



The Effect of Individual-based and Group-based Exercise on Loneliness in the Elderly: A Quasi-Experimental Study

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Abstract

Introduction: The impact of individual versus group-based physical activities on psychological well-being, particularly loneliness in the elderly, remains uncertain. We aimed to compare the effect of group and individual exercise on loneliness in the elderly.

Methods: The present study was a quasi-experimental study with pre-test and post-test design that investigated the effect of exercise on loneliness, involving 110 elderly in Alborz province, Iran in 2021. Participants were randomly divided into three study groups (control, individual exercise and group exercise). The UCLA Loneliness Scale was used to assess the level of loneliness sensing before, immediately and one month after exercises schedule.

Results: The results of intergroup comparison showed no significant difference across the three groups in the feeling of loneliness in the elderly before the interventions. Although no difference was found between individual-based and group-based exercise groups immediately after exercise, there was a meaningful difference between the control group and the other two interventional groups. The one-month trend of the change in loneliness score in both individually exercising ($p = 0.002$), and group-based exercising ($p = 0.008$) was shown to be significant.

Conclusions: Since this research demonstrates that both individual and group exercise activities can alleviate feelings of isolation in elderly populations, government officials should prioritize including group fitness classes in their health initiatives targeting senior citizens.

INTRODUCTION

Aging is a sensitive period of life and a natural process that is characterized by a wide range of physiological and psychological changes including cognitive weakness, gradual decline of body, memory and social function, which mainly leads to loss of independence and decline

in mental health [1-3]. Improving living conditions, health care, and advances in health sciences have led to a global increase in the elderly population [4]. The dramatic increase in the elderly population around the world is a phenomenon that began in the twentieth

century. In 2016, the United Nations estimated the total number of elderly people in the world at around 700 million, and this population is projected to double in the next 40 years [5]. Regarding increasing life expectancy, the mean age for male and female in 1980 was 69.8 and 77.5 years, respectively. In 2040 it is estimated to be 75.0 years for men and 83.1 for women [6].

In Iran, the population over sixty years will reach about ten million by 2020 and more than twenty-six million by 2050 [7]. The growth of the country's elderly population has been associated with increasing problems, one of the most common of which is the increase in loneliness that many older people experience [8].

Studies have shown that about twenty-five to fifty percent of the elderly over the age of sixty experience loneliness [8, 9]. This feeling is not just the result of living alone; it also occurs in the absence of quality social communication. Although older people today are more educated and more active than previous generations, they are more at risk of social isolation and loneliness [10]. The results of some studies show that feeling lonely affects the vulnerability of the elderly to a variety of physical and mental illnesses and also causes various psychological problems such as depression, suicide, severe frustration, social isolation, anxiety and self-care behaviors [11-13]. (Somes J. 2021). A four-year follow-up study of these individuals showed that if the feeling of loneliness persisted, the acceleration of hypertension would continue [10]. Therefore, it seems necessary to study the feeling of loneliness among the elderly and to design various interventions, including sports and physical exercises, to improve this condition.

Research on loneliness in recent years has focused more on psychological pathology and less on factors that can be effective in improving the level of social relationships and reducing isolation and loneliness [10, 13]. Research suggests that psychomotor interventions can significantly enhance emotional, cognitive, and behavioral well-being in older adults. By incorporating exercise and rhythmic movements, these programs can help reduce anxiety and distractions, alleviate stress, strengthen muscles, improve focus, and promote positive thinking, happiness, and a sense of self-worth [14]. Physical activity, both individually and in groups, has many health benefits [15]. Although the distinction between individual and group-based physical activities has been explored, the advantages of group exercise over individual exercise, such as using a treadmill, are not yet fully comprehended [16, 17]. Beneficial health mechanisms in group exercise may have not only physiological effects, but also psychological and social factors. A systematic review focusing on the psychological and social benefits of group exercise has shown that physical activity with others may increase social connection, social support, and collaborative bonding [18]. These social relationships have been

shown to have potential health benefits for individuals [19]. Few studies have examined the differences between exercise and group exercise compared to individual exercise on health [20]. Evidence has also shown that older people are more likely to engage in group physical activity due to social interactions [21].

As the elderly population in Iran is increasing [22] and it has been found that physical activity has a physiological effect on the health of the elderly, however, it has not yet been determined whether the physical activity of the elderly in groups or individually can affect psychological issues, including their sense of loneliness. Therefore, the purpose of this study was to compare the effect of group and individual exercise on loneliness in the elderly.

METHODS

The present study was a quasi-experimental study with pre-test and post-test design that investigated the effect of exercise on loneliness in the elderly of Alborz province in 2021. The current research environment was places such as mosques, parks in Alborz province, where the elderly mostly resided. The inclusion criteria were age 60 years and older and be literate to answer the questionnaire questions. In this regard, participation of people in sports activities, absence from sports sessions, and participants withdrew from the study was considered as the exclusion criteria.

In this study, research data were collected by field method using a questionnaire. The researcher went to the parks, elderly who met the inclusion criteria and was invited to participate in the study. Obviously, all the ethical and legal issues mentioned in the ethical considerations were observed, and by stating the objectives of the study, they were asked to complete the questionnaires before and after the intervention.

The study checklist was applied to collect the general characteristics including age, marital status, having children, economic status, and residence status of the elderly. The UCLA Loneliness Scale was also used to assess how often a person feels disconnected from others. This questionnaire was developed by Russell, Peplau & Ferguson in 1980 and consists of 20 questions that each question scored as 1 for never, 2 for rarely, 3 for sometimes, and 4 for always. The score range between 20 (minimum) and 80 (maximum), so the average score is 50, a score higher than average indicates greater intensity of loneliness. The reliability of this questionnaire in the new revised version was reported to be 0.78. The reliability of the test by test-re test method was reported by Russell and colleagues (1978) as 0.89 [23]. Cronbach's alpha of this tool was reported to be 0.89 in Hojjati et al among Persian population [24]. The reliability of the questionnaire was assessed in the present study using Cronbach's alpha, yielding a coefficient of 0.77. According to Nunnally (1978),

Cronbach's alpha values of 0.9 or higher indicate excellent reliability, 0.8 to 0.9 good reliability, 0.7 to 0.8 acceptable reliability, 0.6 to 0.7 questionable reliability, 0.5 to 0.6 poor reliability, and below 0.5 unacceptable reliability.

To collect data, after approving the proposed plan and obtaining permission from the ethics committee of Shahid Beheshti University of Medical Sciences (IR.SBMU.PHARMACY.REC.1398.292).

The researcher participated in the study in sportswear to increase the trust of the elderly and increase their motivation. After selecting the participants and determining their pre-test scores on feeling loneliness, the aerobic exercise program in 10 sessions was scheduled, which in the first sessions for 15 minutes to a maximum of 45 minutes in the last sessions as 3 sessions per week for group participants. 110 older adults participated in the study and were randomly allocated to three study groups (control, individual exercise and group exercise). To ensure minimal inter-group communication, we initially selected and trained an intervention group. Subsequently, we compared this group to a control group and a group that exercised individually. This approach allowed us to effectively isolate the impact of the intervention on each group and eliminate potential confounding effects arising from inter-group interactions. The researcher was present at all stages and provided the necessary instructions to the people to perform the movement.

Participants in the three groups completed the loneliness questionnaire in two stages, before the interventions (pre-test stage) and after the interventions (post-test stage).

The results were presented as mean $\pm$ standard deviation (SD) for quantitative variables and were summarized by absolute frequencies and percentages for categorical variables. Normality of data was analyzed using the Kolmogorov-Smirnoff test. Categorical variables were compared using chi-square test or

Fisher's exact test when more than 20% of cells with expected count of less than 5 were observed. Quantitative variables were also compared with ANOVA test, or Kruskal-Wallis H test. The change in loneliness-related score after intervention compared to before that was assessed using the Paired t test or Wilcoxon test. In order to compare the trend of changes in the loneliness of the elderly during before, immediately and one month after the intervention in each study group, the repeated measures analysis of variance test was used. For the statistical analysis, the statistical software SPSS version 16.0 for windows (SPSS Inc., Chicago, IL) was used. P values of 0.05 or less were considered statistically significant.

RESULTS

This study investigated the impact of exercise on loneliness in older adults. A total of 110 participants were included and divided into three groups, control group (n=35), Individual exercise group (n=35), group-based exercise group (n=40). As shown in Table 1, all groups were similar in terms of baseline characteristics such as age, marital status, presence of children, economic background, and residence.

Table 2 summarizes the participants' characteristics, loneliness levels before the intervention, immediately after, and one month later. There were no significant differences in loneliness scores between the groups before the intervention. However, after the intervention, significant differences emerged. While no difference was observed between the individual and group exercise groups, both showed a decrease in loneliness compared to the control group. The control group's average loneliness score was significantly higher ($p = 0.024$) than the individual exercise group and even higher ($p = 0.001$) compared to the group exercise group after the intervention period.

Table 1. Baseline characteristics on the study groups

Item	Control (N = 35)	Individual exercise (N = 35)	Group exercise. (N = 40)	P value
Age category				0.686
65 to 72 years	21	19	20	
73 to 85 years	14	16	20	
Marital status				0.846
Single	1	1	2	
Married	34	34	38	
Having children	32	34	38	0.567
Economic status *				0.789
Moderate to high	27	29	33	
Low	8	6	7	
Residence status **				0.617
Moderate to high	27	24	31	
Low	8	11	9	

* Economic situation based on monthly income (above and below the level of income adequacy)

** Location based on urban area (center to north and center to bottom of the city)

Table 2. Comparison of loneliness in the elderly before, immediately and one month after the intervention in the 3 groups

	Control (N = 35)	Individual exercise (N = 35)	Group exercise. (N = 40)	P value
Time point				0.449
Before intervention	58.94±4.58	58.31±4.86	57.57±4.56	<0.001
Immediately after intervention	58.77±4.54	56.08±4.87	53.72±4.64	<0.001
One-month after intervention	58.88±4.52	53.28±4.70	50.75±4.88	
P value	0.176	<0.001	<0.001	

Further analysis using the Bonferroni test revealed a significant difference in loneliness scores between the individual and group exercise groups at different time points. The individual exercise group showed a decrease in average loneliness score of 2.22 points immediately after the intervention and 5.02 points one month later, compared to baseline. The group-based exercise also showed decreases, with scores dropping by 3.85 points and 6.82 points, respectively, at the same time points (Figure 1).

The control group, on the other hand, showed no significant change in loneliness scores before, immediately after, and one month after the intervention ($p = 0.336$). In contrast, both the individual ($p = 0.002$) and the group-based exercise group ($p = 0.008$) demonstrated significant improvements over time.

DISCUSSION

The present study could successfully demonstrate the significant effectiveness of both group-based and individual-based exercise on lowering the loneliness score in the elderly. More interactively, with the continuation of the exercise schedule for one month, the improvement in the loneliness score was gradually visible especially in group-based exercising. Therefore, it seems that individual and group sports were more effective in reducing the loneliness of the elderly and group sports were more effective than individual sports in reducing the loneliness of the elderly. Feelings of loneliness were significantly reduced in the elderly who participated in the aerobic exercise program (both individual and group). This confirms the conclusion that programming sports activities make changes in the cognitive and emotional processes of the elderly that can lead to a change in mood and better social relationships. In agreement with our findings, the results of Rahimi et al. (2012) also showed that aerobic exercise can have positive effects on the quality of life of the elderly and be used as a supplement or alternative in the treatment of cognitive disorders in the elderly. Also, aerobic exercise can increase a person's self-efficacy in performing daily tasks due to the improvement of physical condition by increasing physical strength, flexibility, and cognitive balance. In addition, this method leads to more successful results in daily tasks by increasing concentration [25]. Also, Jafari and Behboodi (2017) showed that aerobic exercise can significantly reduce the loneliness of the elderly and significantly increase their level of happiness. The results of a recent study suggest evidence that aerobic exercise is an appropriate

movement therapy to reduce feelings of loneliness and promote happiness in the elderly. Therefore, in order to reduce the feeling of loneliness and improve the level of happiness of the elderly, it is recommended that the elderly be encouraged to perform daily aerobic exercise [26]. In addition, Kashi et al. (2017) showed that in general, aerobic exercise can improve cognitive function in the elderly, however, it was hypothesized that aerobic exercise in water and even exercise in water better and faster than aerobic exercise can improve working memory in older women [27]. Also, Borzoo et al. (2016) using a regular and codified exercise program observed that the quality of life of the elderly increases significantly compared to before the exercise program, however at the same time, the group that did not practice the exercise program did not experience a significant change in quality of life. According to the findings, the authors concluded that by using a regular, continuous and well-accepted exercise program by this age group, it is possible to increase the quality of life in various dimensions and give a way for healthy aging and better health in this period [28]. The involvement of the elderly in dynamic and balance exercises, and on the other hand, the observation of their relative improvement in walking, movement, and balance, has an effective role in cognitive and emotional changes in the elderly. The effect of exercise on brain neurobiology and the improvement of cognitive status and depression in individuals have been confirmed by valid studies [29]. Therefore, it can be concluded that exercise increases the release of dopamine and reduces the symptoms of the disease, including depression. Balance exercises may also cause significant mood swings by increasing concentration, which is closely related to the nervous system. As the results of previous studies [30, 31] have shown that physical activity has an effect on mood, motor and cognitive function.

Comparison of the effect of individual and group sports on the feeling of loneliness showed that the elderly entered into social interactions by performing group-based exercise activities. As their focus shifted from the inside out, they emerged from isolation, and overall these conditions were associated with many psychological benefits for them [32]. Explaining this result can be said because group exercise and physical activity improve the function of the central nervous system by further strengthening the nervous system of the elderly. Regular exercise further modulates the rate of decline in the power of neurons and dendrites, causing older people to behave more appropriately,

more socially, and more energetically than their peers [33-37].

CONCLUSION

Given the rising elderly population and the significant discomfort experienced by this group, there is a pressing demand to investigate and introduce intervention programs such as group aerobic exercise. In a general sense, physical activity in older individuals elicits mood variations through cognitive transformations, dopamine discharge, elevated cardiovascular responses, improved blood flow, central nervous system fortification, and heightened brain cell activation. These alterations result in enhanced social interactions, decreased feelings of loneliness, and a rejuvenated mood as their physical activity levels increase and their perspectives on life and self-evolve. Since the Geriatric nurses have a vital social responsibility to educate older adults on the benefits and practicalities of participating in group exercise. Then hospitals, nursing homes, and parks frequented by older adults provide prime opportunities for geriatric nurses to deliver such educational programs.

Educating older adults about group exercise can significantly improve their physical and mental well-being, ultimately enhancing their quality of life. Additionally, policymakers play a crucial role in promoting the health of older adults. They should consider incorporating group exercise programs into senior health initiatives.

Limitation

The present study may not fully consider the diversity of the older adult population and may not equally cover the experiences and needs of different ethnic, racial, gender, and socioeconomic groups and the financial and human resources allocated to research on exercise in older adults are limited. This can lead to a small number of studies being conducted and a lack of diversity in the topics examined. Policymakers should consider incorporating group exercise into their senior health programs.

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AUTHOR'S CONTRIBUTIONS

Meysam azadhosseini: researcher, data analyzer. Fatemeh estebarsari: supervisor, result reviser. Elnaz goodarzi: Data gathering. Mitra zandi: supervisor, consultant.

ETHICAL CONSIDERATION

This research is based on a master's thesis in nursing from Shahid Beheshti University of Medical Sciences with ethics code: IR.SBMU.PHARMACY.REC.1398.292.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this study.

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