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The Effectiveness of a Mindfulness Intervention on Mental Well-Being among Intensive Care Unit Nurses

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ABSTRACT

This study aimed to determine the effectiveness of a mindfulness intervention in improving mental well-being among intensive care unit nurses at Imam Hospital in Ahvaz. This applied quasi-experimental clinical study employed a pretest–posttest design with a control group. The statistical population consisted of nurses working in the intensive care units of Imam Hospital in Ahvaz in 2025. Using purposive sampling, 40 eligible nurses were selected and assigned to an experimental group (n = 20) and a control group (n = 20). The experimental group participated in eight 90-minute group mindfulness sessions based on the mindfulness approach of Jon Kabat-Zinn, conducted twice weekly, while the control group remained on a waiting list. Mental well-being was assessed using the 18-item short form of the Ryff Psychological Well-Being Scale. The scale demonstrated acceptable internal consistency in the present study (Cronbach's α = .82). Data were analyzed using descriptive statistics, the Kolmogorov–Smirnov test, Levene's test, and univariate analysis of covariance in SPSS version 21. The significance level was set at $p < .05$. Analysis of covariance showed that, after controlling for pretest mental well-being scores, there was a statistically significant difference between the experimental and control groups in posttest mental well-being, $F = 236.37$, $p < .001$, partial $\eta^2 = .87$. The direction of the adjusted group difference indicated that nurses who received the mindfulness intervention achieved significantly higher posttest mental well-being scores than nurses in the control group, demonstrating a very large intervention effect. The findings indicate that a structured mindfulness intervention is effective in improving mental well-being among intensive care unit nurses and may be considered a useful psychological approach for promoting positive mental functioning in demanding clinical environments.

Keywords: Mindfulness, Mental Well-Being, Psychological Well-Being, Intensive Care Unit, Nurses, Mindfulness Intervention

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Introduction

Nursing is a profession characterized by continuous interpersonal engagement, substantial clinical responsibility, rapid decision-making, and sustained exposure to emotionally demanding situations. These occupational demands become particularly pronounced in intensive and critical care settings, where nurses are routinely responsible for patients with severe, unstable, or life-threatening conditions and must simultaneously manage complex technologies, time-sensitive interventions, communication with distressed families, and multidisciplinary coordination. Under such circumstances, maintaining psychological equilibrium is not only important for the personal health of nurses but also for the continuity, safety, and quality of nursing care. Accordingly, increasing attention has been directed toward positive indicators of

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mental health, particularly mental well-being, rather than limiting occupational health research to the identification of distress, exhaustion, or psychopathology. Mental well-being reflects a positive and multidimensional state in which individuals experience psychological functioning, meaningful engagement, adaptive relationships, purposeful living, self-acceptance, and an ability to manage environmental demands. Within nursing, these capacities are especially relevant because sustained professional functioning depends on the ability to remain attentive, emotionally regulated, relationally available, and psychologically resilient in the presence of persistent workplace pressure (1, 2).

Mental well-being should therefore be viewed as more than the absence of psychological problems. Contemporary positive psychological perspectives conceptualize well-being as a dynamic process involving effective functioning, personal development, adaptive emotional experience, a sense of purpose, and constructive relationships with others. Psychological well-being is frequently discussed through dimensions such as autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance, all of which may be directly relevant to nurses who must function independently while remaining integrated within highly interdependent clinical teams. Evidence from health, educational, and caregiving populations increasingly suggests that well-being can be modified through psychological interventions rather than being regarded as a fixed personal attribute. For example, interventions based on mindfulness and related contemplative processes have been associated with improvements in various dimensions of psychological functioning across different populations, including adults, adolescents, caregivers, and clinical groups (3-6). These findings are important for occupational groups such as nurses because they imply that well-being can potentially be strengthened through structured and teachable psychological skills.

Among nursing personnel, the need to support well-being is intensified by the distinctive emotional and cognitive demands of clinical practice. Nurses are often required to sustain attention during long or irregular shifts, respond rapidly to changing patient conditions, regulate their own emotional reactions while supporting patients and families, and maintain professional standards even under substantial workload. Intensive care nurses encounter an especially concentrated form of these pressures because their clinical environment is defined by high patient acuity, frequent uncertainty, sophisticated monitoring, demanding procedures, and a persistent requirement for vigilance. Such conditions may disrupt opportunities for psychological recovery and make deliberate self-care particularly important. Self-care in nursing has increasingly been framed as a professional necessity rather than an optional personal practice because nurses' capacity to care effectively for others is closely related to their own psychological and physical functioning (1). Consequently, interventions that can be integrated into the professional lives of nurses and that strengthen awareness, emotional balance, and adaptive psychological functioning warrant systematic evaluation.

Mindfulness has emerged as one of the most widely investigated approaches for promoting psychological well-being in both clinical and nonclinical populations. Broadly defined, mindfulness involves intentionally attending to present-moment experiences with openness, acceptance, and a reduced tendency toward automatic judgment or reactivity. Rather than attempting to suppress thoughts or eliminate difficult emotions, mindfulness practices train individuals to recognize internal and external experiences as they arise and to respond to them with greater awareness and psychological flexibility. This orientation may help individuals move away from habitual patterns of automatic functioning and toward more deliberate and

adaptive responses. Mindfulness can be developed through structured practices such as attention to breathing, body scanning, sitting meditation, mindful movement, and the intentional application of present-moment awareness to daily activities. Recent studies across different contexts have linked mindfulness to improved psychological well-being, more adaptive emotional functioning, and healthier forms of self-regulation (7-9).

The theoretical relevance of mindfulness to well-being can be understood through several complementary mechanisms. First, mindfulness strengthens attentional regulation by helping individuals notice when attention has become dominated by worries, automatic reactions, or emotionally charged thoughts and redirect it toward current experience. Second, it promotes decentering, through which thoughts and emotions are perceived as transient psychological events rather than as absolute representations of reality. Third, the acceptance-oriented component of mindfulness may reduce the struggle against unpleasant internal experiences and thereby conserve psychological resources. Fourth, regular mindfulness practice may facilitate greater cognitive flexibility, allowing individuals to consider alternative interpretations and responses rather than relying on rigid habitual patterns. Evidence has linked mindfulness with cognitive flexibility and psychological well-being, suggesting that these capacities may operate together in supporting healthier adjustment (7). Mindfulness has also been associated with relational functioning, indicating that its potential benefits extend beyond intrapersonal regulation to the quality of interpersonal engagement and mutual responsiveness (8, 9).

The potential value of mindfulness is particularly relevant in professions where individuals must remain mentally present under demanding conditions. In nursing, lapses in attention, emotional overload, and persistent cognitive preoccupation can interfere with both personal well-being and professional functioning. Mindfulness practices offer a relatively accessible method for strengthening present-centered awareness during clinical work. Findings from nursing students and future nurses indicate that mindfulness is positively associated with psychological well-being and may interact with other protective resources such as resilience, self-efficacy, and social support (2, 10). Research among senior nursing students has similarly suggested that mindfulness-based activities may improve dimensions of well-being while reducing maladaptive psychological responses during demanding phases of professional education (11). These findings are important because the pressures experienced during nursing education may continue and intensify after entry into clinical practice, particularly within highly demanding hospital units.

Empirical research specifically involving practicing nurses provides further support for mindfulness-based approaches. Systematic reviews examining mindfulness-based interventions among nurses have generally reported beneficial effects on psychological outcomes and have emphasized the potential of such interventions to enhance professional well-being (12, 13). Although intervention protocols, settings, and outcome measures vary across studies, the overall literature indicates that structured mindfulness training can provide nurses with practical strategies for attending to difficult experiences without becoming overwhelmed by them. Similarly, an integrative review of mindfulness-based stress reduction for nurses concluded that mindfulness programs may have considerable value in supporting the psychological health of nursing personnel and in promoting sustainable professional functioning (14). The relevance of these findings extends to intensive care environments, where nurses may particularly benefit from skills that

facilitate attentional stability, emotional regulation, and recovery from repeated periods of high clinical demand.

Technology-assisted and flexible mindfulness programs have also demonstrated that mindfulness principles can be delivered through different formats. A qualitative investigation of a mobile mindfulness intervention among emergency department staff found that mindfulness was perceived as a potentially useful strategy for improving stress management and well-being in a demanding acute-care environment (15). The significance of this finding lies in the similarity between emergency and intensive care environments with respect to unpredictability, rapid decision-making, and sustained demands on attention. Likewise, the development of mindfulness-based psychoeducational applications for parents and caregivers suggests that mindfulness principles can be adapted to populations experiencing sustained caregiving demands and incorporated into practical, user-centered formats (4). Although face-to-face group programs remain a central format for mindfulness interventions, these developments reinforce the broader proposition that mindfulness skills can be learned and used across demanding life and occupational contexts.

The association between mindfulness and well-being has also been supported outside nursing populations, strengthening the plausibility of its broader psychological effects. Mindfulness-based programs have produced improvements in psychological well-being among menopausal women in randomized intervention research (5). Mindfulness-based cognitive therapy has likewise demonstrated beneficial effects on psychological well-being in populations facing substantial psychosocial adversity (16). Among patients with cancer, mindfulness-based stress reduction has been associated with improvements in psychological well-being alongside reductions in distress-related outcomes (17). Meta-analytic evidence involving older adults has further indicated that mindfulness interventions can contribute to mental health and well-being across later life (6). Collectively, these findings suggest that mindfulness may exert positive effects across heterogeneous demographic and clinical groups, lending support to its potential applicability among healthcare professionals exposed to demanding occupational conditions.

Research among younger and nonclinical populations similarly indicates that the benefits of mindfulness may extend beyond symptom-focused outcomes toward broader enhancement of well-being. A universal mindfulness program evaluated in adolescents has provided evidence regarding the role of mindfulness training in promoting positive well-being within a preventive framework (3). School-based mindfulness interventions have also been investigated as strategies for addressing contemporary psychological pressures while enhancing well-being (18). In addition, a quasi-experimental study of a mindfulness-based social and emotional learning curriculum reported beneficial effects on well-being among pre-service teachers, suggesting that mindfulness may be particularly useful in professions requiring sustained interpersonal engagement and emotional labor (19). These studies reinforce the view that mindfulness should not be understood solely as a treatment technique for clinical symptoms; it may also serve as a positive psychological intervention intended to strengthen adaptive functioning and quality of life.

An important feature of mindfulness is its capacity to be integrated with embodied and behavioral practices. Mindful attention is not restricted to seated meditation but can be cultivated through movement, breathing, sensory awareness, and deliberate engagement with everyday activities. Recent reviews of embodied mindfulness interventions have emphasized that movement-based approaches may support

mental well-being through increased bodily awareness, attentional engagement, and emotional integration (20). This perspective is particularly relevant for nurses, whose work is physically active and whose opportunities for lengthy formal meditation practices may be constrained by shift schedules. The cultivation of brief, portable mindfulness skills may allow principles learned in structured sessions to be transferred into routine clinical activities, such as hand hygiene, medication preparation, patient monitoring, communication, or brief periods between procedures.

Mindfulness may also support well-being by increasing tolerance for uncertainty and reducing the tendency to become psychologically absorbed in uncontrollable future outcomes. Clinical nursing, and intensive care nursing in particular, involves substantial uncertainty regarding patient trajectories, treatment responses, and unexpected deterioration. Research linking mindfulness with greater tolerance of ambiguity and improved psychological functioning suggests that present-moment awareness may help individuals remain psychologically grounded when outcomes cannot be fully predicted or controlled (21). In intensive care contexts, this ability may be especially valuable because nurses frequently operate in conditions where they must act competently without certainty, maintain therapeutic communication despite rapidly changing circumstances, and continue providing care after difficult clinical encounters.

The relational dimension of well-being is another reason mindfulness may be relevant to nursing practice. Nursing is inherently interpersonal, and psychological well-being is partly sustained through the quality of relationships with colleagues, patients, and family members. Mindfulness may improve interpersonal functioning by increasing attentiveness during interactions, reducing automatic defensive responses, and strengthening the capacity to notice emotional cues without immediately reacting to them. Research examining relationship-specific mindfulness has indicated meaningful associations between mindfulness and psychological as well as relational well-being (8). Similarly, evidence suggests that the relationship between mindfulness and interpersonal outcomes can depend on the well-being of both individuals involved, emphasizing the reciprocal nature of mindfulness, well-being, and relational processes (9). For nurses, these processes may contribute to more constructive teamwork and more attentive communication within complex care environments.

Despite the growing international evidence supporting mindfulness, important contextual and methodological gaps remain. Much of the existing literature has focused on nursing students, general nursing populations, patients, caregivers, adolescents, or other occupational groups rather than nurses working specifically in intensive care units (10-12, 14). Additionally, studies differ substantially in intervention length, delivery format, mindfulness content, and the psychological outcomes examined. Some investigations have prioritized distress-related outcomes, whereas fewer have treated positive mental well-being as the primary endpoint. This distinction is important because reducing psychological distress does not necessarily imply a corresponding increase in positive functioning. A nurse may experience fewer negative psychological symptoms while still reporting limited purpose, personal growth, autonomy, environmental mastery, or positive interpersonal functioning. Direct assessment of mental well-being is therefore required to determine whether mindfulness interventions promote positive psychological functioning rather than merely attenuating adverse experiences.

The available evidence also supports the need for context-specific evaluations in different healthcare systems and cultural settings. Intervention effects observed in one workforce or country cannot

automatically be assumed to generalize to nurses working under different staffing patterns, organizational structures, professional expectations, and cultural norms. Iranian nurses working in intensive care units may face a combination of high patient acuity, demanding schedules, institutional pressures, family responsibilities, and limited opportunities for structured psychological self-care. A culturally and professionally relevant evaluation of mindfulness in this population can therefore contribute evidence that is directly applicable to nursing practice and hospital-based health promotion. The positive findings reported across nursing and non-nursing populations provide a strong theoretical and empirical rationale for such an intervention, but direct investigation remains necessary to establish whether a structured mindfulness program produces measurable improvements in mental well-being among intensive care nurses (13, 15, 16, 20).

Accordingly, the aim of the present study was to determine the effectiveness of a mindfulness intervention in improving mental well-being among intensive care unit nurses at Imam Hospital in Ahvaz.

Methods and Materials

Study Design and Participants

The present study was an applied clinical intervention study conducted using a quasi-experimental pretest–posttest design with a control group. The independent variable was a mindfulness-based intervention, and the dependent variable was mental well-being. The statistical population consisted of all male and female nurses working in the intensive care units of Imam Hospital in Ahvaz, Iran, during 2025. From this population, 40 eligible nurses were selected through purposive sampling and allocated into two equal groups consisting of 20 participants in the experimental group and 20 participants in the control group. The sample included 20 women and 20 men, with an equal gender distribution in both groups; thus, each group consisted of 10 women and 10 men. Participants were between 25 and 50 years of age. In terms of educational attainment, 12 participants (60%) in the experimental group and 13 participants (65%) in the control group held bachelor's degrees, whereas 8 participants (40%) in the experimental group and 7 participants (35%) in the control group held master's degrees. Regarding marital status, 14 participants (70%) in the experimental group and 13 participants (65%) in the control group were married, while 6 participants (30%) and 7 participants (35%), respectively, were single. The age and work-experience distributions were also generally comparable between the two groups. Eligibility criteria included providing informed consent to participate in the study, being between 25 and 50 years of age, working as a nurse in an intensive care unit of Imam Hospital in Ahvaz, completing the required self-report measure, obtaining a score above the mean on the screening measure, and having the ability and commitment to participate in the intervention sessions. The exclusion criteria included incomplete completion of the study questionnaire, receipt of psychological or counseling services during the previous six months, simultaneous participation in another psychological or educational intervention, absence from more than two intervention sessions, the presence of significant medical conditions that could interfere with participation, use of psychiatric medications, and use of addictive substances. Following acquisition of the necessary administrative permissions and coordination with Imam Hospital, eligible nurses were identified according to the inclusion and exclusion criteria, informed about the purpose and procedures of the study, and invited to participate voluntarily. Before the intervention, both groups completed the pretest assessment. The experimental group

subsequently received eight group-based mindfulness intervention sessions, whereas the control group was placed on a waiting list and did not receive the intervention during the study period. After completion of the intervention, the mental well-being measure was administered again to both groups as the posttest. Ethical principles were observed throughout the research process. Participants received sufficient information concerning the study objectives, procedures, and voluntary nature of participation before enrollment. Written and verbal informed consent was obtained from all participants, confidentiality of personal information and questionnaire responses was guaranteed, and participants were informed that they could withdraw from the study at any stage without any penalty or adverse consequence. No deception was used, and all collected information was used exclusively for research purposes.

Data Collection Tools

Mental well-being was assessed using the short form of the Ryff Psychological Well-Being Scale, originally developed by Ryff and subsequently revised as a brief version of the original 120-item instrument. The short form consists of 18 items and assesses six dimensions of psychological well-being: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. Each dimension is represented by three items. Responses are scored on a six-point Likert scale ranging from 1 for "strongly disagree" to 6 for "strongly agree," with items 1, 4, 5, 8, 15, 16, 17, and 18 reverse-scored. Autonomy is assessed by items 9, 12, and 18; environmental mastery by items 1, 4, and 6; personal growth by items 7, 15, and 17; positive relations with others by items 3, 11, and 13; purpose in life by items 5, 14, and 16; and self-acceptance by items 2, 8, and 10. Higher total scores indicate a higher level of psychological or mental well-being, whereas lower scores indicate poorer well-being. Previous psychometric evaluations have supported the validity and reliability of the scale. Ryff and Singer reported correlations ranging from 0.70 to 0.89 between the short form and the longer 84-item version. Evidence from Iranian samples has also supported the factorial validity and internal consistency of the instrument, with acceptable reliability coefficients reported for its dimensions and total score. In the present study, the internal consistency of the Mental Well-Being Scale was assessed using Cronbach's alpha, and a coefficient of 0.82 was obtained, indicating satisfactory reliability for the study sample.

Intervention

The experimental group participated in an eight-session group mindfulness intervention based on the mindfulness approach developed by Jon Kabat-Zinn. Sessions were conducted twice weekly, with each session lasting approximately 90 minutes. The first session focused on orientation to mindfulness and recognizing automatic patterns of functioning. Participants were introduced to fundamental mindfulness attitudes, including nonjudgment, acceptance, patience, and present-moment awareness, as well as the distinction between the "being" and "doing" modes of mind. A body-scan exercise was introduced to increase awareness of bodily sensations, and participants were asked to practice the body scan for approximately 30–45 minutes per day and record relevant bodily, cognitive, and emotional experiences. The second session emphasized increased awareness of bodily sensations and breathing. Previous exercises were reviewed, more advanced body-scan practice was conducted, and participants learned to use the breath as an attentional anchor while identifying common obstacles to mindfulness practice, such as boredom, drowsiness,

distraction, and resistance. Participants were also encouraged to bring mindful awareness to ordinary daily activities, including eating, walking, and routine nursing-related experiences. The third session focused on awareness of thoughts and development of cognitive distancing. Participants learned to recognize thoughts as transient mental events rather than objective facts and practiced sitting meditation in which thoughts were observed without judgment, suppression, or attempts to change them. The fourth session addressed mindful responses to occupational and daily stress. Participants were introduced to the cycle of stress involving triggering events, appraisal, and automatic reactions and were trained in the three-minute breathing space as a strategy for moving from automatic responding toward deliberate and mindful responding. They were encouraged to apply this practice when encountering stressful situations and to observe changes in their emotional and behavioral reactions. The fifth session focused on acceptance and emotional awareness. Participants practiced attending to the bodily manifestations of difficult emotions, remaining present with unpleasant experiences without avoidance or excessive reactivity, and recognizing the changing and temporary nature of emotional states. The sixth session was devoted to mindful communication and enhancement of interpersonal functioning. Participants practiced mindful listening and speaking, examined habitual interpersonal reactions and conflict patterns, and were encouraged to apply mindful listening during interactions with colleagues, patients, and family members. The seventh session introduced self-compassion and self-care within the mindfulness framework. Loving-kindness meditation and compassionate awareness were practiced to encourage a more supportive and accepting relationship with one's internal experiences and to strengthen adaptive self-care in demanding professional circumstances. The eighth and final session integrated the skills acquired throughout the intervention. Participants reviewed the principal mindfulness practices, reflected on personal changes experienced during the program, identified the practices that were most useful to them, and developed individualized plans for maintaining regular mindfulness practice after completion of the intervention. The posttest assessment was administered after completion of the eighth session. Throughout the intervention period, the control group remained on a waiting list and received no mindfulness training as part of the study.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 21. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were calculated to summarize the demographic characteristics of the participants and their mental well-being scores at the pretest and posttest stages. Before conducting the main inferential analysis, the relevant statistical assumptions were evaluated. The normality of the distribution of scores was examined using the Kolmogorov–Smirnov test, and homogeneity of variances between the experimental and control groups was assessed using Levene's test. Cronbach's alpha coefficient was calculated to examine the internal consistency of the study instrument. To evaluate the effectiveness of the mindfulness intervention on posttest mental well-being while statistically controlling for baseline differences in pretest scores, univariate analysis of covariance (ANCOVA) was employed. In this analysis, the posttest mental well-being score was treated as the dependent variable, group membership as the independent variable, and the corresponding pretest score as the covariate. This procedure allowed comparison of adjusted posttest means between the experimental and control groups after removing the influence of baseline scores. The statistical significance level for all inferential analyses was set at $p < .05$.

Findings and Results

Descriptive analyses were first conducted to examine changes in mental well-being scores across the pretest and posttest assessments in the experimental and control groups. Means and standard deviations were calculated separately for each group and assessment stage. As shown in Table 1, the two groups had relatively similar mental well-being scores at baseline, whereas a noticeable increase was observed in the experimental group following the mindfulness intervention.

Table 1. Mean and Standard Deviation of Mental Well-Being Scores in the Experimental and Control Groups at Pretest and Posttest

Assessment	Experimental Group, M	Experimental Group, SD	Control Group, M	Control Group, SD
Pretest	47.80	3.28	46.50	2.94
Posttest	55.85	4.54	47.00	3.17

As presented in Table 1, the mean mental well-being score of the experimental group increased from 47.80 (SD = 3.28) at pretest to 55.85 (SD = 4.54) at posttest. In contrast, the control group's mean score showed only a slight change, increasing from 46.50 (SD = 2.94) at pretest to 47.00 (SD = 3.17) at posttest. Thus, while the two groups demonstrated relatively comparable levels of mental well-being before the intervention, a clear difference emerged at posttest, with the experimental group showing substantially higher mental well-being following participation in the mindfulness intervention.

Before conducting the analysis of covariance, the statistical assumptions underlying ANCOVA were examined. The relationship between pretest and posttest mental well-being scores was sufficiently linear, with a correlation coefficient of $r = .75$, supporting the assumption of linearity. The normality assumption was also satisfied, as the Kolmogorov–Smirnov test for the pretest mental well-being scores was nonsignificant ($Z = 1.19$, $p = .12$). Homogeneity of variances was examined using Levene's test and was supported because the result was nonsignificant, $F(1, 38) = 1.47$, $p = .23$. In addition, the interaction between group membership and the pretest covariate was nonsignificant, $F = 0.91$, $p = .41$, indicating that the assumption of homogeneity of regression slopes was met. Accordingly, the required assumptions for conducting ANCOVA were adequately satisfied, and the analysis could be performed to compare posttest mental well-being scores while controlling for baseline differences.

To determine whether the mindfulness intervention significantly affected nurses' mental well-being, a univariate analysis of covariance was conducted in which posttest mental well-being was considered the dependent variable, study group was entered as the independent variable, and pretest mental well-being was treated as the covariate. The results of this analysis are presented in Table 2.

Table 2. Analysis of Covariance for Posttest Mental Well-Being Scores in the Experimental and Control Groups

Dependent Variable	Sum of Squares	df	Mean Square	F	p	Partial η^2
Mental well-being	502.24	1	502.24	236.37	< .001	.87

As shown in Table 2, after controlling for the effect of pretest mental well-being scores, there was a statistically significant difference between the experimental and control groups in posttest mental well-being, $F = 236.37$, $p < .001$, partial $\eta^2 = .87$. The direction of the adjusted group difference, together with the descriptive findings, indicates that participants who received the mindfulness intervention achieved

significantly higher mental well-being scores than those in the control group. The effect size was very large, with approximately 87% of the variance associated with the group effect being attributable to the intervention after adjustment for baseline scores. Therefore, the study hypothesis was supported, indicating that the mindfulness intervention was effective in improving mental well-being among intensive care unit nurses.

Discussion and Conclusion

The present study examined the effectiveness of a mindfulness intervention in improving mental well-being among intensive care unit nurses. The findings showed that, after controlling for pretest scores, nurses who participated in the mindfulness intervention demonstrated significantly higher posttest mental well-being than those in the control group. The magnitude of the intervention effect was substantial, indicating that participation in the structured mindfulness program was associated with a meaningful improvement in the nurses' psychological functioning. The descriptive results were consistent with the inferential analysis: the experimental group's mean mental well-being score increased from 47.80 at pretest to 55.85 at posttest, whereas the control group's score remained relatively stable, changing only from 46.50 to 47.00. The ANCOVA results further confirmed that this difference was statistically significant, $F = 236.37$, $p < .001$, partial $\eta^2 = .87$. Taken together, these findings support the effectiveness of mindfulness training as a psychological intervention for strengthening mental well-being among nurses working in intensive care settings.

The results are consistent with a growing body of evidence indicating that mindfulness-based interventions can enhance psychological well-being in nursing populations. Systematic reviews of mindfulness-based interventions among nurses have generally concluded that these programs are associated with favorable psychological outcomes and may strengthen nurses' well-being and adaptive functioning (12, 13). The present findings extend this evidence by focusing specifically on intensive care unit nurses, a professional group exposed to sustained cognitive, interpersonal, and emotional demands. The observed improvement suggests that even within a high-pressure clinical environment, mindfulness skills can be learned and translated into better psychological functioning. This conclusion is also consistent with the integrative review by Wexler and Schellinger, which emphasized the value of mindfulness-based stress reduction for supporting nurses' psychological health and professional sustainability (14).

The present findings are also compatible with studies involving nursing students and future nurses. Berdida and colleagues reported meaningful relationships among mindfulness, resilience, self-efficacy, social support, perceived stress, and psychological well-being in nursing students, indicating that mindfulness may form part of a broader network of psychological resources that support adaptive functioning (2). Similarly, McVeigh and colleagues identified mindfulness as a potentially useful well-being initiative for undergraduate nursing students, emphasizing its relevance before nurses enter full professional practice (10). Although nursing students and intensive care nurses differ substantially in terms of professional responsibility and exposure to clinical pressure, the convergence of findings suggests that mindfulness may be beneficial across different stages of nursing development. The current results therefore reinforce the proposition that mindfulness can be relevant both as an educational preventive strategy and as an occupational intervention for practicing nurses.

The findings are further supported by the study of Sari Ozturk and Kilicarslan Toruner, in which a mindfulness-based activity improved psychological outcomes among senior nursing students (11). Such findings are theoretically important because mindfulness interventions are not limited to reducing negative emotional states; they may also facilitate positive dimensions of functioning. In the present study, mental well-being was treated as a positive psychological outcome rather than merely as the inverse of distress. The increase observed in the experimental group therefore suggests that mindfulness may promote more than symptom relief. It may contribute to improved self-acceptance, environmental mastery, purpose, interpersonal functioning, personal development, and autonomy, which are central dimensions of the well-being framework assessed in this study.

One possible explanation for the observed effect concerns attentional regulation. Mindfulness training repeatedly directs attention toward present-moment experience, particularly through practices such as breathing awareness, body scanning, and observation of thoughts. Intensive care nursing requires continuous monitoring of patients, rapid interpretation of clinical information, and frequent shifts in attention between competing demands. Under these conditions, habitual cognitive overload may reduce the ability to remain psychologically grounded. Mindfulness practice may strengthen the ability to notice attentional drift and return attention deliberately to the present task. This may reduce cognitive fragmentation and allow nurses to experience greater perceived control over their internal and external environments. Research linking mindfulness with psychological well-being and cognitive flexibility provides support for this interpretation (7). Greater cognitive flexibility may enable nurses to respond to complex or changing clinical situations with less rigid appraisal and more adaptive adjustment, thereby contributing to improved well-being.

A second explanation is related to the acceptance-based component of mindfulness. Intensive care nurses regularly encounter situations that cannot be fully controlled, including unpredictable changes in patient condition, uncertain treatment outcomes, emotional interactions with family members, and rapidly changing clinical priorities. Persistent attempts to mentally control such circumstances may consume psychological resources. Mindfulness teaches individuals to distinguish between experiences that require action and experiences that must be acknowledged without excessive internal struggle. Through repeated practice of nonjudgmental awareness and acceptance, nurses may become better able to experience difficult thoughts and emotions without becoming dominated by them. This may enhance psychological stability and reduce unnecessary internal conflict. Zamani and Zolfaghari's work linking mindfulness with tolerance of ambiguity provides indirect support for this interpretation, particularly because uncertainty is a routine feature of intensive care work (21).

The observed improvement may also be explained through decentering, one of the central cognitive processes cultivated in mindfulness practice. Decentering involves recognizing thoughts as temporary mental events rather than unquestioned facts. During the intervention, participants practiced observing thoughts without trying to suppress, avoid, or immediately react to them. This capacity may be especially useful for nurses whose work involves recurrent exposure to demanding situations and high-stakes decision-making. By creating psychological distance from automatic interpretations, mindfulness may enable nurses to respond to stressful experiences with greater deliberation and less cognitive reactivity. Evidence from

mindfulness research indicates that these mechanisms can contribute to psychological well-being by increasing flexibility in the way individuals relate to their internal experiences (6, 7).

The intervention may additionally have improved mental well-being by strengthening self-awareness and self-care. Nurses are frequently socialized into professional roles that prioritize the needs of patients and families, sometimes at the expense of their own psychological needs. However, sustainable nursing practice requires the ability to identify and respond appropriately to signs of mental and emotional strain. Williams and colleagues emphasized self-care as an important component of nurses' professional health and functioning (1). The mindfulness intervention used in the present study encouraged participants to monitor bodily sensations, emotional states, attentional patterns, and routine reactions. This heightened self-awareness may have helped participants identify their own needs more accurately and engage in more intentional self-regulation, which could contribute to improved mental well-being.

The results also align with evidence from non-nursing populations showing that mindfulness-based programs can enhance positive psychological functioning. Amin and colleagues reported that mindfulness intervention improved quality of life and psychological well-being among menopausal women (5). Nosrati and colleagues similarly found that mindfulness-based cognitive therapy was effective in enhancing psychological well-being in incarcerated women (16). In a clinical context, Yıldırım and colleagues reported improvements in psychological well-being following mindfulness-based stress reduction among patients with cancer (17). Although these populations differ from intensive care nurses in both demographic and contextual characteristics, the consistency of findings across diverse groups suggests that mindfulness may influence broad psychological processes that are not limited to a specific occupational or clinical condition.

Meta-analytic and broader intervention evidence provides further support for this interpretation. Verhaeghen and colleagues found that mindfulness interventions could improve mental health and well-being among older adults, reinforcing the view that mindfulness has applicability across age groups and life circumstances (6). Qvick and colleagues likewise examined a universal mindfulness program and found evidence relevant to well-being enhancement in adolescents (3). Ünlü and colleagues reported that a mindfulness-based school intervention could improve well-being while addressing contemporary psychosocial pressures (18). Wu and Qin also found that a mindfulness-based social and emotional learning intervention improved well-being among pre-service teachers (19). Together, these studies suggest that mindfulness is best understood not solely as a treatment for psychological disturbance but as a broader positive psychological intervention capable of improving adaptive functioning.

The present findings may also reflect the relational benefits of mindfulness. Mental well-being is partly shaped by the quality of interpersonal relationships, and nursing is a highly relational profession. Intensive care nurses must communicate effectively with colleagues, physicians, patients, and family members, often under emotionally charged conditions. Mindful communication practices included in the intervention may have helped participants become more attentive during interpersonal exchanges and less reactive in difficult interactions. Varghese and Alfonso's review highlighted links between mindfulness and relational as well as psychological well-being (8). Similarly, Zheng and colleagues showed that mindfulness is associated with relational outcomes and that these associations may interact with the well-being of individuals involved (9). These findings support the possibility that improvements in nurses' mental well-being may partly arise from more adaptive interpersonal functioning and more constructive engagement within the clinical environment.

The embodied dimensions of the mindfulness protocol may also have contributed to the results. Body scanning, mindful breathing, and awareness of physical sensations encourage participants to reconnect with present bodily experience. This may be especially relevant for nurses, whose work requires prolonged standing, repeated physical activity, and sustained physiological arousal. Zafeiroudi and colleagues emphasized the potential contribution of embodied mindfulness and movement-based practices to mental well-being (20). Although the present intervention was not a movement-based program, its use of body awareness may have supported a similar process by increasing sensitivity to early signs of tension and enabling participants to respond more deliberately to physiological activation.

Another factor that may explain the effectiveness of the intervention is its structured and repeated nature. The eight-session format allowed participants to encounter mindfulness not as a single technique but as a gradually developed set of skills. Initial sessions emphasized awareness and attentional grounding, while later sessions expanded to emotional acceptance, mindful communication, compassion, and integration into everyday life. Repetition is likely important because mindfulness is skill-based and depends on regular practice. A single session may produce temporary relaxation, but repeated practice may alter habitual responses to internal and external stressors. Evidence from structured mindfulness programs across different populations supports the value of repeated practice in producing measurable improvements in well-being (3, 5, 17).

The group format may also have contributed to the positive outcome. Group-based interventions provide opportunities for participants to normalize their experiences, observe that colleagues face similar difficulties, and learn through shared reflection. For nurses who work in demanding environments, a structured space in which occupational experiences can be acknowledged without judgment may itself support psychological well-being. In addition, group participation may increase adherence and motivation because members can observe one another's progress and discuss obstacles to practice. Although the present study did not separately test the effect of group support, the broader literature on mindfulness-based nursing interventions suggests that structured group programs can be feasible and psychologically useful within healthcare settings (12, 14).

The findings are also relevant in light of research on flexible mindfulness delivery. Xu and colleagues showed that mobile mindfulness approaches could be useful for emergency department staff seeking to improve stress management and well-being (15). Ma and colleagues similarly demonstrated the feasibility of mindfulness-based psychoeducation delivered through a digital application for caregivers (4). These studies suggest that the benefits observed in the present face-to-face program may potentially be sustained or extended through flexible delivery formats. This has practical importance for intensive care nurses, whose shift work may make attendance at fixed intervention sessions difficult. Although the present study used a structured in-person program, the underlying mindfulness skills may be adaptable to brief digital, hybrid, or workplace-based formats.

Overall, the present study adds to the existing literature by showing that a structured mindfulness intervention can produce a pronounced improvement in mental well-being among intensive care unit nurses. The findings are consistent with systematic reviews, integrative reviews, nursing studies, and intervention research conducted in a range of populations (2, 6, 13, 14). The consistency of the results with previous evidence strengthens the interpretation that mindfulness may support well-being through multiple

interacting pathways, including attentional regulation, acceptance, cognitive flexibility, self-awareness, relational functioning, embodied awareness, and deliberate self-care. Given the demanding nature of intensive care nursing, interventions that can strengthen positive psychological functioning may have particular value for maintaining a healthier and more sustainable workforce.

The present study had several limitations that should be considered when interpreting its findings. First, the sample size was relatively small and consisted of nurses from a single hospital in Ahvaz, which limits the generalizability of the findings to nurses working in other hospitals, cities, clinical specialties, or organizational environments. Second, purposive sampling was used, and this may have introduced selection bias because participants who were willing and able to participate in a mindfulness program may differ systematically from other nurses. Third, the study relied on a self-report measure of mental well-being, and responses may therefore have been influenced by social desirability, response tendencies, or participants' expectations regarding the intervention. Fourth, the design included only pretest and immediate posttest assessments, so the durability of the observed improvement could not be determined. Finally, the control group was a waiting-list group rather than an active comparison condition, making it difficult to separate the specific effects of mindfulness practice from nonspecific effects such as group attention, expectancy, or regular contact with the intervention facilitator.

Future studies should replicate the present findings with larger and more diverse samples drawn from multiple hospitals and different nursing specialties. Random sampling and randomized controlled designs would strengthen causal inference and reduce potential selection bias. Researchers should also include follow-up assessments at several time points to determine whether improvements in mental well-being are maintained after the formal intervention ends. Future investigations could compare mindfulness with other structured psychological or occupational well-being programs and could use active control conditions to distinguish mindfulness-specific mechanisms from general intervention effects. It would also be valuable to examine potential mediators of treatment response, such as mindfulness skills, cognitive flexibility, self-compassion, perceived occupational support, or adherence to home practice. Combining self-report measures with behavioral, organizational, or physiological indicators could provide a more comprehensive assessment of intervention effects.

From a practical perspective, hospital managers and nursing administrators may consider incorporating structured mindfulness programs into staff well-being initiatives, particularly in high-demand units such as intensive care. Short mindfulness exercises could be integrated into staff development programs, wellness workshops, or scheduled recovery periods without substantially disrupting clinical responsibilities. Nurse educators could also provide introductory training in mindful breathing, body awareness, present-moment attention, and mindful communication as part of continuing professional development. To improve accessibility, hospitals could offer flexible formats such as brief group sessions, recorded practices, mobile resources, or hybrid programs that accommodate rotating shifts. Implementation should remain voluntary and should be presented as one component of a broader organizational approach to staff well-being rather than as a substitute for appropriate staffing, supportive leadership, manageable workloads, and healthy workplace conditions.

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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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