing research by incorporating students' achievement emotions into learning contexts, an area that has been relatively underexplored. Specifically, this research seeks to investigate the structural associations among mindfulness, achievement emotions, and academic performance in nursing students. Drawing upon previous nursing studies, which suggest that mindfulness functions as a key factor to influencing both positive and negative emotions [3], [14, 15], that achievement emotions exert a direct influence on academic performance [3], [6], [8], and that mindfulness itself contributes to academic performance [3, 4], [16] this study anticipates the presence of structural relationships among these three key variables: mindfulness, achievement emotions, and academic performance. Furthermore, by analyzing these relationships in greater depth, the study aims to explore the potential mediating effect of achievement emotions

in the relationship between mindfulness and academic performance. The present study addresses the following research questions:

Research question 1. What structural relationships exist among mindfulness, achievement emotions, and academic performance in nursing students?

Research question 2. Do achievement emotions mediate the association of mindfulness with academic performance in nursing students?

2. Materials and Methods

2.1 Research design

A cross-sectional quantitative design was employed to investigate the associations among mindfulness, achievement emotions, and academic performance in nursing students, with an emphasis on the mediational influence of achievement emotions.

2.2 Participants and procedure

A total of 203 nursing students from a university in C province, South Korea, participated in this study, including 178 second-year and 25 third-year students. The sample included 158 females (77.8%) and 45 males (22.2%), with a mean age of 21.42 years (SD = 2.98). The participants were limited to students from a single university to control potential exogenous variables arising from differences in theory classes and clinical practicum experiences across universities. The sample size was appropriate for conducting structural equation modeling (SEM) in this study, following Kline's (2023) recommendation that a sample of over 200 is preferable for such analyses.

Data were collected through an online survey from December 2 to 13, 2024. Participants first reviewed an overview of the study, ensuring they understood its objectives, significance, and ethical considerations. They were reminded of their right to withdraw at any time without any consequences. To minimize social desirability and reporting bias, participants were also assured that the survey was voluntary, responses would be kept strictly confidential, and data would be used solely for research purposes. After providing informed consent, they completed a questionnaire that included measures of mindfulness and achievement emotions, along with demographic information, including academic performance.

2.3 Measures

Mindfulness in nursing students was evaluated utilizing the Cognitive and Affective Mindfulness Scale–Revised (CAMS-R), originally formulated by Feldman et al. [18] and later validated for Korean use by Cho [19]. This measure is divided into three dimensions: attention (4 items, e.g., "I can easily focus on what I am doing"), awareness (4 items, e.g., "I can easily stay in tune with my thoughts and emotions"), and acceptance (2 items, e.g., "I can accept things I cannot change just as they are"). The higher the total score, the greater the level of mindfulness represented. Responses were assessed through a four-point Likert scale, with options from 1 (not at all) to 4 (almost always). The internal consistency of the original CAMS-R [18] was reported as Cronbach's $\alpha = .77$, and the Korean CAMSR [19] achieved $\alpha = .70$. The reliability analysis in this research indicated a Cronbach's α of .70 for the total scale; subscale reliabilities were .76 (attention), .63 (awareness), and .65 (acceptance).

To evaluate the students' achievement emotions related to their nursing courses, the Achievement Emotions Questionnaire (AEQ) developed by Pekrun et al. [20] was applied. For this research, the Korean adaptation of the AEQ, validated for nursing students by Lee [6], was employed. This scale evaluates three positive emotions (hope, pride, and enjoyment) and five negative emotions (anger, boredom, anxiety, shame, and hopelessness). It includes 12 items for positive emotions (e.g., "Before taking an exam, I think positively that everything will go well") and 20 items assessing negative emotions (e.g., "I get angry because my homework takes up so much of my time"). Participants responded to all items using a five-point Likert format, anchored at 1 (strongly disagree) and 5 (strongly agree). Cronbach's α coefficients were .86 for positive emotions and .89 for negative emotions, demonstrating acceptable internal consistency.

Academic performance was evaluated using participants' self-reported overall midterm grade average across all enrolled courses, including general education and major courses. Each participant was requested to specify their midterm grade from the six predefined levels, with ranges of 1 (< 50, the lowest), 2 (51–60), 3

(61–70), 4 (71–80), 5 (81–90), and 6 (91–100, the highest). Because the six levels represent ordered categories, academic performance was coded from 1 to 6 and treated as an approximately continuous observed variable in the SEM.

2.4 Data analysis

Data were processed with SPSS 28.0 (IBM Corp., Armonk, NY, USA) and Mplus 8 [21]. Descriptive statistics, including means and standard deviations, and correlations among study variables, were computed in SPSS. Subsequently, structural equation modeling (SEM) was conducted in Mplus to examine the structural associations among mindfulness, achievement emotions, and academic performance. In Mplus, academic performance (six ordered levels) was modeled as a continuous observed variable, and parameters were estimated using robust maximum likelihood. Indirect effects were evaluated using bootstrapping with 1,000 resamples. Model fit was judged according to commonly recommended cutoff values for fit indices. Acceptable fit was defined as comparative fit index (CFI) and Tucker–Lewis index (TLI) values greater than .90 [22, 23], together with root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) values lower than .08 [22]. These thresholds were applied to evaluate whether the model adequately represented the data. Finally, path analysis with Mplus 8 was applied to test the mediating influence of achievement emotions on the link between mindfulness and academic performance.

3. Results

3.1 Preliminary findings

Table 1 displays the descriptive statistics of the study variables, reporting their means and standard deviations, along with correlation analysis results. The overall mindfulness score, along with its three subscales, exceeded the midpoint value of 2.00, with awareness displaying the highest mean (M = 2.87, SD = .50). Regarding the achievement emotions, participants demonstrated greater endorsement of positive emotions (M = 3.61, SD = .50) than of negative ones (M = 2.49, SD = .60).

The correlational findings revealed that higher mindfulness was associated with greater positive achievement emotions (r = .580, $p < .001$), while mindfulness showed a negative relationship with negative achievement emotions (r = −.473, $p < .001$). Additionally, each of the three mindfulness subscales demonstrated a similar pattern, being positively linked to positive achievement emotions and inversely related to negative achievement emotions. Academic performance correlated positively with mindfulness (r = .151, $p < .05$) and positive achievement emotions (r = .143, $p < .05$), but negatively with negative achievement emotions (r = −.220, $p < .001$).

Table 1. Descriptive statistics and correlations among the study variables (N = 203)

Variables	1	1.1	1.2	1.3	2	3	4
1. Mindfulness	1						
1.1. Attention	.806**	1					
1.2. Awareness	.785**	.392**	1				
1.3. Acceptance	.663**	.300**	.386**	1			
2. Positive achievement emotions	.580**	.460**	.435**	.424**	1		
3. Negative achievement emotions	−.473**	−.402**	−.282**	−.401**	−.544**	1	
4. Academic performance	.151*	.238**	.001	.073	.143*	−.220**	1
Mean	2.83 [a]	2.80 [a]	2.87 [a]	2.83 [a]	3.61 [b]	2.49 [b]	3.84 [c]
SD	.44	.59	.50	.73	.50	. 60	1.09

Note. SD = Standard deviation. [a] Possible range = 1−4; [b] Possible range = 1−5; [c] Possible range = 1−6.
* $p < .05$, ** $p < .001$.

3.2 Relationships among mindfulness, achievement emotions, and academic performance (Research question 1)

SEM was conducted with Mplus 8 to examine the interrelationships among mindfulness, achievement emotions, and academic performance in nursing students. As shown in Figure 1, the path coefficients estimate the impact of mindfulness on both achievement emotions and academic performance. As a fully saturated model, it produced optimal fit indices of CFI = 1.000, RMSEA = 0.000, TLI = 1.000, and SRMR = 0.000, suggesting that the model fit the observed data perfectly.

Findings from the SEM analysis presented that mindfulness showed a positive correlation with positive achievement emotions (β = .402, $p < .001$) while exhibiting a negative association with negative achievement emotions (β = −.423, $p < .001$). Furthermore, positive achievement emotions were found to enhance academic performance (β = .247, $p < .001$), whereas negative achievement emotions had an adverse effect (β = −.181, $p < .05$). However, mindfulness showed no statistically significant effect on academic performance.

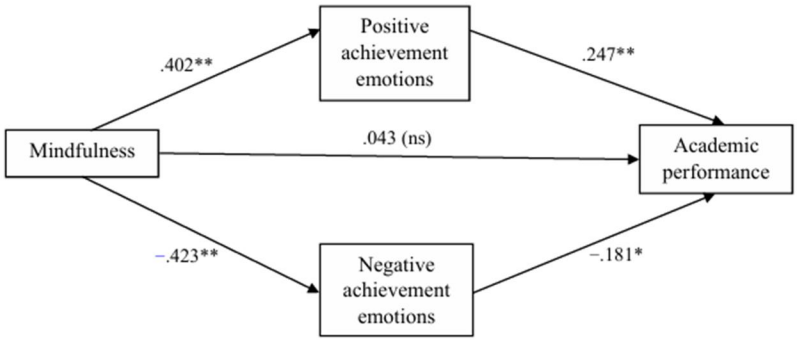

Figure 1. Structural equation model presenting parameter estimates for mindfulness effects on achievement emotions and academic performance. * $p < .05$. ** $p < .001$.

3.3 Mediating role of achievement emotions (Research question 2)

This study explored whether achievement emotions would serve as a mediator in the association between mindfulness and academic performance in nursing students through mediation analysis. Baron and Kenny [24] outlined specific conditions for mediation, emphasizing that significant associations must exist: (1) between an independent and a dependent variable, (2) between an independent variable and a mediator, and (3) between a mediator and a dependent variable. However, alternative perspectives suggest that a direct link between an independent and a dependent variable is not a prerequisite for mediation [25, 26]. These scholars argue that as long as the independent variable significantly influences the mediator, which in turn significantly affects the dependent variable, mediation can still be established. This perspective was applied in conducting the mediation analysis for the present study.

To examine whether achievement emotions mediated the relationship between mindfulness and academic performance, a path analysis was performed with Mplus 8. To increase statistical robustness in identifying direct and indirect effects, a bootstrapping approach with 1,000 resamples was implemented. The results revealed that achievement emotions were the full mediator in this relationship. Table 2 presents a comprehensive overview of the total, direct, and indirect (mediated) effects.

Table 2. Achievement emotions mediating the mindfulness–academic performance relationship (N = 203)

IV	M	DV			Total effect	Direct effect	Indirect effect
			IV→M (a)	M→DV (b)	IV→DV (c)	IV→DV (c′)	IV→M→DV (a X b)
MF	PAE	AP	.402**	.294**	.195*	.077 (ns)	.118*
MF	NAE	AP	−.423**	−.257**	.195*	.087 (ns)	.109*

Note. IV = Independent variable; M = Mediator; DV = Dependent variable; MF = Mindfulness; PAE = Positive achievement emotions; NAE = Negative achievement emotions; AP = Academic performance. Standardized coefficients are presented. * $p < .01$. ** $p < .001$.

The findings demonstrated that achievement emotions had a pivotal influence on the relationship between mindfulness and academic performance. Regarding positive achievement emotions, mindfulness was found to significantly enhance these emotions (a =.402, $p < .001$), which in turn positively influenced academic performance (b = .294, $p < .001$). After controlling for the effect of positive achievement emotions, the direct path from mindfulness to academic performance was attenuated (c′= .077, ns) compared with the total effect (c = .195, $p < .01$). The mediating influence of positive achievement emotions was found to be significant (a X b = .118, $p < .01$), and the direct link between mindfulness and academic performance was no longer significant. This indicates that positive achievement emotions acted as a full mediator of the relationship between mindfulness and academic performance in nursing students.

Similarly, the analysis of negative achievement emotions revealed a significant mediating effect. Mindfulness was associated with a reduction in negative achievement emotions (a = −.423, $p < .001$), and lower levels of these negative emotions were linked to better academic performance (b = −.257, $p < .001$). After controlling for the effect of negative achievement emotions, the direct influence of mindfulness on academic performance diminished (c′= .087, ns) compared with the total effect (c = .195, $p < .01$). The mediating pathway via negative achievement emotions was also significant (a X b = .109, $p < .01$), and the direct link between mindfulness and academic performance was no longer significant. This suggests that the link between mindfulness and academic performance was entirely mediated by negative achievement emotions.

4. Discussion

This study explored the structural associations among mindfulness, achievement emotions, and academic performance in nursing students, with specific attention to the mediating role of achievement emotions in the relationship between mindfulness and academic performance. Using SEM, the analysis showed that mindfulness was positively correlated with positive achievement emotions but negatively correlated with negative achievement emotions. Furthermore, positive achievement emotions had a beneficial impact on academic performance, whereas negative achievement emotions were linked to lower academic performance. However, no direct association was found between mindfulness and academic performance. Importantly, achievement emotions served as a complete mediator, meaning that the influence of mindfulness on academic performance was entirely explained through its influence on students' emotions.

For research question 1, first, the finding revealed that mindfulness showed a positive correlation with positive achievement emotions, whereas its association with negative achievement emotions was negative among nursing students. These results are consistent with previous research indicating that mindfulness enhances positive emotions and reduces negative emotions [27, 28]. For example, Brockman et al. [28] found that college students with higher levels of mindfulness exhibited increased positive emotions and lower negative emotions, supporting the overall adaptive nature of mindfulness. Additionally, the present finding reinforces prior research within the nursing field; mindfulness played a significant role in shaping both positive and negative emotions in nursing students [3], [15]; mindfulness programs could effectively reduce negative emotions in nurses while enhancing their emotional well-being and job satisfaction [29]. Furthermore, a recent meta-analysis by Chen et al. [30] confirmed that mindfulness interventions significantly alleviated negative emotions including anxiety, depression, and stress among nursing students. Mindfulness fosters awareness of both external and internal stimuli, enabling individuals to navigate emotional experiences more effectively by cultivating an accepting attitude or mitigating the intensity and frequency of negative emotions [27]. This perspective provides a plausible explanation for the strong association between mindfulness and achievement emotions observed in the current research.

Second, the finding showed a meaningful relationship between achievement emotions and academic performance. Specifically, students who experienced positive achievement emotions tended to perform better academically, whereas those with negative achievement emotions showed poorer academic outcomes. These results corroborate existing literature in nursing education [3], [6], which emphasizes the essential contribution of achievement emotions to students' academic success. The beneficial influence of achievement emotions on academic performance may be understood through Fredrickson's [31] theoretical perspective. In line with her broaden-and-build theory, positive emotions enhance individuals' cognitive flexibility by expanding their thought-action repertoires, enabling them to explore and integrate new information more effectively. This cognitive broadening strengthens problem-solving skills and academic competence, ultimately leading to improved academic performance. Negative achievement emotions, by contrast, may function in the opposite direction, as they consume cognitive resources, hinder concentration, and diminish motivation, thereby impairing academic performance [1, 2]. Given these findings, fostering positive emotional experiences within educational settings becomes essential for enhancing students' academic success.

Third, this study revealed no statistically significant association between mindfulness and academic performance among nursing students, which was unexpected. Several studies have reported that mindfulness enhances cognitive abilities, alleviates stress, and leads to better academic outcomes [3, 4], [16]. However, some studies reported inconsistent findings, showing no meaningful association between mindfulness and academic success [32, 33]. Our findings align with the latter perspective, implying that mindfulness alone may not serve as a major predictor of academic performance in nursing students. One possible explanation for this non-significant relationship is that academic performance is influenced by multiple interrelated factors, including motivation, learning strategies, and external support systems [34]. Furthermore, Shaw et al. [35] pointed out that students with varying levels of mindfulness may misjudge their academic performance, particularly when self-reported measures are used—an issue relevant to the present study. This non-significant finding underscores the intricate relationship between mindfulness and academic performance, suggesting that its impact may vary depending on factors such as students' educational stage, the way mindfulness is practiced, and individual differences [32]. Given these complexities, further research is needed to identify alternative explanations and examine potential mediating or moderating factors that may clarify the role of mindfulness in academic performance.

In addressing research question 2, the path analytic findings revealed that achievement emotions entirely mediated the connection between mindfulness and academic performance. More specifically, mindfulness indirectly enhanced academic performance by fostering positive achievement emotions while simultaneously diminishing negative ones. This mediation effect aligns with prior research, which confirmed that achievement emotions played the role of a mediator in the association between mindfulness and academic outcomes [3]. Our findings suggest that mindfulness is pivotal in enhancing positive achievement emotions while alleviating negative achievement emotions among nursing students, thereby leading to improved academic performance. These findings underscore the advantageous impact of positive emotions and the harmful effect of negative emotions within the mindfulness–academic success association. Since achievement emotions fully mediated this relationship, they entirely accounted for the process through which mindfulness influenced academic performance. This finding also implies that achievement emotions may be a key explanatory mechanism in understanding how mindfulness contributes to academic success [3]. Additionally, the mediation effect emphasizes the value of expanding empirical inquiry into achievement emotions in nursing education and points to the need for training programs designed to enhance nursing students' achievement emotions. In the digital era, these results also provide an empirical basis for designing scalable IT-based interventions such as mobile applications or digital therapeutics that deliver mindfulness training and emotion-focused learning support. Such technology-enabled programs may help students improve achievement emotions in real time and ultimately strengthen learning outcomes.

This study is subject to several limitations that should be noted. First, our sample was limited to nursing students from a single university in Korea; thus, the findings may not be applicable to all nursing students. To enhance the generalizability of the results, future research should involve nursing students from a variety of universities and regions. Another limitation is the cross-sectional design of the study, which prevents us from determining causality in the observed relationships. Longitudinal studies are needed to examine these relationships over time and assess the influence of one variable on another, which is crucial for understanding mediation [36]. Additionally, academic performance was assessed via self-reported midterm grades, which may be vulnerable to recall error and social desirability bias, potentially resulting in over- or under-reporting. Such bias may introduce measurement error, affecting parameter estimates and conclusions about the structural paths. This limitation may also partly explain the nonsignificant association observed between mindfulness and academic performance. For a broader perspective on the connection between mindfulness and academic performance, future studies should utilize more objective measures, such as university admissions and registration data, rather than depending on self-reported data.

5. Conclusions

By incorporating achievement emotions in learning contexts that have been relatively overlooked in nursing research, this study provides meaningful insights into how mindfulness fosters positive achievement emotions, reduces negative achievement emotions, and ultimately enhances academic performance. Given its novel contribution to clarifying the links among mindfulness, achievement emotions, and academic performance, these findings offer a valuable foundation for advancing nursing education.

To further strengthen the implications of this research, future research should explore empirical interventions that cultivate mindfulness and help students regulate their emotions effectively. Considering the significant mediating function of achievement emotions, expanding future research on students' emotions within learning contexts is essential. A deeper investigation into the mechanisms through which emotions influence academic outcomes could provide critical insights into strategies that enhance both emotional well-being and academic performance. Ultimately, this study establishes the groundwork for developing and implementing educational programs that promote mindfulness, foster positive achievement emotions, and optimize learning experiences for nursing students.

Acknowledgements: This research was supported by the Dongshin University research grants.

Conflicts of Interest: The author declares no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

References

[1] R. Pekrun, "The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice," Educ. Psychol. Rev., vol. 18, no. 4, pp. 315–341, Dec. 2006, doi: http://dx.doi.org/10.1007/s10648-006-9029-9.

[2] R. Pekrun, H. W. Marsh, A. J. Elliot, K. Stockinger, R. P. Perry, E. Vogl, T. Goetz, W. A. P. van Tilburg, O. Lüdtke, and W. P. Vispoel, "A three-dimensional taxonomy of achievement emotions," J. Pers. Soc. Psychol., vol. 124, no. 1, pp. 145–178, Jan. 2023, doi: http://dx.doi.org/10.1037/pspp0000448.

[3] M. Lee and K. S. Jang, "Nursing students' meditative and sociocognitive mindfulness, achievement emotions, and academic outcomes: Mediating effects of emotions," Nurse Educ., vol. 46, no. 3, pp. E39–E44, May/Jun. 2021, doi: http://dx.doi.org/10.1097/NNE.0000000000000902.

[4] P. E. Manocchi, "Fostering academic success in nursing students through mindfulness: A literature review," Teach. Learn. Nurs., vol. 12, no. 4, pp. 298–303, Oct. 2017, doi: http://dx.doi.org/10.1016/j.teln.2017.05.002.

[5] P. Ratanasiripong, N. Ratanasiripong, and D. Kathalae, "Biofeedback intervention for stress and anxiety among nursing students: A randomized controlled trial," Int. Schol. Res. Notices, vol. 2012, Art. no. 827972, 2012, doi: http://dx.doi.org/10.5402/2012/827972.

[6] M. Lee, "Relationships between achievement goals, emotions, and academic performance in nursing students," J. Learn.-Cent. Curric. Instr., vol. 20, no. 18, pp. 73–92, Sep. 2020, doi: http://dx.doi.org/10.22251/jlcci.2020.20.18.73.

[7] D. U. Onu and M. C. C. Onyedibe, "Positive and negative affect explains the association between social support and perceived stress among nursing students," Psychol. Health Med., vol. 27, no. 4, pp. 815–822, Apr. 2022, doi: http://dx.doi.org/10.1080/13548506.2021.1891267.

[8] J. Camacho-Morles, G. R. Slemp, R. Pekrun, K. Loderer, H. Hou, and L. G. Oades, "Activity achievement emotions and academic performance: A meta-analysis," Educ. Psychol. Rev., vol. 33, no. 3, pp. 1051–1095, Sep. 2021, doi: http://dx.doi.org/10.1007/s10648-020-09585-3.

[9] J. Kabat-Zinn, "An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results," Gen. Hosp. Psychiatry, vol. 4, no. 1, pp. 33–47, Jan. 1982, doi: http://dx.doi.org/10.1016/0163-8343(82)90026-3.

[10] K. W. Brown, R. M. Ryan, and J. D. Creswell, "Addressing fundamental questions about mindfulness," Psychol. Inq., vol. 18, no. 4, pp. 272–281, 2007, doi: http://dx.doi.org/10.1080/10478400701703344.

[11] P. Barbosa, G. Raymond, C. Zlotnick, J. Wilk, R. Toomey III, and J. Mitchell III, "Mindfulness-based stress reduction training is associated with greater empathy and reduced anxiety for graduate healthcare students," Educ. Health, vol. 26, no. 1, pp. 9–14, Apr. 2013, doi: http://dx.doi.org/10.4103/1357-6283.112794.

[12] M. N. Ahn, "The effect of mindfulness-based stress reduction program on nurses' stress, burnout, sleep and happiness," Ph.D. dissertation, Eulji Univ., Korea, 2017.

[13] Y. S. Choi and M. A. Kim, "The effect of mindfulness-based cognitive therapy program on stress, self-esteem and depression of nursing students," J. Korea Contents Assoc., vol. 19, no. 2, pp. 210–222, Feb. 2019.

[14] F. Lu, Y. Xu, Y. Yu, L. Peng, T. Wu, T. Wang, B. Liu, J. Xie, S. Xu, and M. Li, "Moderating effect of mindfulness on the relationships between perceived stress and mental health outcomes among Chinese intensive care nurses," Front. Psychiatry, vol. 10, p. 260, Apr. 2019, doi: http://dx.doi.org/10.3389/fpsyt.2019.00260.

[15] L. Lin, G. He, J. Yan, C. Gu, and J. Xie, "The effects of a modified mindfulness-based stress reduction program for nurses: a randomized controlled trial," Workplace Health Saf., vol. 67, no. 3, pp. 111–122, Mar. 2019, doi: http://dx.doi.org/10.1177/2165079918801633.

[16] E. B. Yilmaz, "Mindfulness-Based Interventions to Improve Academic Achievement," J. Nurs. Educ., vol. 62, no. 2, pp. e1, Feb. 2023, doi: http://dx.doi.org/10.3928/01484834-20230112-01.
[17] S. H. Hong, J. S. Kim, and D. B. Ju, "The effect of resilience on academic stress and academic achievement in nursing students," J. Korea Converg. Soc., vol. 11, no. 9, pp. 443–450, Sep. 2020.
[18] G. Feldman, A. Hayes, S. Kumar, J. Greeson, and J. P. Laurenceau, "Mindfulness and emotion regulation: the development and initial validation of the cognitive and affective mindfulness scale-revised (CAMS-R)," J. Psychopathol. Behav. Assess., vol. 29, pp. 177–190, 2007, doi: http://dx.doi.org/10.1007/s10862-006-9035-8.
[19] Y. R. Cho, "The reliability and validity of a Korean version of the cognitive and affective mindfulness scale-revised," Korean J. Clin. Psychol., vol. 28, no. 3, pp. 667–693, 2009, doi: http://dx.doi.org/10.15842/kjcp.2009.28.3.002.
[20] R. Pekrun, T. Goetz, and A. C. Frenzel, Achievement Emotions Questionnaire-Mathematics (AEQ-M): User's Manual, Munich, Germany: Univ. Munich, Dept. Psychology, 2005.
[21] L. K. Muthén and B. O. Muthén, Mplus User's Guide, Los Angeles, CA, USA: Muthén & Muthén, 2012.
[22] R. B. Kline, Principles and Practice of Structural Equation Modeling, New York, NY, USA: Guilford Publications, 2023.
[23] C. E. Lance, M. M. Butts, and L. C. Michels, "The sources of four commonly reported cutoff criteria: What did they really say?," Organ. Res. Methods, vol. 9, no. 2, pp. 202–220, Apr. 2006, doi: http://dx.doi.org/10.1177/1094428105284919.
[24] R. M. Baron and D. A. Kenny, "The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations," J. Pers. Soc. Psychol., vol. 51, pp. 1173–1182, 1986, doi: http://dx.doi.org/10.1037//0022-3514.51.6.1173.
[25] A. F. Hayes, "Beyond Baron and Kenny: Statistical mediation analysis in the new millennium," Commun. Monogr., vol. 76, pp. 408–420, Dec. 2009, doi: http://dx.doi.org/10.1080/03637750903310360.
[26] D. D. Rucker, K. J. Preacher, Z. L. Tormala, and R. E. Petty, "Mediation analysis in social psychology: Current practices and new recommendations," Soc. Pers. Psychol. Compass, vol. 5, pp. 359–371, 2011, doi: http://dx.doi.org/10.1111/j.1751-9004.2011.00355.x.
[27] E. S. Blanke, M. J. Schmidt, M. Riediger, and A. Brose, "Thinking mindfully: How mindfulness relates to rumination and reflection in daily life," Emotion, vol. 20, no. 8, pp. 1369–1379, Dec. 2020, doi: http://dx.doi.org/10.1037/emo0000659.
[28] R. Brockman, J. Ciarrochi, P. Parker, and T. Kashdan, "Emotion regulation strategies in daily life: mindfulness, cognitive reappraisal and emotion suppression," Cogn. Behav. Ther., vol. 46, no. 2, pp. 91–113, 2017, doi: http://dx.doi.org/10.1080/16506073.2016.1218926.
[29] S. F. Ghawadra, K. L. Abdullah, W. Y. Choo, and C. K. Phang, "Mindfulness-based stress reduction for psychological distress among nurses: A systematic review," J. Clin. Nurs., vol. 28, no. 21–22, pp. 3747–3758, Nov. 2019, doi: http://dx.doi.org/10.1111/jocn.14987.
[30] X. Chen, B. Zhang, S. X. Jin, Y. X. Quan, X. W. Zhang, and X. S. Cui, "The effects of mindfulness-based interventions on nursing students: A meta-analysis," Nurse Educ. Today, vol. 98, p. 104718, Jan. 2021, doi: http://dx.doi.org/10.1016/j.nedt.2020.104718.
[31] B. L. Fredrickson, "The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions," Am. Psychol., vol. 56, no. 3, pp. 218–226, 2001, doi: http://dx.doi.org/10.1093/oso/9780195135336.003.0009.
[32] H. Alomari, "Mindfulness and its relationship to academic achievement among university students," Front. Educ., vol. 8, p. 1179584, 2023, doi: http://dx.doi.org/10.3389/feduc.2023.1179584.
[33] S. Miralles-Armenteros, R. Chiva-Gómez, A. Rodríguez-Sánchez, and Z. Barghouti, "Mindfulness and academic performance: The role of compassion and engagement," Innov. Educ. Teach. Int., vol. 58, no. 1, pp. 3–13, Jan. 2021, doi: http://dx.doi.org/10.1080/14703297.2019.1676284.
[34] M. Richardson, C. Abraham, and R. Bond, "Psychological correlates of university students' academic performance: A systematic review and meta-analysis," Psychol. Bull., vol. 138, no. 2, pp. 353–387, Mar. 2012, doi: http://dx.doi.org/10.1037/a0026838.
[35] E. J. Shaw and K. D. Mattern, "Examining the accuracy of self-reported high school grade point average," College Board Res. Rep. No. 2009-5, 2009. [Online] Available: https://files.eric.ed.gov/fulltext/ED562616.pdf
[36] D. P. MacKinnon, Introduction to Statistical Mediation Analysis, New York, NY, USA: Erlbaum, 2008.