Mindfulness in nursing students: enhancing well-being through breath practices

Mindfulness em estudantes de enfermagem: melhorando o bem-estar através de práticas respiratórias

Mindfulness en estudiantes de enfermería: potenciando el bienestar a través de prácticas de respiración

DOI: 10.55905/revconv.17n.6-032

Originals received: 04/26/2024
Acceptance for publication: 05/17/2024

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ABSTRACT
The present study aimed to assess focus/concentration, perception of quality of life, class attention, and anxiety, as well as class attendance and academic performance of nursing undergraduates from a Higher Education Institution before and after the application of breathing and mindfulness meditation techniques. Forty-five seventh-semester (fourth-year) students of both genders, aged 18 and above, participated in the study. The technique was applied for three months through breathing and meditation practices in the classroom. For data collection, a structured questionnaire with four closed-ended questions was used, administered before and after the training sessions. The overall results of the indicators showed that the undergraduates demonstrated a 32.6% improvement in focus/concentration, a 32.4% improvement in perceived quality of life post-training. Regarding class attention, there was a 25.7% increase. An improvement of 44% was observed in anxiety levels, along with a 27% increase in class attendance (reduced absenteeism), and a 74% enhancement in academic performance. The students showed significant improvements in all indicators related to focus/concentration, quality of life, anxiety levels, absenteeism, and academic performance after learning and practicing some breathing and mindfulness meditation techniques. These data underscore the importance of integrating mindfulness approaches in the educational context, contributing to the development of undergraduates.

Keywords: breathing and meditation techniques, mindfulness, quality of life, academic performance, anxiety.
mindfulness. Esses dados destacam a importância da integração de abordagens mindfulness no contexto educacional, contribuindo para o desenvolvimento dos graduandos.

**Palavras-chave:** técnicas de respiração e meditação, mindfulness, qualidade de vida, desempenho acadêmico, ansiedade.

**RESUMEN**

El presente estudio tuvo como objetivo evaluar el enfoque/concentración, la percepción de calidad de vida, la atención en clase y la ansiedad, así como la asistencia a clases y el rendimiento académico de estudiantes de enfermería de una Institución de Educación Superior antes y después de la aplicación de técnicas de respiración y meditación mindfulness. Cuarenta y cinco estudiantes del séptimo semestre (cuarto año) de ambos sexos, mayores de 18 años, participaron en el estudio. La técnica se aplicó durante tres meses a través de prácticas de respiración y meditación en el aula. Para la recopilación de datos, se utilizó un cuestionario estructurado con cuatro preguntas cerradas, administrado antes y después de las sesiones de entrenamiento. Los resultados generales de los indicadores mostraron que los estudiantes demostraron una mejora del 32,6% en el enfoque/concentración, una mejora del 32,4% en la calidad de vida percibida después del entrenamiento. En cuanto a la atención en clase, hubo un aumento del 25,7%. Se observó una mejora del 44% en los niveles de ansiedad, junto con un aumento del 27% en la asistencia a clases (reducción del ausentismo) y un aumento del 74% en el rendimiento académico. Se observó una mejora del 44% en los niveles de ansiedad, junto con un aumento del 27% en la asistencia a clases (reducción del ausentismo) y un aumento del 74% en el rendimiento académico. Estos datos resaltan la importancia de integrar enfoques mindfulness en el contexto educativo, contribuyendo al desarrollo de los estudiantes.

**Palabras clave:** técnicas de respiración y meditación, mindfulness, calidad de vida, rendimiento académico, ansiedad.

**1 INTRODUCTION**

According to the World Health Organization (WHO), quality of life is "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns". It encompasses spiritual, physical, mental, psychological, and emotional aspects, as well as social relationships, health, education, housing, sanitation, and more (Who, 1996).

Historically and conceptually, the quality of life has been addressed since the 1950s, first used by Lyndon Johnson in 1964. The Ottawa Charter of 1986 defines Health Promotion as "the process of enabling the community to act in improving its quality of life and health". Quality of
life is a dialectical concept, divided into objective and subjective aspects, encompassing basic needs to historical and cultural contexts (Brasil, 1996).

A study at the Department of Psychobiology at the Federal University of São Paulo revealed that Zen meditation reduced blood pressure and improved quality of life. Furthermore, the ability to maintain focus, mindfulness, and emotional management is crucial for well-being (Goleman, 2013).

Attention, considered as a muscle that develops with use, directs, selects, alerts, and contemplates, directly influences performance. Focused and oriented attention helps avoid negligence. Anxiety, characterized by psychological and physiological components, can be reduced through meditative practices (Langer, 1989).

Interventions with meditation have demonstrated anxiety reduction in various contexts, such as in obese patients and family caregivers of Alzheimer's patients. Mindfulness, popularized by Jon Kabat-Zinn since 1979, offers mental health benefits and has been incorporated into psychotherapeutic programs (Chiesa; Malinowski, 2011).


Regular mindfulness practice leads to a lasting reduction in the brain's emotional response, including amygdala regulation. It also influences the autonomic nervous system, promoting balance between the sympathetic and parasympathetic systems. The purpose of the practice is to train the mind for attention in the present, without emptying the mind or eliminating emotions. Meditation, which can be done anywhere, doesn't aim for immediate calm but seeks to accept all present feelings, including pain (Goleman, 2013; Desbordes, et al., 2012).

In the cognitive context, meditation modulates attention mechanisms and enhances information processing. In addition to behavioral benefits, meditation contributes to physical,
mental, and emotional well-being. Regular practice reduces stress and anger, promoting greater psychological resilience (Grupe, et al., 2021).

Understanding these benefits is crucial for effectively adopting meditation and leveraging its positive effects on mental and emotional health. Studies at the University of California have revealed that integrated systems biology approaches identify gene regulatory networks associated with immune and stress responses. Meditation has demonstrated impacts on genes linked to inflammation and stress, particularly in experienced practitioners. Companies like Google and Harvard have embraced mindfulness to reduce anxiety and enhance focus (Epel, et al., 2016).

In organizations, stress management is indispensable for productivity. Mindfulness not only addresses anxiety and depression but also promotes physical well-being. It enhances focus and quality of life among nursing students and brings corporate benefits such as increased productivity and decision-making skills. As an effective and non-religious practice, meditation gains relevance in the corporate environment (Hofmann; Gómez, 2017).

In this context, the aim of this study was to evaluate focus/concentration, perception of quality of life, attention to classes, and anxiety, as well as to assess attendance and academic performance of nursing students, before and after conducting breathing and mindfulness meditation practices.

2 METHODOLOGY

This research is a non-randomized clinical field trial conducted at a Higher Education Institution (HEI) in Mogi das Cruzes, involving a sample of 45 students of both genders from the 7th semester of the Nursing Course.

Inclusion criteria included regular enrollment in the 7th semester, acceptance through the completion and signing of the Informed Consent Form (ICF), and willingness to apply the breathing and mindfulness meditation technique. Students who were unable to perform the breathing and mindfulness meditation technique were excluded.

A structured questionnaire on the Likert Scale was used as a research instrument, with options Always, Almost always, Sometimes, Rarely, and Never, scored as 5, 4, 3, 2, and 1, respectively. The questionnaire consisted of 4 questions (Do you consider yourself a focused and concentrated person in your activities?; Do you consider yourself someone who cares about your
quality of life?; Are you able to stay attentive throughout the entire class? and Are you able to stay attentive throughout the entire class?)

The study was evaluated by the Research Ethics Committee with Human Subjects of the University of Mogi das Cruzes under protocol CAAE number 64155317.6.0000.5497 and approval number 2.255.092.

Procedures included an introductory lecture on the technique, followed by the delivery of the Informed Consent Form to interested students and the pre-training questionnaire. All students expressed interest in participating in the research. When administering the pre-training questionnaire, respondents were asked to mark the statement that best suited their daily experience. This procedure helped obtain data corresponding to the indicators evaluated before the application of the breathing and mindfulness meditation technique. The pre-training questionnaire was administered in April. The mindfulness technique was applied and conducted by a clinical psychologist and mindfulness instructor following nine steps (1-Set a five-minute period, adjusting the timer to calculate the time; 2-Sit with an upright spine without tension, as posture is important; 3-Feel the breath and focus on it as much as possible; 4-Most likely, the mind will become restless; it's natural, they are just thoughts; 5-Notice your mind wandering: going to the past, future, or judging the experience, then return attention to your breath; 6-Your mind will become restless again; 7-Return attention to your breath; 8-The practice develops the ability to return to the present moment, and for that, we can always use the breath; 9-Repeat until the five minutes are complete) over three months, accompanied by audio distributed to the students. After this period, the same questionnaire, as post-training questionnaire, was administered in June 2017 to the participants to evaluate the same indicators.

Comparisons were made in the participants' responses, assessing possible discrepancies. For the analysis of quantitative data, basic descriptive statistics were used.

The reliability assessment involved test-retest to check if the values provided by the students remained the same or improved after the three-month period. Data tabulation used elements of descriptive statistics supported by the Excel spreadsheet. For statistical analysis, the paired Student's t-test and Fisher's Exact Test were used.
3 RESULTS

A total of 45 students from the 7th semester of a nursing course participated in the study. It was observed that the minimum age was 20 years, and the maximum was 42 years and average age of 27.6±3.5 years old.

In the analysis of results regarding focus and concentration, only 6.6% marked Always, and 35.3% marked Almost always before the training. Subsequently, these values increased to 42.2% and 44.4%, respectively. Thus, we have 86.6% of students focused and concentrated post-training, compared to 41.9% pre-training, representing an increase of 2.07 times (95% Confidence Interval, = 1.71 to 7.54) in the chance of developing better Focus and Concentration compared to pre-training. This result was statistically significant (P < 0.0001), assessed by Fisher's Exact Test (n=45), where participants who answered Always (5) and Almost always (4) were classified as "High Attention/Focus" compared to those with Medium-Low Focus/Concentration who answered Sometimes (3), Rarely (2), and Never (1) (n=13), in pre- and post-mindfulness training (FIGURE 1).

Figure 1 – Distribution of participants in relation to focus and concentration in pre- and post-mindfulness training.
The average responses to the Focus and Concentration question before mindfulness training were 3.33 ± 0.13 (N=45), and after training, it was 4.24 ± 0.12 (N=45). This difference was statistically significant in the paired t-test (p < 0.0001), and data pairing was highly effective and statistically significant with a Pearson Correlation Coefficient of 0.913, and p < 0.0001 (FIGURE 1).

When analyzing the concern about Quality of Life (QoL) through the 2nd question, we observed that, after the practices of breathing and mindfulness meditation, 51.11% (n=23) of participants expressed concern about their QoL. However, it was noted that only 22.22% of students (n=10) had this concern before training. In other words, there was a 2.30-fold increase in the number of students who began to assess their own QoL over the 3 months of practice application. The number of students indicating QoL Sometimes and Rarely decreased by 4 times and 8 times, respectively, compared to pre-training, indicating the effectiveness of the training in increasing the students' perception of their QoL (FIGURE 2A).

Considering those who responded Always and Almost always, the data show that before mindfulness training, only 37.78% of students (n=17) declared having a high concern for Quality of Life, but after mindfulness training, this value increased to 86.67% (n=39) of nursing students. Thus, we can observe that mindfulness meditation practice increased by 2.29 times the number of students concerned about their QoL, with the results showing a 95% Confidence Interval between 1.87 to 8.33 for the chance of developing better quality of life compared to pre-training (FIGURE 2A).

In the assessment of students' attention in class (3rd question), it was found that 57.78% of students declared having attention Sometimes and 28.88% Rarely in pre-training. In post-training, these numbers reduced to 15.56% (n=7) and zero, respectively, and there was an increase in the statements Almost always (3 times) and Always (8 times), going from 15.56% (n=7) and 4.44% (n=2) to 46.67% (n=21) and 35.56% (n=16), respectively, after the mindfulness meditation practice (FIGURE 2B).
The data show that in pre-mindfulness training, only 20% (sum of respondents Always and Almost always with n=9) of students declared having high attention. In post-training, we observed that 80% (n=36) began to declare having high attention. Thus, we can observe that mindfulness meditation practice increased by 4.0 times, with a 95% Confidence Interval between 2.19 to 7.31, the student's attention capacity compared to pre-training, and this result was statistically significant with $P < 0.0001$, assessed by Fisher's Exact Test (N=45) (FIGURE 2B).
The average responses to the "attention to classes" question before mindfulness training were 2.93 ± 0.12 (N=45), and after training, it was 4.13 ± 0.12 (N=45), and this difference was statistically significant in the paired t-test (P < 0.0001). Data pairing was moderately effective and statistically significant with a Pearson Correlation Coefficient of 0.657 and a P value of < 0.0001 (FIGURE 2B).

In the evaluation of anxiety among nursing students (4th question), we observed a significant improvement in anxiety reduction. The results showed that in pre-training, 55.56% (n=25) of students reported Never or Rarely considering themselves attentive to the present moment, on the other hand, 17.78% (n=8) of students declared being Always or Almost always attentive to the present in pre-training. However, after mindfulness training, 71.11% (n=32) of students indicated Always and Almost always, corresponding to a 4-fold reduction in the risk of developing anxiety compared to pre-training, with a 95% Confidence Interval between 1.88 to 5.04. This result was statistically significant (P < 0.0001), assessed by Fisher's Exact Test (N=45). The average responses to the "Anxiety" question before mindfulness training were 2.27 ± 0.18 (n=45), and after training, it was 3.82 ± 0.17 (n=45). This difference was statistically significant in the paired t-test (P < 0.0001), and the data pairing was moderately effective and statistically significant (Pearson Correlation Coefficient = 0.678, P < 0.0001) (FIGURE 3).

Figure 3 – Distribution of participants regarding the anxiety indicator in pre- and post-mindfulness training.
In the overall analysis of indicators (Focus/Concentration, Quality of Life, Attention, and Anxiety), the results indicate considerable improvements in these indicators after the continuous application of mindfulness meditation and breathing techniques over three months. According to the data, there was an improvement of 32.6% in focus/concentration, 32.4% in quality of life, 25.7% in attention during classes, and an impressive improvement of 44% in anxiety. In addition, we also observed a 27% improvement in overall class attendance by students, data collected from the class attendance register (Figure 4).

![Figure 4](image-url) - Improvement in indicators after the mindfulness breathing and meditation technique for nursing students.

According to Figure 5, there was a 74% improvement in grades above the average of 5 after the practices of mindfulness breathing and meditation, while in the pre-training, 55% of students achieved a grade higher than five, demonstrating a considerable improvement in grades.
4 DISCUSSION

Research on mindfulness meditation is growing in global literature, with studies in Brazil still in the early stages. There has been recent special attention to these studies due to the association between mindfulness practices and various health indicators. The use of mindfulness-based interventions is increasingly explored, emphasizing the importance of validated instruments to measure these interventions, such as the mindfulness meditation technique and its components, and to understand their relationships with clinical changes (Didonna, 209).

It is believed that validated mindfulness instruments in the Brazilian context could contribute in the future to investigations into the effects generated in communities, enabling experimental research on mindfulness and its relationship with other meditation techniques. An example is the Philadelphia Mindfulness Scale, validated in Brazil and available for use. This scale is divided into two factors: Acceptance and Awareness, differing from Kabat-Zinn's definition in this study (Silveira, et al., 2012).

Other relevant scales include the Mindful Attention Awareness Scale (MAAS) and the Five Facet Mindfulness Questionnaire (FFMQ), measuring mindfulness levels in a unidimensional and multidimensional manner, respectively (Atanes, et al., 2012). The choice of questions for this study was based on standardized questionnaires in the literature, considering...
focus, attention, quality of life, and anxiety as main indicators. The use of short and objective questions aimed to facilitate application and increase students' interest in the research.

When locally adapted instruments are not available, the literature suggests the development of new instruments or the adaptation of validated instruments in other languages. The Philadelphia Mindfulness Scale, with 20 items, assesses the frequency of mindfulness experiences in the respondents over the past week. Other scales, such as the MAAS, with 15 items, focus on evaluating attention to the awareness of the present moment (Brown; Ryan, 2003).

The questionnaire used in this study provided a practical tool for academics from various fields to conduct their research, adapted for undergraduate students. It could also offer business managers the opportunity to assess indicators in employees.

Regarding focus/concentration, we observed a 2.07-fold increase (ranging from 41.9% to 86.6%) in the number of students in relation to this indicator post-training (FIGURE 1).

Stimulating the prefrontal cortex, vital for concentration, memory, and decision-making, may explain increased gray matter concentration in brainstem regions over eight weeks. Studies also indicate volume increases in brain regions tied to emotional regulation, empathy, and cognition post-mindfulness meditation, including specific areas like the left hippocampus, posterior cingulate cortex, temporo-parietal junction, and cerebellum (Singleton, et al., 2014).

Studies indicate that mindfulness practice is correlated with improvements in attention and concentration, improvement in working memory, and reduction in mental dispersion. These cognitive advances play an essential role in effective learning and information processing, contributing to more positive academic outcomes (Alomari, 2023).

In the evaluation of the perception of quality of life, the results jumped from 22.22% to 51.11%, a 2.3-fold increase after mindfulness training (FIGURE 2). Awareness of one's own life and the present moment leads to greater purpose, dedication, and attention to activities performed. Conceptualizing quality of life is a challenge, as it is a dialectical concept divided into objective and subjective aspects. Quality of life is subjective and depends on historical, cultural, and basic human needs in the objective realm (Brasil, 1996).

In our study, we observed that some students associated quality of life only with good nutrition and periods of rest and leisure, while others included professional recognition, in
addition to basic human needs. There was a significant improvement in quality of life after students engaged in and practiced mindfulness breathing and meditation.

Individuals who are fully engaged and focused on the activities they are doing in the present moment tend to feel happier. In other words, mental and emotional presence in the current moment, without distractions or excessive concerns, is associated with a greater sense of happiness. This idea aligns with mindfulness and mindful attention principles, where being aware and engaged in the present is considered beneficial for emotional well-being (Brown; Ryan, 2003; Singleton, et al., 2014; Seligman, 2002). Well-being, quality of life, and happiness are intrinsically interconnected and interrelated factors, highlighting the relevance of this indicator for the study.

Regarding attention in classes, we observed a pre-training rate of 20% and a post-training rate of 80%, corresponding to a 4-fold increase in students' attention (FIGURE 3). Attention is a process that encompasses direction, selection, alertness, deliberation, and contemplation. This term covers various processes, from concentration to vigilance, and it is important to exercise and improve attention to keep the mind in a state of vigilance. The active engagement of attention is a descending activity, a defense mechanism against excessive automation of daily activities. Attention enables surveillance of the environment, reflection on automatic routines, constant improvement, and regular attention focusing prevents negligence in activities. The search for more comprehensive explanations of attention has led to new theories conceiving it as a filter. The general hypothesis suggests that the attention mechanism has a fixed capacity to process information and, when overloaded by task requirements, enhances performance (Langer, 1989).

Our brain functions like a muscle, as every time it wanders and attention is intentionally brought back, the circuits are being strengthened, a mechanism known as metacognition. Companies use this technique because they want more focused employees, as more focused employees are undoubtedly more efficient. In this regard, our results align with the literature, as we observed a significant improvement in the attention to classes’ indicator.

In the analysis of the anxiety indicator, only 17.78% reported being attentive to the present (Always and Almost always), indicating high anxiety in the student group. After the training, this number increased to 71.11% (FIGURE 4). Mindfulness meditation practice can induce changes in attitudes, impacting thoughts, sensations, and emotions, a phenomenon known as neuroplasticity. This effect appears promising in reducing stress symptoms in non-clinical
populations and may provide support for dealing with various clinical conditions, such as anxiety and depression (Santarnecchi, et al., 2014).

Meditation practice has been associated with neuroplasticity phenomena, reducing age-related brain degeneration and enhancing cognitive functions. Studies demonstrate correlations between meditation and improvements in attention, working memory, spatial skills, and long-term memory. Although various meditation traditions exist, they share similarities but differ in practices and theoretical orientation. Traditionally categorized into concentrative meditation and open awareness meditation, these practices direct attention processes differently. Neuroimaging and electroencephalography studies reveal changes in brain connectivity during meditation and at rest. Consistent meditation practice leads to extensive long-term changes in structural connectivity, suggesting its role in inducing neuroplasticity (Luders, 2014; Wahbeh, et al., 2014).

In the overall assessment of the indicators, all showed significant improvements post-training, with the anxiety indicator being the parameter that underwent the most positive impact (FIGURE 5). Anxiety is a future-oriented emotional state. Thus, students showing lower levels of anxiety post-training suggest that the students are more focused on the present moment.

Mindfulness meditation promotes creativity, increased attention and concentration in students, improves performance and socio-emotional skills, as well as anxiety symptoms and quality of life, significantly contributing to the mental health of its practitioners (Gherardi-Donato, et al., 2019).

Regarding academic performance, there was a 74% improvement in grades above the average 5 due to mindfulness training (FIGURE 5). Stress is characterized as a state in which the body mobilizes physiological resources to face threats, whether external or internal. This triggers a series of neuroendocrine responses that modulate various physiological functions. In the academic environment, stress can manifest in situations such as presenting papers, taking exams, or performing in internships. The literature points to the existence of a threshold where stress, when natural, has positive effects on neuroplasticity. However, when an individual cannot overcome the threat, either due to the intensity of the stressor or its prolongation, maintaining this altered physiological state can compromise organic functions, including the depression of the immune system and the emergence of psychopathologies (Wilson, et al., 2015). Elevated levels of stress, especially when chronic, can directly impact university life, widely recognized as one of the main factors associated with the low academic performance of students.
Mindfulness-based interventions, detached from religion and originating in the academic environment, have been shown to significantly reduce stress and anxiety levels. Daily practice, focusing on "being present," yields various brain benefits, including stimulation of the prefrontal cortex, vital for concentration, memory, and decision-making. These practices also impact practitioners' attitudes, acting on thoughts, sensations, and emotions, thereby reducing stress symptoms in non-clinical populations and aiding in coping with clinical conditions like anxiety and depression. Consequently, in university settings, mindfulness interventions contribute to greater resilience to stress, leading to increased Positive Learning among students and enhanced academic performance (Santarnecchi, et al., 2014; Gherardi-Donato, et al., 2020).

This study successfully achieved its purpose, revealing remarkable results in the application of mindfulness to undergraduate nursing students. A clear transformation in the behavior of students was observed, as they demonstrated increased focus and concentration during classes after the incorporation of mindfulness practices, specifically breathing and meditation.

The improvement in students' attention was particularly noteworthy, highlighting the positive impacts of these practices on the absorption and retention of presented content in the classroom. Additionally, a significant reduction in anxiety levels among students was evident after participating in mindfulness activities, indicating substantial benefits for psychological well-being.

The positive effects extended beyond the emotional aspect, manifesting in the academic achievements of the students. Their consistently elevated grades and increased class attendance point to an association between mindfulness practice and high academic performance.

5 CONCLUSION

In conclusion, breathing and mindfulness meditation practices have emerged as valuable tools to enhance students' overall performance, providing not only tangible academic gains but also greater engagement and enjoyment in school activities. This conclusion underscores the importance of integrating mindfulness approaches into the educational context, contributing to the holistic development of nursing students.
ACKNOWLEDGEMENTS

We thanks the Fundação de Amparo ao Ensino e Pesquisa (FAEP) of the University of Mogi das Cruzes, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq).
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