

Research Article

The Effect of Exercise-Based Game Intervention on Reducing Depression in the Older Adults

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Abstract: The older adults are a population vulnerable to mental health problems, particularly depression. Exercise-based game is a game-based training activity that involves body movement according to given instructions and is considered effective in improving emotional balance and reducing depressive symptoms in older adults. This study aimed to determine the effect of exercise-based game and education on reducing depression levels among the older adults at the Posyandu Lansia Bugar Mandiri Bangunrejo, Yogyakarta. This experimental study employed a quasi-experimental approach with a pre-test and post-test two group design. The sampling technique used total sampling with 30 participants divided equally into two groups of 15 each. The training program was conducted three times a week for four weeks. The research instrument used the Geriatric Depression Scale, and data were analyzed using paired sample t-test and independent sample t-test. The results showed that both exercise-based game and education significantly reduced depression in the older adults ($p = 0.00$; $p < 0.05$). However, there was no significant difference between the two groups ($p = 0.096$; $p > 0.05$). In conclusion, both exercise-based game and education are effective in reducing depression among the older adults, but neither showed a significantly greater effect than the other.

Keywords: Education; Exercise-Based Game; Geriatric Depression; Mental Health; Older Adults

1. Introduction

Older adults, commonly defined as individuals aged 60 years and above, experience a range of biological, psychological, and social changes that affect their overall well-being (Sudirman et al. in Karomah, 2015). The World Health Organization's conceptualization of positive mental health, which includes emotional, psychological, and social well-being, highlights the multi-dimensional nature of mental health in later life (Yuliani, 2018). Demographic shifts toward population ageing driven by improvements in health, nutrition, and social welfare have produced a rising proportion of older adults worldwide and in Indonesia. Recent reports indicate that the share of older adults in the Indonesian population exceeded 11 percent in 2023 and is expected to continue increasing in the coming years (Amania & Usman, 2024; Annisadina & Fernanda, 2024; Rahayuwati et al., 2024). Although increased longevity reflects national development, this condition also creates new challenges for physical and mental health services for older people (Bakroh & Hiilamo, 2025; Munawaroh et al., 2025).

Mental health problems, particularly depression, are a serious concern among older adults. Depressive symptoms in this population are often overlooked or misattributed to the normal process of ageing, which delays diagnosis and treatment and negatively impacts quality

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of life, functional independence, and mortality (Astutik et al., 2021; Handajani & Schröder-Butterfill, 2022; Idaiani & Indrawati, 2021). Depression in older adults frequently appears together with somatic complaints such as decreased energy, sleep disturbances, and appetite loss (Hasri, 2023). Psychosocial factors including bereavement, reduced social interaction, and limited family support also contribute to psychological distress. Cognitive and personality-related vulnerabilities, such as passive thinking patterns, irrational self-blame, pessimism, and apathy, further intensify depressive symptoms (Ayu et al., 2022; Lampert & Ferreira, 2018; Nul Hakim, 2020). On the other hand, older adults who remain socially active and receive emotional support tend to demonstrate better mental health because social engagement strengthens their sense of belonging and self-worth (Khuzaimah et al., 2023).

A variety of interventions have been used to reduce depression among older adults, including psychoeducation, structured training, and technology-based therapies such as virtual-reality programs. Existing reviews show these approaches produce diverse outcomes (Kamnardsiri et al., 2021). Exercise and activity-based programs are widely recommended because they simultaneously address physical functioning and psychosocial well-being, although conventional exercise may lack motivational elements for some older individuals. Exercise-based games, which combine physical movement with interactive game elements, represent an innovative alternative that enhances motivation, enjoyment, and social interaction. Research shows that such interventions can improve motor coordination, foster positive emotions, and reduce loneliness, which subsequently contributes to decreased depressive symptoms (Li et al., 2014).

Observations and interviews conducted at Posyandu Lansia Bugar Mandiri Bangunrejo, Yogyakarta, revealed substantial challenges among older adults, particularly regarding physical flexibility and mental health. Out of approximately seventy older adults interviewed, thirty reported mental health issues related to depression. These findings identify a clear research problem regarding the need for effective community-based interventions. The present study aims to address this issue by examining whether an exercise-based game yields different effects on depression reduction compared to an educational program among older adults in this community setting.

2. Related Work

The demographic transition toward an ageing population has been widely discussed in recent research and national statistical reports. Studies highlight that increasing numbers of older adults present both opportunities and challenges for public health systems, especially in countries such as Indonesia where the proportion of older adults continues to rise (Amania & Usman, 2024; Annisadina & Fernanda, 2024; Rahayuwati et al., 2024). This demographic shift increases the need for adequate mental health services and community interventions to support holistic well-being among older adults (Bakroh & Hiilamo, 2025; Munawaroh et al., 2025).

Previous research consistently demonstrates that depression in older adults is underdiagnosed because its symptoms often resemble physical effects of ageing or other comorbid conditions (Astutik et al., 2021; Idaiani & Indrawati, 2021). Untreated depression is associated with serious consequences such as reduced functional capacity, dependency, and elevated mortality risk (Handajani & Schröder-Butterfill, 2022; Hasri, 2023). Psychological studies further identify cognitive and personality-related factors that contribute to depressive symptoms, including passive thinking, negative self-attribution, and cognitive decline. Social determinants such as loneliness, decreased family interaction, and reduced participation in community activities also worsen mental health outcomes (Ayu et al., 2022; Khuzaimah et al., 2023; Lampert & Ferreira, 2018; Nul Hakim, 2020).

Intervention research for late-life depression includes psychoeducational programs, therapist-directed training, physical exercise, and technology-enhanced treatments. According to Kamnardsiri et al. (2021), commonly used game-based therapies for depression include psychoeducation, skill training, and virtual-reality formats. Each of these approaches has strengths and limitations. Psychoeducation improves awareness and coping but may not strongly influence behavior change. Training programs build functional abilities but often lack engaging elements. Virtual-reality and game-based therapies enhance user engagement, though resource requirements may limit their accessibility. Exercise-based games attempt to integrate the strengths of physical exercise and interactive technology. Studies show that these games can simultaneously improve physical flexibility, mood, and social connectedness, which are key protective factors for mental health in older adults (Li et al., 2014).

However, gaps still remain in the literature. Many existing studies are conducted in controlled laboratory settings, making it difficult to apply findings directly to community-based environments such as posyandu. Furthermore, fewer studies compare exercise-based games with conventional educational approaches, particularly in Indonesian community contexts. There is also limited evidence that simultaneously evaluates both physical and psychological outcomes in the same intervention model. To address these gaps, the present study compares the effectiveness of exercise-based games and educational programs in reducing depressive symptoms among older adults at Posyandu Lansia Bugar Mandiri Bangunrejo, Yogyakarta, with the aim of producing practical insights for community-level interventions.

3. Materials and Method

This study employed a true experimental design with a pre-test and post-test two-group structure. The sample was selected using a purposive sampling technique, in which research subjects were determined based on predefined inclusion criteria. Data collection was conducted using a research instrument in the form of a questionnaire that had obtained ethical approval under permit number No.3403/KEP-UNISA/I/2024. The collected data were then statistically analyzed using a paired sample t-test to identify significant differences between pre-intervention and post-intervention measurements in each research group.

The study population consisted of older adults registered as members of the Posyandu Lansia Bugar Mandiri Bangunrejo, Yogyakarta. The inclusion criteria targeted older adults who exhibited symptoms of mild depression. Based on the sample size calculation, a total of 30 respondents met the research criteria. These respondents were then divided into two treatment groups, with each group comprising 15 participants. The first group received an intervention in the form of exercise-based game training, while the second group received an educational exercise program. This grouping was conducted to compare the effectiveness of both methods in reducing depression levels among older adults. All stages of the study were carried out in accordance with research ethics and the principles of participant confidentiality.

4. Results and Discussion

Results

Table 1 presents the frequency distribution of respondents based on age and sex variables in each research group.

Table 1. Frequency Distribution of Respondents by Age and Sex

Variable	Exercise-Based Game	Education
Sex		
Male (n, %)	10 (66.7%)	10 (66.7%)
Female (n, %)	5 (33.3%)	5 (33.3%)
Age		
63–74 years (n, %)	4 (26.7%)	4 (26.7%)
75–90 years (n, %)	11 (73.3%)	11 (73.3%)

Based on the characteristics of respondents by sex, the majority in both the exercise-based game group and the education group were male, with 10 respondents (66.7%). According to the measurements using the Geriatric Depression Scale 30, most older adults aged 63–74 years experienced mild depressive symptoms. Hartutik and Nurrohmah (2021) noted that around 10–15% of older adults aged 65–74 who live with their families experience depression, while the prevalence increases significantly among those living in institutions, where approximately 50–75% show mild to moderate depressive symptoms.

In terms of age characteristics, respondents in both the exercise-based game group and the education group were dominated by older adults aged 75–90 years, totaling 11 individuals (73.3%), compared to 4 individuals (26.7%) aged 63–74 years. This finding aligns with the statement of Jacoby, Oppenheimer, and Tom cited in Hartutik and Nurrohmah (2021), which explains that among married couples, older women tend to experience depression more frequently than older men. Older adults without a spouse are also at greater risk of depression. Biological factors such as hormonal changes during menopause may affect mood and emotional stability, while psychologically, older women tend to adjust better to loneliness than older men.

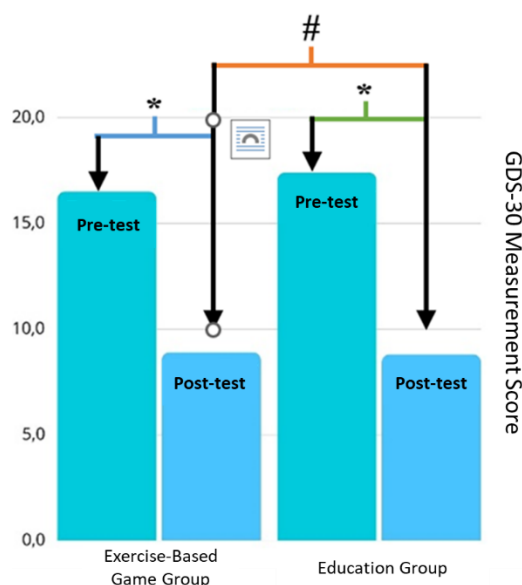


Figure 1. Research Results with Hypothesis Testing.

The first hypothesis test, analyzed using the paired sample t-test, yielded a p-value of 0.00 ($p < 0.05$), thus accepting H_a and rejecting H_o . This indicates that the exercise-based game intervention significantly reduced depression levels among older adults.

The second hypothesis test also produced a p-value of 0.00 ($p < 0.05$), meaning that H_a is accepted and H_o is rejected. This signifies that the educational intervention also had a significant effect on reducing depression among older adults.

The third hypothesis test resulted in a p-value of 0.968 ($p > 0.05$), indicating acceptance of H_o and rejection of H_a . Consequently, it can be concluded that there was no significant difference between the effects of the exercise-based game intervention and the educational intervention in reducing depression among older adults. The mean value in the exercise-based game group was 38.27, while the education group had a mean of 31.07.

Discussion

The results presented in Table 1 indicate that most respondents in both groups were within the age range of 63–74 years, totaling 10 individuals (66.7%). Based on the Geriatric Depression Scale 30 assessment, this age group showed higher levels of depression. Hartutik and Nurrohmah (2021) explained that depression among older adults living with family ranges from 10–15%, while the rate increases to 50–75% among those residing in long-term care facilities. This demonstrates that social and environmental factors play a crucial role in shaping the psychological condition of older adults.

Sex characteristics also showed a predominance of female respondents (73.3%). This supports the findings of Jacoby et al. in Hartutik and Nurrohmah (2021), who stated that older women are more vulnerable to depression than older men. Hormonal factors, psychological tendencies, and social conditions contribute to this higher risk. Menopause, for example, may lead to emotional changes, while the loss of a spouse contributes to loneliness and mood disturbances.

The findings of the first hypothesis test demonstrated that exercise-based games effectively reduced depression levels among older adults. The p-value of 0.000 ($p < 0.05$) indicates a significant effect after the intervention. Sumarni et al. (2019) found that game-based exercises can enhance emotional balance and mental well-being in older adults. Through interactive gameplay activities, older adults may improve their mood, expand social interaction, and reduce feelings of loneliness.

The second hypothesis test confirmed that education also contributed to lowering depression levels. Lestari and Fuada (2021) explained that educational programs can provide relaxation effects through counseling and group discussions. These activities help older adults shift their thinking patterns toward more positive and adaptive perspectives, enabling them to better accept personal conditions.

Meanwhile, the results of the third hypothesis test indicated no significant difference between the effects of exercise-based games and educational interventions. The p-value of 0.968 ($p > 0.05$) confirms that both interventions have relatively equal levels of effectiveness in reducing depression among older adults. Gerardi (2008) stated that game-based interventions naturally support depression reduction through elements of enjoyment and social interaction, whereas mental health education contributes to improved self-understanding and emotional regulation (Cahyadi et al., 2022).

Mental health education at the Posyandu Lansia, as described by Cahyadi et al. (2022), emphasizes the importance of maintaining a harmonious balance between physical and mental health. Through these activities, older adults are encouraged to manage their emotions, sustain positive social relationships, and focus on meaningful aspects of life. These benefits align with those of exercise-based games, which not only emphasize physical activity but also offer cognitive and emotional stimulation. Thus, both approaches, exercise-based games and

education, demonstrated positive effects in reducing depression among older adults, with relatively comparable levels of effectiveness.

6. Conclusion

The findings of this study show that both the exercise-based game and educational interventions effectively reduced depression levels among older adults, as reflected in decreased GDS-30 scores after treatment, and these results align with the study's objectives by confirming the usefulness of nonpharmacological approaches in improving mental well-being. Although both interventions demonstrated similar effectiveness, with no statistically significant difference between groups, the study contributes to the growing evidence that accessible community-based programs can support psychological health in later life. However, this study is limited by its small sample size and short intervention duration; therefore, future research should involve larger and more diverse samples, longer intervention periods, and broader outcome measures to deepen understanding of the long-term impact of these interventions.

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Data Availability Statement: The data supporting the findings of this study are available from the corresponding author upon reasonable request. Data cannot be publicly shared due to privacy and ethical restrictions involving older adult participants.

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