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Determining the Effectiveness of Zen Technique on Psychological Well-being and Pain in Elderly Residents of Kahrizak Nursing Home

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A B S T R A C T

Objective: This study aimed to examine the effectiveness of Zen meditation techniques on psychological well-being and pain in elderly residents.

Methods and Materials: The study employed a quasi-experimental design with pre-test, post-test, and follow-up assessments and included both experimental and control groups. A total of 42 elderly residents (20 men and 22 women, aged 65-85) from Kahrizak Nursing Home in Tehran, Iran, in 2023 were randomly assigned to the groups. The experimental group received Zen meditation training over 20 sessions (100 minutes per session, three times a week), while the control group received no intervention. Psychological well-being was assessed using the Ryff Psychological Well-being Questionnaire, and pain levels were measured with the McGill Pain Questionnaire. Data were analyzed using mixed two-factor ANOVA.

Findings: Results indicated that Zen meditation training significantly improved psychological well-being in the experimental group compared to the control group, with notable increases in self-acceptance, positive relations, autonomy, and personal growth. However, the effect on pain reduction was less pronounced and not significant compared to controls, although some pain reduction was observed in the post-test and follow-up assessments.

Conclusion: Zen meditation training effectively enhanced psychological well-being among elderly participants, suggesting it could be a beneficial intervention for improving mental health in this population. However, the limited effect on pain highlights the need for further investigation and potentially combining Zen meditation with other pain management strategies. The study recommends more extensive longitudinal research to establish the long-term impact of meditation on well-being and pain in diverse elderly populations.

Keywords: *Elderly, Zen Technique, Psychological Well-being, Pain*

1. Introduction

Healthy aging is a right for all human beings, which highlights the importance of addressing aging and preventing its associated issues. In Iran, encountering the aging phenomenon of the population necessitates establishing infrastructures and systems to better adapt elderly individuals to their living environments (Saidi et al., 2021).

Elderly individuals who maintain physical and mental activity can not only preserve their abilities in various areas but even improve their skills and efficiency (Papalia et al., 2018). Analyzing the rapid rate of aging in Iran reveals that there is limited time to prepare for and address the consequences of population aging (Haji Zadeh & Tajvar, 2024). Thus, research on this significant topic is considered a scientific priority for the country (Samandari et al., 2020). Solutions, such as promoting continuous learning, teaching healthy lifestyles, and providing education on stress and pain management through spirituality and religion, are necessary to prevent the isolation of the elderly and support their health (Zanjari, 2018).

Successful aging depends on how individuals actively manage their lives and behaviors to enhance mental health and well-being. Therefore, the trend of population aging necessitates conducting research to develop practical insights and interventions that support the increasing elderly population, which is a social necessity (Zarshki & Shayganmanesh, 2021). Additionally, over 60% of elderly individuals experience some degree of pain, with this figure rising to 80% among those residing in nursing homes. Pain in the elderly leads to functional impairment, falls, depression, sleep disturbances, decreased appetite, social isolation, reduced quality of life, memory and attention impairment, decreased executive functioning, and increased levels of disability and mortality, resulting in higher healthcare costs and, consequently, a greater need for nursing home care (Haghghi et al., 2019).

Due to higher rates of surgery, hospitalization, injury, and disease, elderly individuals are more susceptible to pain than others. Comorbidities and polypharmacy also present challenges in pain management for the elderly (Haghghi et al., 2019). The interest in meditation has grown with the rising health issues faced by elderly individuals, in line with the development of integrated care (Kwon et al., 2021). Mindfulness meditation has received significant attention in neuroscience research over the past two decades (Tang et al., 2015).

There is increasing evidence that meditation-based training promotes healthy aging across various dimensions. The belief that it is too late for elderly individuals to change poses a significant barrier to their treatment. Research shows that the elderly brain has a remarkable capacity and resilience for forming new connections, acquiring updated information, and gaining new skills (Lidlau et al., 2008). Meditation and mind-body practices are effective in enhancing cognition in individuals aged 60 and older (Day et al., 2019). Systematic reviews also indicate that psychological well-being can be improved through interventions such as mindfulness meditation (Čakire & Vanags, 2020).

Findings suggest that mindfulness-based interventions have positive effects on psychological well-being (Wu et al., 2019). Evidence demonstrates the beneficial effects of mindfulness training on physical health, psychological well-being, and the reduction of pain symptoms. Mindful individuals are more capable of recognizing, managing, and solving daily problems (Zeidan et al., 2010). Meditation can be defined as a form of mental training aimed at improving core psychological capacities. It includes various emotional and attentional regulation strategies to achieve cognitive well-being and emotional balance (Chan et al., 2019). Meditation also improves the side effects of chemotherapy, stress, pain, and psychological well-being. Thus, interest in meditation has increased with the rising health problems of elderly individuals (Kwon et al., 2021).

Different forms of meditation, such as yoga and Zen meditation, are particularly relevant for mental and physical health due to their low cost, non-invasive nature, and scalability, especially within public health (Deolindo et al., 2020). Mindfulness meditation, by altering pain control beliefs, is significantly associated with improved pain interference (Day et al., 2019). Individuals who meditate show better general health, less anxiety, improved sleep, and reduced depression and social dysfunction (Jafari Roshan & Riazi, 2022). After three months of meditation, 96% of participants report high or maximum relaxation levels, and 64% report minimal to no tension (Vijayaraghavan & Chandran, 2019).

Studies indicate that meditators score higher in psychological well-being compared to non-meditators (Chaturvedi et al., 2021). Pain management programs are not only a suitable clinical intervention but also an ethical commitment (Saidian Asl & Goudarzi, 2011).

Given the substantial burden on the healthcare system, finding effective interventions to enhance cognitive

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functions or improve cognitive decline in the elderly population is crucial (Chan et al., 2019). Numerous meditation techniques, such as yoga and Zen meditation, exist (Farias et al., 2020). Zen meditation involves focusing on breathing and being present. The term "Zen" signifies "attitude" and "introspection" and initially represented the immediate intuitive experience of truth or intuitive enlightenment. Zen, as a unique method of training the body and mind based on awakening and enlightenment, allows for the pure, direct perception of reality and action based on a pragmatic perspective (Mortezaei & Sheikhi Nejad, 2014). "Here and now" is a key concept (Honda, 2022; Hwang et al., 2023).

It is worth mentioning that the focus on Zen in this study is due to its considerable resemblance to mystical experiences in other traditions, such as Abrahamic religions. Therefore, given the importance of the issues mentioned among the elderly and the need for non-invasive, low-cost methods, this study aims to address the question of whether Zen technique training can reduce pain and increase psychological well-being in the elderly.

2. Methods and Materials

2.1. Study Design and Participants

This study is quasi-experimental, using a pre-test, post-test, follow-up, and control group design. Follow-up was conducted by re-administering the tests three months after the post-test (twice the duration allocated for training). The statistical population included all elderly residents at the Kahrizak Nursing Home in Tehran in 2023 who met the study's inclusion criteria. A sample size of 42 participants (20 men and 22 women, aged 65 to 85) was selected. After coordinating with and obtaining permission from the university and preparing the questionnaires, authorization was obtained from the Kahrizak Nursing Home to conduct the research. Ethical principles, including confidentiality, privacy, and secrecy, were strictly followed throughout the study. Consent forms were signed by participants, an ethics code was obtained from the university and presented to the nursing home management, after which the study commenced. After conducting the MoCA test on interested participants, they were randomly assigned to two groups: experimental (21 participants) and control (21 participants).

The Ryff and McGill Psychological Well-being Questionnaires were administered, and individual scores were recorded. Zen technique training was then conducted for the experimental group over 20 sessions (based on a protocol provided by a Zen master, three sessions per week, each lasting 100 minutes, both in group and individual formats). The Zen meditation practice included proper sitting posture, hand positioning, spinal breathing, 528 Hz frequency music, spatial visualization, mantra, breathing exercises with Surah Al-Fatiha, and gradual omission of the mantra. Corrective exercises included wrist flexion, ankle flexion, finger movements, wrist and ankle rotation, and correct walking posture. After the Zen technique training and corrective exercises, the Ryff and McGill questionnaires were completed again. Three months later, the questionnaires were completed once more (to prevent researcher bias, two trained staff members completed the questionnaires).

2.2. Measures

2.2.1. Psychological Well-being

The short form of the Ryff Psychological Well-being Questionnaire contains 18 items. Scoring is based on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). The Ryff questionnaire has six components, with three questions per component and a total score. In the Ryff Psychological Well-being Questionnaire, some items are scored inversely, while others are scored directly. A higher score indicates higher psychological well-being. This multidimensional questionnaire includes six components: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth. Validity and reliability were confirmed in the study by Bayani et al. (2008), with a total reliability coefficient of 0.82 and subscales of self-acceptance, positive relations, autonomy, environmental mastery, purpose in life, and personal growth yielding 0.71, 0.77, 0.78, 0.77, 0.70, and 0.78, respectively, all statistically significant ($p < .001$) (Bayani et al., 2008).

2.2.2. Pain

The McGill Pain Questionnaire (MPQ) contains 78 descriptors grouped into 20 unequal categories. Forty-two descriptors assess the sensory dimension, 14 assess the affective dimension, and five assess pain evaluation. The remaining 17 descriptors are classified as miscellaneous (Asghari Moghadam, 2011). The Cronbach's alpha coefficient for the questionnaire was 0.85, and reliability across all domains was above 0.8 (Khosravi et al.).

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2.3. Intervention

2.3.1. Zen Mediation Training

The intervention protocol for this study involved a structured Zen meditation training program designed for elderly residents at the Kahrizak Nursing Home. The training was delivered over 20 sessions, conducted three times per week for a duration of approximately 100 minutes each session, combining group and individual training formats to ensure tailored attention to each participant's needs. Each session adhered to a specific protocol developed by a Zen master to standardize and optimize the meditation experience. The sessions began with guided instructions on achieving correct sitting posture and hand positioning to promote alignment and comfort, followed by spinal breathing exercises aimed at deep, mindful inhalation and exhalation through controlled breathing patterns to calm the body and mind. Background music at a frequency of 528 Hz was played to facilitate relaxation and focus. Spatial visualization exercises encouraged participants to imagine peaceful environments, helping to further reduce mental tension. To enhance mindfulness and focus, a mantra was introduced in the initial sessions, which involved simple, repetitive phrases to anchor participants in the present moment; over time, the mantra was gradually phased out as participants gained familiarity with meditation techniques, shifting their focus to natural breathing. The intervention included specific corrective movements designed to improve physical comfort and flexibility, such as gentle wrist and ankle flexions, finger movements, wrist and ankle rotations, and instruction on proper walking techniques. These exercises aimed to counteract stiffness and encourage fluidity in joint movement, enhancing physical well-being and supporting the mental effects of meditation. As participants completed their meditation sessions, they were gradually guided into relaxation and encouraged to observe their breathing and sensations with a non-judgmental awareness. The protocol included specific recommendations for maintaining mindfulness and applying meditation techniques in daily activities outside of sessions to promote sustainability and integration of these skills into daily life.

2.4. Data analysis

Statistical analyses were conducted using SPSS version 26. For data analysis, descriptive statistics were used for data classification, mean calculation, charting, tables, curves, and hypothesis testing. Inferential statistics, including a mixed two-factor analysis of variance, were applied to examine between-group and within-group changes. The Shapiro-Wilk test was used to determine normality, Levene's test for homogeneity of variances, and Mauchly's test for sphericity to assess homogeneity in the variance-covariance matrix of the independent variable.

3. Findings and Results

The demographic indicators by group show an equal distribution of men and women, with the highest frequency in the 65-68 age group (13 individuals) for both the experimental and control groups. Regarding educational level, the highest frequency in the experimental group was among elementary education participants (10 individuals), while in the control group, it was among illiterate individuals (14 individuals). For years of residence in the nursing home, both groups had a majority with 1 to 3 years of residence. The statistical characteristics of the dependent variables by time and group are presented in Table 1.

Table 1

Descriptive statistics for dependent variables by time and group

Group Membership	Dependent Variable	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Follow-up Mean	Follow-up SD
Experimental	Psychological Well-being	63.571	10.433	84.666	8.731	73.238	11.886
	Pain	36.809	11.608	17.809	9.195	29.523	7.576
Control	Psychological Well-being	58.523	8.997	59.428	9.962	67.428	8.139
	Pain	30.285	7.688	28.904	10.653	33.238	9.470

A mixed two-factor analysis of variance (ANOVA) was used to test the hypotheses (pre-test, post-test, and follow-up in both experimental and control groups), which is a repeated measures design with a between-subjects factor (Myers et al., 2019). Before analyzing the hypotheses, test assumptions were checked. The Shapiro-Wilk test was used to examine data normality, a prerequisite for the mixed two-factor ANOVA at three time points and across two groups. Results indicated that for both pain and psychological well-being,

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the assumption of normality was satisfied at all three time points and in both groups ($p > .05$).

The homogeneity of variances, examined using Levene's test, showed no violations for psychological well-being (pre-test $F(40,1) = .176$, $p > .05$; post-test $F(40,1) = .696$, $p > .05$; follow-up $F(40,1) = 1.722$, $p > .05$) and pain (pre-test $F(40,1) = 2.857$, $p > .05$; post-test $F(40,1) = .198$, $p > .05$; follow-up $F(40,1) = 2.034$, $p > .05$).

M's test for covariance matrices indicated homogeneity of the covariance matrices for psychological well-being [$F(11592.453,6) = .677$, $p > .05$] and for pain [$F(11592.453,6) = .784$, $p > .05$]. Thus, no heterogeneity was found between groups, allowing further analysis with Wilks' Lambda, which is suitable when sphericity assumptions are met.

The results showed significant differences in psychological well-being across times (pre-test, post-test, and follow-up) [$F(2,39) = 20.707$, $p < .001$] and in the interaction between time and group [$F(2,39) = 17.435$, $p < .05$]. Pain also showed significant differences across times [$F(2,39) = 22.486$, $p < .001$] and in the interaction between time and group [$F(2,39) = 18.894$, $p < .001$]. Therefore, both time effects and time-group interactions for the dependent variable were significant, justifying the use of mixed ANOVA.

For psychological well-being, the within-group main effect of time was significant [$F(2,80) = 15.624$, $p < .001$], with the eta-squared indicating that 28% of the variance was explained by within-group factors. The interaction effect between time and group was also significant [$F(2,80) = 13.182$, $p < .001$], with an eta-squared showing that 25% of variance could be explained by the interaction between time levels and group.

Since the within-group main effect was significant, pairwise comparisons using the Bonferroni test were conducted (Table 2).

Table 2

Pairwise comparison of within-group variables for Psychological Well-being

Group	Time (I)	Time (J)	Mean Difference (I-J)	Standard Deviation	Sig
Experimental	Pre-test	Post-test	-21.095	2.597	.000
		Follow-up	-9.667	2.916	.010
	Post-test	Pre-test	21.095	2.597	.001
		Follow-up	11.429	2.949	.003
	Follow-up	Pre-test	9.667	2.916	.010
		Post-test	-11.429	2.949	.003
Control	Pre-test	Post-test	-.905	2.158	1.000
		Follow-up	-.571	.685	1.000
	Post-test	Pre-test	.905	2.158	1.000
		Follow-up	.333	2.000	1.000
	Follow-up	Pre-test	.571	.685	1.000
		Post-test	-.333	2.000	1.000

As shown, there is a significant difference in psychological well-being scores between pre-test and post-test and follow-up scores in the experimental group, with about a 21-point increase from pre-test to post-test. Additionally, there was a significant difference between post-test and follow-up scores, with psychological well-being decreasing by about 11 points in the follow-up compared to post-test. Thus, Zen technique training was effective in enhancing psychological well-being in the experimental group, with significant improvements observed post-intervention. However, a slight decline occurred during follow-up, though scores remained above pre-test levels. No significant differences were found in the control group between pre-test, post-test, and follow-up scores for psychological well-being. Table 3 shows the results of the between-group effect test.

Table 3

Results of between-group effect test

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Source	Sum of Squares	df	Mean Square	F	Sig	Effect Size
Intercept	555874.294	1	555874.294	4215.909	.001	.991
Group	6908.643	1	6908.643	52.397	.001	.567
Error	5274.063	40	131.852			

Results indicate a significant between-group effect [$F(1,40) = 52.397$, $p < .001$], suggesting comparability of psychological well-being between the experimental and control groups. Thus, Zen technique training impacted the psychological well-being variable in the study group, with significant differences between the experimental and control groups. The partial eta-squared indicates that approximately 57% of variance in psychological well-being scores was explained by Zen technique training.

Table 4

Comparison of psychological well-being mean in experimental and control groups

Group I	Group J	Mean Difference (I-J)	Standard Deviation	Sig
Experimental	Control	14.810	2.046	.001

As shown, the psychological well-being score in the experimental group was 15 points higher than in the control group, with significant differences ($p < .001$).

Subsequent analysis of the effectiveness of Zen technique training on subcomponents of psychological well-being (self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth) was conducted.

For the self-acceptance component, within-group and between-group mean comparisons show that there was a significant difference in self-acceptance scores between pre-test and post-test in the experimental group, with an increase of approximately 1 point in the post-test. However, no significant difference was found between pre-test and follow-up. Additionally, a significant difference was observed between post-test and follow-up, with about a 1-point decrease in follow-up. This suggests that while Zen technique training was initially effective for self-acceptance in the experimental group, its effectiveness decreased after two months. A significant difference in self-acceptance scores was also found between the experimental and control groups.

For the positive relations with others component, within-group and between-group analyses indicated a significant difference in the experimental group's scores between pre-test, post-test, and follow-up, with a 2-point increase from pre-test to post-test. A significant difference also emerged between post-test and follow-up, with a decrease of about 1 point in follow-up compared to post-test. Overall, results demonstrate the effectiveness of Zen technique training in enhancing positive relations in the elderly group.

For the autonomy component, the within-group and between-group analyses in the experimental group showed a significant 1-point difference between pre-test and post-test scores for autonomy. However, no significant difference was observed between pre-test and follow-up. A significant difference was also observed between post-test and follow-up, with a decrease of about 1 point in autonomy scores in follow-up compared to post-test. These results suggest that Zen technique training was effective in increasing autonomy scores in the post-test but showed some decline in the follow-up, indicating that the effect did not fully persist. There was also a significant difference in autonomy scores between the experimental and control groups.

For the environmental mastery component, the within-group and between-group mean comparisons showed a significant 1-point difference between pre-test and post-test scores in the experimental group. However, no significant difference was observed between pre-test and follow-up. A significant difference was found between post-test and follow-up, with about a 1-point decrease in environmental mastery scores in follow-up compared to post-test. These results indicate the effectiveness of Zen technique training in enhancing environmental mastery in the post-test, though the effect did not persist into follow-up.

For the purpose in life component, neither within-group nor between-group effects were significant. Consequently, no further analysis was conducted for this component.

For the personal growth component, within-group and between-group analyses showed significant differences in the experimental group between pre-test, post-test, and follow-up, with a 2-point increase in personal growth scores in post-test and follow-up. No significant difference was

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found between post-test and follow-up, indicating the sustained effectiveness of Zen technique training on personal growth. However, no significant difference was found between the experimental and control groups regarding personal growth.

Mixed ANOVA results for the pain variable in the within-group effects showed a significant main effect of time [$F(2,80) = 18.364$, $p < .001$], with the eta-squared indicating that approximately 32% of the variance in pain scores was explained by the within-group factor. The interaction effect between time and group was also significant [$F(2,80) = 15.432$, $p < .001$], with the eta-squared indicating that approximately 28% of the variance could be explained by the interaction between time levels and group. Given the significant within-group main effect, Bonferroni pairwise comparisons were conducted.

Table 5

Pairwise comparison of within-group pain variable

Groups	Time (I)	Time (J)	Mean Difference (I-J)	Standard Deviation	Sig
Experimental	Pre-test	Post-test	19.000	2.143	.000
		Follow-up	7.286	2.565	.030
	Post-test	Follow-up	-11.714	2.340	.001
Control	Pre-test	Post-test	.381	2.087	.857

The results for within-group comparisons show a significant difference in pain scores between pre-test, post-test, and follow-up in the experimental group, with approximately a 19-point reduction in pain in the post-test compared to pre-test. A further significant difference was found between post-test and follow-up, with a 12-point reduction in follow-up compared to post-test, indicating the effectiveness of Zen technique training in reducing pain among the elderly. However, a slight increase in pain was observed in the follow-up period. No significant difference was found between pre-test and post-test scores in the control group for pain.

Table 6

Between-group effect test results (Pain variable)

Source	Sum of Squares	df	Mean Square	F	Sig	Eta Squared
Intercept	110360.643	1	110360.643	839.792	.001	.955
Group	301.786	1	301.786	2.296	.138	.054
Error	5256.571	40	131.414			

The between-group effect test results show no significant difference [$F(1,40) = 2.296$, $p > .05$], indicating that Zen technique training did not significantly affect the pain variable between experimental and control groups.

For pain subcomponents (sensory, affective, evaluative, and miscellaneous), Wilks' Lambda was used for within-group effects in the mixed design, as assumptions were confirmed.

For the sensory component, within-group and between-group mean comparisons showed significant differences in the experimental group between pre-test, post-test, and follow-up, with a reduction of approximately 1 point in the sensory pain component in both post-test and follow-up. No significant difference was observed between post-test and follow-up, indicating the sustained effectiveness of Zen technique training on sensory pain. However, no significant difference was found between the experimental and control groups.

For the affective component, within-group and between-group analyses showed a significant reduction of about 1 point in affective pain scores in the experimental group from pre-test to post-test. A significant difference was observed between post-test and follow-up, indicating that the reduction in affective pain did not persist. No significant difference was found between the experimental and control groups for affective pain.

For the evaluative component, within-group and between-group analyses showed significant differences in the experimental group between pre-test, post-test, and follow-up, with a 2-point reduction in post-test and a 1-point reduction in follow-up. No significant difference was found between post-test and follow-up, indicating stability in evaluative pain scores. No significant difference was found

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between the experimental and control groups for the evaluative component.

For the miscellaneous component, within-group and between-group analyses indicated a significant reduction of about 1 point in the experimental group from pre-test to post-test. A significant difference was also found between pre-test and follow-up, suggesting that although Zen technique training initially reduced miscellaneous pain scores, the reduction did not persist over two months. No significant difference was found between the experimental and control groups for the miscellaneous component.

4. Discussion and Conclusion

As the study results indicate, Zen technique training increased well-being but did not have a significant effect on pain, which will be discussed further.

The mixed two-factor ANOVA results showed that Zen technique training was effective in enhancing the psychological well-being of the experimental group, with a significant improvement in their well-being scores after the intervention. No significant difference was observed between pre-test, post-test, and follow-up scores in the control group. This outcome aligns with findings from prior studies: Prashanth (2024) demonstrated that meditation techniques, with dual benefits of meditation and relaxation, enhance the physiological and psychological well-being of the elderly (Prashanth et al., 2024). Fincham et al. (2023) reported increased well-being scores across various mindfulness interventions (Fincham et al., 2023). Hwang et al. (2023) found that a music and Zen meditation program promoted well-being (Hwang et al., 2023). Jain et al. (2022) reported reduced anxiety and perceived stress scores with the use of meditation to maintain psychological well-being (Jain et al., 2022). In Chaturvedi et al.'s (2021) study, meditation practitioners scored higher in psychological well-being after receiving meditation training (Chaturvedi et al., 2021). Sylapan et al. (2020) found that meditation significantly raised well-being scores in experienced meditators and suggested that even novice meditators experience well-being benefits after gaining some skill (Sylapan et al., 2020). Ramirez-Barrantes et al. (2019) showed that specific meditation practices enhanced the quality of life among the elderly (Ramírez-Barrantes et al., 2019). Klimke et al. (2019) demonstrated improvements in cognition and well-being in elderly meditators (Klimecki et al., 2019). Lindberg (2005) reported that even novice elderly meditators experienced feelings of calmness and well-being during a specific session, which lasted several hours afterward. Lindberg also found that nursing home residents benefit emotionally and spiritually from short daily meditation practice more quickly than from cognitive restructuring or psychotherapy (Lindberg, 2005). Aghaei et al. (2017) supported the efficacy of mindfulness-based cognitive intervention in increasing well-being, noting increases in decentering and psychological well-being subscales (Aghaei et al., 2017). Jamshidian et al. (2019) demonstrated that a mindfulness training program had a significant positive impact on various components of elderly well-being (Jamshidian et al., 2019). Etemadi Shams Abadi et al. (2019) found that meditation positively impacted the executive functions and psychological well-being of the elderly and was the most effective intervention for psychological well-being (Etemadi Shams Abadi et al., 2019). Sadeghi and Cheraghi (2018) concluded that mindfulness enhances psychological well-being by promoting acceptance and awareness of emotions, self-awareness, and avoiding automatic thought patterns, making it a valuable tool for rehabilitation and improving life quality (Sadeghi & Cheraghi, 2018).

Only in Lomas (2019) were the effects of mindfulness on well-being moderate to small (Lomas et al., 2019). Goyal (2014) also found insufficient evidence for the impact of mantra meditation programs on psychological stress or well-being outcomes (Goyal et al., 2014). In contrast to our findings, which showed that mindfulness positively and significantly affected all well-being components, Jenabadi et al. (2017) found that while mindfulness improved self-acceptance, environmental mastery, purpose in life, autonomy, and personal growth, it did not significantly affect the positive relations with others subscale of psychological well-being (Jenabadi et al., 2016).

One of the most critical factors that counteract the negative aspects of aging and enhance our understanding of elderly abilities is psychological well-being. Given the elderly's heightened vulnerability to loss of happiness and psychological well-being, this can lead to emotional disorders like depression and anxiety stemming from age-related issues in various areas. Mindfulness enhances the psychological well-being of the elderly directly and indirectly through intermediary variables. Mindful individuals are better able to recognize, manage, and solve daily problems. Some studies show that mindfulness directly impacts positive psychological well-being and physical health outcomes. As mindfulness increases, individuals become more capable of stepping back to observe states like

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anxiety and depression. This distancing helps reduce automatic behavioral patterns and enables individuals to engage with emotions in a more mindful way, thereby enhancing psychological well-being (Zarshki & Shayganmanesh, 2021). Additionally, the elderly may experience a sense of self-esteem through practices they can perform independently at their own discretion (Lindberg, 2005).

Meditation's effects are frequently reported enthusiastically by the media. However, many findings remain unreplicated. Many researchers are also enthusiastic meditators. Although their insider perspective can provide valuable insights, researchers should maintain a critical view of study results. As shown in a meta-analysis, meditation studies exhibit a strong publication bias toward positive or significant results. The methodological quality of meditation research remains relatively low, with few longitudinal studies actively controlled and small sample sizes. As is typical in a young field, many experiments are not yet grounded in precise theories, so these results remain preliminary and should be carefully replicated. Meditation research also faces specific methodological challenges. Meditation studies are predominantly cross-sectional, comparing a group of meditators to a control group at one time point. Many studies have examined highly experienced meditators and compared them with non-meditating controls matched on various factors, assuming that any meditation effects in highly experienced meditators will be easily observable. Newer studies using longitudinal designs compare data from one or more groups over multiple time points, ideally including an active control condition and random assignment to conditions. However, longitudinal studies remain relatively rare in this field. Among such studies, some examine mindfulness training effects over a few days, while others analyze 1- to 3-month programs. It is also essential to control variables potentially conflated with meditation, such as lifestyle and dietary changes or the expectations and intentions of beginner meditators. Researchers should carefully determine which variables are integral to meditation training and which can be controlled. Some earlier studies controlled only the duration of practice and effects of repeated testing, but newer studies have developed active interventions in control groups, including stress management training, relaxation training, or health-promotion programs to control for factors like social interaction, physical exercise, and psycho-education. Better-designed studies can thus isolate specific meditation effects. For example, a study investigating short-term meditation training used a "sham meditation" condition in which participants believed they were meditating but did not receive proper instructions, allowing researchers to control for expectancy, posture, and attention (Tang et al., 2015).

Numerous studies demonstrate that increased mindfulness enhances psychological well-being and life satisfaction. As well-being increases, anxiety, depression, negative affect, and psychological symptoms decrease, while self-esteem, optimism, and positive affect increase. The current study results indicate that enhancing mindfulness can improve psychological well-being. Mindfulness brings clarity and sharpness to experiences, teaching individuals to live in each moment, which helps reduce negative psychological symptoms and improve psychological well-being.

Mixed two-factor ANOVA results showed a significant difference in pain scores after the intervention, although a slight reduction was observed during follow-up. In the control group, no significant difference was found between pre-test, post-test, and follow-up pain scores. No significant differences were also observed in pain subcomponents between the experimental and control groups.

These findings align with Goyal's (2014) study, which analyzed 47 trials with 3,515 participants in mindfulness meditation programs, showing moderate evidence for pain improvement (Goyal et al., 2014). In contrast to expectations, Mazaheri and Manshaei (2016) found no significant difference between groups regarding pain acceptance; higher mindfulness levels in patients with functional gastrointestinal disorders did not lead to a notable positive change in pain acceptance (Mazaheri & Manshaei, 2016).

Most studies, however, support meditation's effectiveness in pain reduction. Foulk et al. (2023) found mindfulness-based chronic pain care programs practical and effective for pain management among participants (Foulk et al., 2023). Honda (2022) reported reduced subjective pain by combining cognitive-behavioral therapy with Zen meditation (Honda, 2022). Kwon et al. (2021) showed that mindfulness meditation programs enhance overall life satisfaction and may improve metabolic disorders and chronic pain in the elderly (Kwon et al., 2021). Day's (2020) research found mindfulness meditation mechanisms beneficial in chronic back pain outcomes (Day et al., 2019). Hussein and Said (2019) demonstrated the impact of mindfulness-based meditation and progressive relaxation on chronic pain in elderly women (Hussain & Said, 2019). Ahn et al. (2019) showed mindfulness-based meditation's

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effectiveness for pain in elderly people with knee osteoarthritis (Ahn et al., 2019). la Cour and Petersen (2015) concluded that a standardized mindfulness program aids in pain management (la Cour & Petersen, 2015). Grant et al. (2011) suggested Zen meditators may develop the ability to separate higher-order brain processes while focusing on a painful stimulus (Grant et al., 2011). Morone et al. (2008) described mind-body therapies as a promising non-pharmacological supplement for treating elderly pain (Morone et al., 2008). Mazaheri and Manshaei (2016) found that mindfulness programs and related training could reduce pain and its negative aspects (Mazaheri & Manshaei, 2016). Ganesan et al. (2022) demonstrated significant pain reduction through mindfulness meditation (Ganesan et al., 2022).

Despite humanity's long-standing efforts to alleviate pain, complete relief remains elusive for many chronic pain sufferers. Some key factors should be considered, such as that even within a single meditation style, practitioners may be at different stages of mindfulness training. Individual differences in personality, lifestyle, life events, and the mentor-trainee dynamic likely influence training effects, although little data exists on these influences. Temperament and personality have been used to predict individual improvement in creative functioning post-mindfulness meditation (Tang et al., 2015). Fortunately, as reported in studies like Goyal (2014), no intervention-related harm was found. In clinical samples, pain acceptance correlates with lower pain experience, psychological issues, and physical disability, along with higher psychological well-being and engagement in daily activities (Goyal et al., 2014). Letting go of resistance and accepting the present situation without judgment is a core concept in mindfulness (Mazaheri & Manshaei, 2016).

Differences in findings across studies may stem from methodological variations, including (a) distinct cognitive-emotional processes involved in different training styles, (b) study designs and analytical approaches, including control group selection (e.g., novice versus experienced meditators) and baseline conditions like unstructured mind-wandering, and (c) the level of experience among trained groups, which may reveal unique pathways of training-induced change. Training and practice effects may depend on these design decisions, pointing to their potentially critical influence on meditation study outcomes (Skwara et al., 2022).

Practicing and learning a new skill likely fosters feelings of mastery, supporting the hypothesis that mastery enhances mood states. Group meditation sessions may promote happiness compared to solo practice, supporting the social connections hypothesis for reduced depression (Mazaheri & Manshaei, 2016). Many chronic pain sufferers consciously limit physical activity to prevent exacerbating pain or further injury, often moving cautiously and with a limited range of motion. This movement limitation may lead to muscle tension, aggravating pain. Reducing muscle tension could help reduce pain and improve other functional areas. This effect may be explained by the gate control theory, where cognitive and emotional factors influence pain through descending inhibitory systems (Saidian Asl & Goudarzi, 2011). Observational studies face high bias risks, with individuals who believe in meditation benefits or have prior experience more likely to enroll in meditation programs and report positive outcomes. Elderly caregivers need to know whether meditation training offers benefits beyond self-selection biases and non-specific effects of time, attention, and improvement expectations (Goyal et al., 2014).

Given the limited physical capabilities of the elderly, yoga breathing exercises and relaxation practices are low-cost, enjoyable, safe, and non-invasive. These exercises focus on slow, controlled breathing, concentration, release, and relaxation, making them suitable for enhancing mental health and reducing depression among the elderly. However, broader and longer-term studies are needed across different groups to examine these exercises' more enduring effects (Hussain & Said, 2019). Integrated therapies like mindfulness meditation can be part of a comprehensive pain management plan, reducing medication use, improving outcomes, alleviating conditions like anxiety and depression, and avoiding addiction risks (Hussain & Said, 2019).

This study introduces a novel approach regarding selected exercises. Although simple, meditation and physical exercises can reduce pain, but further research on their type and intensity is required to identify optimal practices for different age groups, particularly the elderly. Therefore, more research in primary care and specific patient populations is needed to address uncertainties from inconsistencies in evidence, power deficiencies, and bias risks. Day (2020) argues that cognitive content changes can be achieved through diverse therapeutic approaches. Some individuals may prefer cognitive restructuring, while others may favor sitting in mindfulness meditation. Offering patients a range of treatment options may ultimately enhance therapeutic benefits (Day et al., 2019).

5. Limitations & Suggestions

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The short intervention period and lack of long-term follow-up are study limitations. Future research should employ longitudinal, randomized designs with larger sample sizes to advance understanding of mindfulness meditation mechanisms. If rigorously supported, mindfulness meditation practice could hold promise for treating clinical disorders and may foster mental health and well-being. Since this method is entirely non-invasive and safe, it is recommended for diverse populations beyond the elderly. Conducting it in different settings and comparing results with the present study could strengthen the interpretation of treatment effects' generalizability.

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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. Each participant received an informed consent form to understand the study's objectives.

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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Authors' Contributions

All authors equally contributed in this article.

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