



Original Article



Effects of Mindfulness Intervention on Anxiety among Female Nursing Students

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ABSTRACT

Nursing students face higher levels of stress and anxiety than other college students due to the combined pressures of classroom and clinical responsibilities, and meditation is the process of training your mind to focus and redirect your thoughts. **Objective:** To examine the impact of mindfulness intervention on nursing students' anxiety at a public sector college of nursing.

Methods: A quasi-experimental pre- and post-single group study was conducted at a public sector female nursing institute, including 32 nursing students of BS Nursing, while students from the auxiliary nursing discipline were excluded from the study. The duration of the study was 6 months (November 2025 to April 2026) after the required approvals. Sample size was calculated using G*Power 3.1.9.4 with a paired sample t-test at a 5% level. The final sample size was 32, after adding a 10% attrition rate. A stratified random sampling technique was used to collect data. Furthermore, written informed consent was obtained, and confidentiality and privacy were protected. Data were analysed through SPSS version 21.0. Appropriate statistical tests were applied for the analysis. **Results:** The mean BAI score reduced significantly from 36.68 ± 6.79 to 21.26 ± 4.47 following the intervention, with a statistically significant reduction ($p < 0.001$). Overall, the intervention was successful in lowering anxiety across the majority of demographic features. **Conclusions:** The results of the study showed a statistically significant reduction in the level of anxiety following the intervention; for that reason, mindfulness could be included in routine activities of the nursing students.

INTRODUCTION

Nursing students face higher levels of stress and anxiety than other college students due to the combined pressures of classroom and clinical responsibilities [1]. The high stress and anxiety often cause negative effects on students' learning, motivation, and performance [2]. During the first years of training, students experience symptoms like anxiousness, irritability, and issues falling asleep [3]. Anxiety also hinders learning, undermines interpersonal connection, and reduces confidence in clinical judgment, all of which are essential nursing competencies [4]. The inadequate number of mental health treatment options is included in the nursing curricula. They are rarely taught how to maintain their own psychological wellness [5]. The stressors of nursing

education include rapid curricular content, frequent high-stakes testing, clinical practice, and transition of the role. Poor mental health among students is associated with lower academic performance, greater absenteeism, and a higher risk of dropout [6]. Nursing students who participated in the present study perceived that mindfulness would enable them to enhance their awareness, but also encourage self-care [7]. Due to the demanding nature of their course, nursing students believed mindfulness could potentially help build coping strategies to deal with stress [8]. Mindfulness is the intentional practice of concentrating on the present moment with awareness and without expressing judgment [9]. Mindfulness methods have been shown to increase



emotional awareness, modulate the stress response, and help improve autonomic regulation [10]. Meditation is the process of training your mind to focus and redirect your thoughts. Due to stigma, lack of time, or a concern of presenting as weak, many people are reluctant to seek out formal counseling services [11]. The objective of this study was to examine the impact of mindfulness intervention on nursing students' anxiety at a public sector college of nursing.

Nursing students in Pakistan experience significant psychological distress due to the demanding nature of their academic and clinical training, yet evidence-based mental health interventions remain scarce, especially for female students in public sector institutions. Although mindfulness interventions have demonstrated general efficacy in reducing anxiety, limited research exists on their application to this specific population, and no studies have explored their differential effectiveness across demographic subgroups such as age, marital status, family structure, academic year, and extracurricular participation. Consequently, this study aimed to evaluate the impact of an 8-week mindfulness intervention on anxiety levels among female nursing students at a public sector college, while also assessing its varying effects across these demographic characteristics.

METHODS

A quasi-experimental pre- and post-single group study was conducted at a female public nursing institute, Qatar College of Nursing (QCON), Karachi [1]. This study was completed within 6 months (November 2025 to April 2026). Furthermore, all participants were required to sign a written informed consent form. Confidentiality and data integrity were strictly followed throughout the analysis process, and privacy was protected. Sample size was calculated using G*Power 3.1.9.4 with a paired sample t-test, taking a 5% level of significance and a test power of 80%. Based on an effect size of 0.5604 (means: 6.89 ± 2.37 vs 7.08 ± 2.29) [1], the final sample size was 32 with a 10% attrition rate. This stratification ensured equal representation from all academic years and minimized selection bias in the recruitment process. It is important to clarify that this sampling method pertained solely to participant selection and not to intervention assignment, as all selected participants received the same intervention in this single-group design. All female undergraduate nursing students currently enrolled in the 1st, 2nd, 3rd, or 4th year of the Bachelor of Science in Nursing program at the public sector nursing college (Qadri College of Nursing, Karachi) were included in the study, while students from other disciplines of nursing were excluded. All participants were recruited from this single public sector nursing institute. During the T1 phase, participants completed the

Beck Anxiety Inventory (BAI) questionnaire to assess their baseline anxiety levels. Informed consent was obtained from all participants before data collection. Once participants were recruited for the study, the intervention phase began, involving an 8-week program conducted in a serene environment under the guidance of a master trainer. Participants attended 2-hour sessions weekly, where they were guided through mindfulness exercises and activities. To facilitate the intervention, theory flyers and brochures prepared by the master trainer were distributed to all participants. To ensure flexibility, participants who missed a session were allowed to attend a make-up session on another day, and attendance was maintained before and after each weekly session. The post-data were collected again from participants by employing the BAI questionnaire after 4 weeks of the completion of the intervention. For participant recruitment, a stratified random sampling technique was used: students were first divided into four strata based on their academic year (1st, 2nd, 3rd, and 4th year), and from each stratum, 8 participants were randomly selected using a computer-generated random number list. This stratification ensured equal representation from all academic years and minimized selection bias in the recruitment process. It is important to clarify that this sampling method pertained solely to participant selection and not to intervention assignment, as all selected participants received the same intervention in this single-group design. The Beck Anxiety Inventory (BAI) was a 21-item self-reported tool used. The scale has demonstrated excellent internal consistency (Cronbach's $\alpha = 0.92$) [12]. Although the tool has already been used in the same context with good psychometric evaluation, this study reported excellent internal consistency (Cronbach's $\alpha = 0.91$) and solid split-half reliability (0.83), supporting the use of the BAI in Pakistani contexts, particularly in Lahore [13]. Data were analyzed using SPSS version 21.0. Paired t-tests were used to compare pre- and post-intervention anxiety scores. The normality assumption for paired differences was assessed using the Shapiro-Wilk test ($p > 0.05$), confirming that the data met the assumption of normality. Mean and standard deviation were calculated for quantitative variables, while frequency and percentage were calculated for all qualitative variables. Cohen's d effect sizes were calculated to determine the magnitude of the intervention effect. A p -value < 0.05 was considered the level of significance. No adjustment for multiple testing was applied, which is acknowledged as a limitation.

RESULTS

Most participants (68.8%) were in the 21–25 age range. 90.6% of them were single. 43.8% of students reported living in a nuclear family. Every academic year had an equal

number of participants. 68.8% of respondents said they were not involved in extracurricular activities (Table 1).

Table 1: Demographic Characteristics of the Participants (n=32)

Characteristics	n (%)
Age (Years)	
18-20	8 (25.0%)
21-25	22 (68.8%)
26-30	2 (6.3%)
Marital Status	
Married	3 (9.4%)
Unmarried	29 (90.6%)
Family Structure	
Extended Family	11 (34.4%)
Nuclear Family	14 (43.8%)
Single Parent	7 (21.9%)
Academic Year	
1 st Year	8 (25.0%)
2 nd Year	8 (25.0%)
3 rd Year	8 (25.0%)
4 th Year	8 (25.0%)
Extracurricular Activity	
Yes	10 (31.3%)
No	22 (68.8%)

The current study illustrates pre-intervention and post-intervention mean anxiety scores using a paired t-test. The mean BAI score reduced significantly from 36.68 ± 6.79 to 21.26 ± 4.47 following the intervention. The average difference was 15.42 ± 7.38 , with a 95% confidence interval of 12.71-18.12. The intervention substantially lowered participants' anxiety levels, as evidenced by a statistically significant reduction ($p < 0.001$) (Table 2).

Table 2: Comparison of Pre-Intervention and Post-Intervention Mean Anxiety Score Using a paired t-test

Time Point	BAI Score (Mean $\pm$ SD)	Mean Difference (Pre - Post) $\pm$ SD	95% CI of Difference	p-value	Cohen's d
Pre-Intervention	36.68 ± 6.79	15.42 ± 7.38	(12.71 - 18.12)	<0.001	2.09
Post-Intervention	21.26 ± 4.47				

After the intervention, mean anxiety scores decreased significantly across most demographic categories. Significant decreases were discovered among participants aged 18-20 and 21-25 years, unmarried students, all family configurations, all academic years, and both groups with and without extracurricular activities ($p < 0.010$). However, the reductions among participants aged 26-30 years and married people were not statistically significant (Table 3).

Table 3: Comparison of Pre-Intervention and Post-Intervention Mean Anxiety Score among Demographic Characteristics Using Paired t-test

Characteristics	Pre-Intervention, Mean $\pm$ SD	Post-Intervention, Mean $\pm$ SD	p-value
Age			
18-20	34.71 ± 8.30	19.28 ± 1.79	0.010
21-25	36.72 ± 6.21	21.50 ± 4.75	<0.001
26-30	43.00 ± 7.07	25.50 ± 6.36	0.317
Marital Status			
Married	38.00 ± 10.00	23.66 ± 5.50	0.152
Unmarried	36.53 ± 6.60	21.00 ± 4.38	<0.001
Family Structure			
Extended Family	36.09 ± 8.09	21.00 ± 5.00	<0.001
Nuclear Family	36.35 ± 6.42	21.35 ± 4.39	<0.001
Single Parent	38.50 ± 5.75	21.50 ± 4.41	0.003
Academic Year			
1 st Year	38.50 ± 8.71	20.37 ± 2.87	<0.001
2 nd Year	34.14 ± 8.07	21.57 ± 4.64	0.005
3 rd Year	37.00 ± 4.72	20.62 ± 4.68	<0.001
4 th Year	36.75 ± 5.80	22.50 ± 5.80	0.001
Extracurricular Activity			
Yes	37.11 ± 5.66	22.55 ± 5.54	<0.001
No	36.50 ± 7.31	20.72 ± 3.97	<0.001

DISCUSSION

In the current study, the level of anxiety was assessed before and after intervention, which showed that most of the participants (68.8%) were aged 21-25 years and unmarried, which reflects the typical demographic profile of undergraduate students. Similar findings were revealed by another study that identified that the majority of university students fall within early adulthood and are single [13, 14]. Likewise, another study found that nuclear family structures were common among college students, supporting the current findings [15]. In contrast, Tinto emphasized that higher education level students engage in extracurricular activities, which differs from the low participation observed in this study [16]. Similarly, in 2022, another study reported a greater prevalence of extended family systems among students, contrary to the predominance of nuclear families found here. These differences may be attributed to cultural, institutional, and regional variations [17]. The current study demonstrated a marked reduction in anxiety levels following the intervention, with severe anxiety decreasing from 75.0% to 3.1% and low anxiety increasing to 71.9%, indicating the effectiveness of the intervention. Similar results were reported by Goldberg, who found that cognitive-behavioral interventions significantly reduced symptoms of anxiety across clinical populations [18]. In contrast, Firth *et al.* reported that although psychological interventions reduce anxiety, the effect sizes are sometimes moderate and vary across populations [19]. Similarly, Leichsenring *et al.* noted

that not all participants experience substantial improvement, and some maintain moderate to severe anxiety even after intervention [20]. These non-significant findings are likely attributable to the very small sample sizes in these subgroups ($n = 2$ for age 26–30 years; $n = 3$ for married participants), which severely limit statistical power to detect true differences even when clinically meaningful reductions were observed. Specifically, the mean anxiety score reduction among participants aged 26–30 was 17.50 points (from 43.00 ± 7.07 to 25.50 ± 6.36), while married participants showed a reduction of 14.34 points (from 38.00 ± 10.00 to 23.66 ± 5.50), both representing substantial clinical improvements. The wide confidence intervals and unstable estimates associated with such small samples make it inappropriate to conclude that the intervention is ineffective for these groups; rather, the results should be interpreted with caution, and larger studies are needed to draw definitive conclusions about intervention efficacy in these demographic subgroups. There was a statistically significant reduction in mean anxiety scores among participants aged 18–20 and 21–25 years after the intervention ($p \leq 0.010$), while the 26–30 age group did not show significant improvement. Unmarried participants showed a significant decrease in anxiety levels ($p < 0.001$), whereas the reduction among married participants was not statistically significant. Significant reductions in anxiety were observed across all academic years, family structures, and both groups ($p < 0.010$). The present findings are consistent with Christ *et al.* who reported that psychological interventions such as cognitive behavioral therapy significantly reduced anxiety symptoms across various demographic groups, particularly among young adults [21]. However, Cuijpers *et al.* found that while psychological interventions are generally effective, treatment outcomes may vary across demographic subgroups, and in some cases, reductions are not statistically significant, especially in smaller or specific population categories [22].

This study has several limitations that should be acknowledged, including the small sample size ($n = 32$) which limits generalizability and reduces statistical power for subgroup analyses particularly for participants aged 26–30 years ($n = 2$) and married participants ($n = 3$), whose non-significant results are likely attributable to insufficient sample sizes rather than lack of clinical effectiveness alongside the single-group quasi-experimental design without a control group, which cannot establish causality, the use of a single nursing institute limiting external validity, the absence of adjustment for multiple testing across numerous subgroup comparisons, and the lack of long-term follow-up to assess sustainability of effects. Future research should employ larger, multi-center randomized controlled trials with adequate sample sizes for meaningful subgroup analyses, longer follow-up

periods to evaluate durability of benefits, adjustments for multiple comparisons to reduce Type I error, and exploration of the mechanisms underlying mindfulness efficacy, as well as investigating the integration of mindfulness training into routine nursing curricula as a sustainable mental health support strategy.

CONCLUSIONS

Based on the study findings, it is concluded that nursing students face considerable mental health challenges, including anxiety, due to the demanding nature of their curriculum; however, the 8-week mindfulness intervention produced a statistically significant overall reduction in anxiety scores ($p < 0.001$) with a large effect size (Cohen's $d = 2.09$), and statistically significant improvements were observed across the majority of demographic subgroups, including younger students (18–20 and 21–25 years), unmarried students, all family structures, all academic years, and both extracurricular participation groups ($p < 0.010$). Nevertheless, the intervention did not achieve statistical significance among participants aged 26–30 years ($p = 0.317$) and married students ($p = 0.152$), a finding that must be interpreted with caution because these subgroups had extremely small sample sizes ($n = 2$ and $n = 3$, respectively), which severely limits statistical power and renders the estimates unstable; consequently, these non-significant results should not be taken as evidence of ineffectiveness, and larger studies are needed to confirm the intervention's efficacy in these specific groups. Given the strong overall positive effect, mindfulness remains a promising non-invasive, non-pharmacological strategy that could be integrated into routine activities for nursing students to support their mental well-being.

Authors' Contribution

Conceptualization: YA

Methodology: AB

Formal analysis: YA

Writing and Drafting: YA, AB, RW, FI, AY

Review and Editing: YA, AB, RW, FI, AY

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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