

Comparing the Effects of Group and Home-based Physical Activity on Mental Health in the Elderly

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ABSTRACT

Background: The present study focuses on comparing the effects of home-based (HB) and group-based (GB) physical activity on mental health in a sample of older adults in Shahr-e-kord.

Methods: In this quasi-experimental study, a twice-weekly physical activity program for 2 months was provided either individually at home or in a group format for 181 people who were divided into two groups (HB and GB). The outcome, mental health, was measured with the 28-item General Health Questionnaire (GHQ-28).

Results: Mental health status improved after participation in the physical activity program. The decrease in GHQ-28 total score in GB group, 3 months after intervention, was 3.61 ± 2.28 ($P < 0.001$). In HB group, this reduction was 1.20 ± 2.32 during the same period ($P < 0.001$). The difference of these “before–after differences” between the two groups in the GHQ-28 and all its subscales was statistically significant ($P < 0.001$). Also, the effects of GB physical activity on mental health compared with HB physical activity, adjusted for related baseline variables, were significant.

Conclusions: These findings reveal the probable effects of GB rather than HB physical activity on mental health among the elderly.

Keywords: Elderly, group-based physical activity, home-based physical activity, mental health

INTRODUCTION

According to World Health Organization, the world's population has been aging rapidly.^[1] Currently 600 million people worldwide are getting 60 years old or more, and this number will grow to 1.2 billion by 2025.^[2] Although the aging of the population is one of the biggest achievements of human society, older age is associated with higher prevalence of mental and physical problems.^[3,4] Movement disorders, osteoporosis,^[5] cancers,^[6] diabetes,^[7] cardiovascular diseases,^[8] depression, anxiety, and dementia are all highly prevalent in later life.^[9] Mental health disorders are the second leading causes of losing life.^[10]

In the past 20 years, there has been growing recognition that physical activity is an important health behavior to the process of physical disability.^[11] Evidences indicate that frequent participation in physical activities substantially reduces the risk of several chronic diseases including cardiovascular disease, stroke, and some cancers, and promotes maintenance of healthy weight, blood pressure, cholesterol, and mental health.^[12,13] In addition, numerous studies link physical activity and mental health.^[14,15] Research examining the influence of exercise interventions on clinical depression has been published for more than a century.^[16] Therefore, adequate prescribed physical activity is highly recommended to promote health among the elderly.^[17]

A large number of physical activity intervention studies have been conducted considering older adults.^[18] These interventions have been found in various formats, including supervised home-based activity, group/class-based activity or a combination of group- and home-based activity (both).^[3] Despite these efforts, there has been inadequate research in which the differences between these kinds of various formats of physical activity have been found,^[19] especially in Iran. So, there is a need to continue research on the effectiveness of physical activity interventions.^[20] The aim of the present study is to compare the effects of group-based (GB) and home-based (HB) physical activity on mental health in people aged 60 and more.

METHODS

In this quasi-experimental study, among the 35 health centers located in Shahr-e-kord district, 10 urban ones, which were randomly selected, provided us the list of subjects. Twenty people were randomly selected from the list in each of the health centers (making a total of 200 females and males aged 60-89 years). In order to rule out the study exclusion criteria, participants had been visited by a general practitioner. Those who were prohibited from exercising due to medical reasons and those who had been absent for more than three uninterrupted sessions were excluded. All participants were mentally and physically able to participate in the study, and all of them gave written consent. Due to low level of education, all the participants were interviewed orally. One

trained personnel in each health center educated the participants about the goals of study, the questionnaires, and the interviewing method, and conducted interviews with the study subjects individually. Interviews were performed within 2 weeks at the beginning and were repeated 3 months after the trial. Participants completed surveys including demographic characteristics and measures of mental health [28-item General Health Questionnaire (GHQ-28)]. At the end (of recruiting 200 participants), 181 satisfactorily completed the study [Figure 1].

After the baseline mental health assessment, members were divided into two groups of physical activity, GB and HB, according to participants' tendencies. Because of the nature of the intervention, participants were not blinded to group membership. Because of the condition of the elderly people due to which they could not participate in the classes regularly, we were not able to choose the members of the groups randomly.

Physical activity programs

Two kinds of interventions were conducted in this study, GB and HB. In the first group, the participants exercised in 10 groups of 10 persons in each with the exercise instructors, and the participants in the other group exercised at home with one of their family members. Exercise instructors and one of the family members of each of the participants were educated to supervise

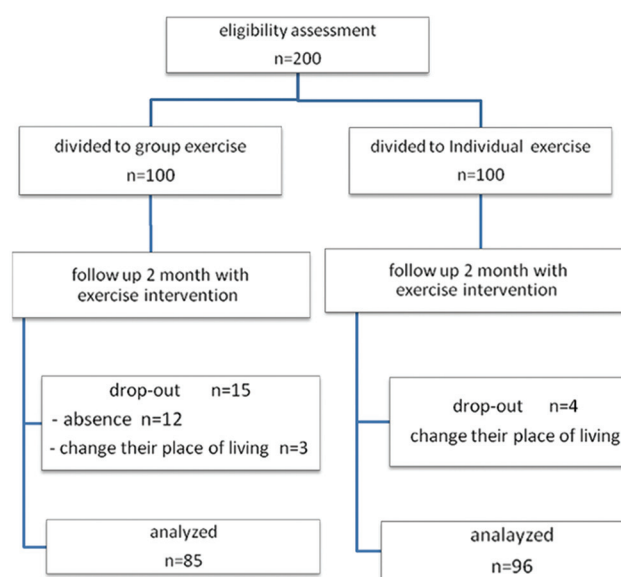


Figure 1: Participant flow and follow-up

the intervention in the first and second study groups, respectively. After that, in the first session, an exercise instructor provided information about maintaining a good health on topics like healthy aging, exercise and health, physical and mental resistance and endurance, mental health in elderly, and symptoms related to aging for all of the participants. Then, another exercise instructor delivered exercise program based on instructions prepared by Iran Ministry of Health.^[21]

This exercise includes three important stages: Warm-up (10 min), exercises (whole muscles should be included) for 30 min, and cool-down (5 min), which overall takes 45 min.

This program had been delivered in 16 sessions twice a week for 2 months. The exercise sessions were accompanied by tape recorded music and were graded in terms of difficulty and the number of repetitions. The activities could be practiced both seated and in standing position.

Measures

Demographic variables were calculated with a questionnaire containing 10 questions. Mental health was assessed by GHQ-28, which is widely used in screening minor psychiatric disorders in community samples. The GHQ offers a continuous measure of psychological distress or current mental health status. The 28-item version describes individual health status in terms of four dimensions of psychological morbidity and social functioning: Somatic symptoms, anxiety, social dysfunction, and depression. These are rated on 4-point rating scales.^[22] Seven items of this questionnaire are formulated in a positive manner and the other 21 items are formulated in a negative manner. In the case of the positive items, the scale is: 1 = more than usual, 2 = as usual, 3 = less than usual, and 4 = much less than usual. In the negative items, the scale is: 1 = not at all, 2 = not more than usual, 3 = a little more than usual, and 4 = much more than usual.

Traditional/binary, the system used in this research to calculate the score is [0-0-1-1] for positive items (a score of 0 was used for response choices 1 and 2 and a score of 1 was used for response choices 3 and 4) and [0-1-1-1] for negative items (a score of 0 was used for response choice 1 and a score of 1 was used for the remaining three response choices 2-4).^[23] This questionnaire was

translated into Persian and its validity and reliability were acceptable.^[24] Reliability and validity of this questionnaire have also been indicated for the Iranian elderly.^[25]

In this study, a score of 6 was calculated as the best cut-off point. This means those who got 6 or more out of 28 (full score of the questionnaire) were suspected as mental disorder cases. In addition, score 2 was considered as the best cut-off point for each dimension.

Statistical analysis

All analyses were conducted using the SPSS for Windows software, version 17 (SPSS Inc., Chicago, IL, USA) and the statistical significance level was set at $P < 0.05$. Paired-*t* test was used to test the significance of differences between before and after intervention mental status scores. Independent sample *t*-test was used to calculate the differences of these “before–after differences” between the two groups (diff of diff).

In addition, we tested the associations with multivariate analysis models, applying the cut-off point for this questionnaire and the possibility of confounding the results by some of the potential confounders.

Chi-square was used to test the association between baseline and outcome variables in the two groups in order to select the covariates of model (potential confounders). The adjusted value of effect had been measured with logistic regression model to evaluate the association between intervention and outcome variables adjusted for the baselines.

RESULTS

Demographic and mental health characteristics at baseline

The total number of elderly people enrolled in this study was 181 (90.05% of the recruited participants). There were 116 women (64.1%) and 65 men (35.9%). Participants' ages ranged from 60 to 89 years, with a mean age of 71.64 ± 7.9 years. The most common marriage category was widows (49.7%) and 3.9% had never been married. Almost two-thirds (67.4%) of the subjects were living with their family (husband, children, or other members of family). Participants were not well educated and more than half of them were illiterates (60.2%). Most of the elderly in this

trial were socially inactive [Table 1]. None of the baseline variables were significantly different in the two groups ($P > 0.05$).

As shown in Table 2, before intervention, the most common mental health disorder (around 60%) was somatization in the two groups. Preliminary Chi-square found that there was no significant difference between two groups in mental disorder prevalence according to GHQ-28 and its subscales.

Table 1: Demographic and baseline variables in group- and home-based physical activity

Variables	Total (N=181)	GB (n=85)	HB (n=96)	P value
Age (years)				0.053
Mean (SD)	71.6 (7.9)	70.2 (.79)	72.5 (.84)	
Gender (%)				0.40
Female	64.1	61.2	66.7	
Male	35.9	38.8	33.3	
Education (%)				0.90
Illiterate	60.2	61.2	59.4	
Literate	39.8	38.8	40.6	
Marriage status (%)				0.90
Married	46.4	47.1	45.8	
Not married	53.6	52.9	54.2	
Life status (%)				0.30
Alone	32.6	29.4	35.4	
With family	67.4	70.6	64.6	
Social activities (%)				0.30
No	84.0	81.2	86.5	
Yes	16.0	18.8	13.5	
Past psychological disorders history (%)				0.07
No	85.6	90.6	81.3	
Yes	14.4	9.4	18.8	

GB=Group based, HB=Home based, SD=Standard deviation

Table 2: Frequency and prevalence of mental disorder in group-based physical activity and home-based physical activity, before intervention

	HB (n=85)		GB (n=96)		P value Chi-square
	Frequency	Percent	Frequency	Percent	
Somatization	58	60.4	45	52.9	0.31
Anxiety	53	55.2	45	52.9	0.76
Social dysfunction	44	45.8	33	38.8	0.34
Depression	40	41.7	41	48.2	0.38
Total	58	60.4	49	57.6	0.71

GB=Group based, HB=Home based

Physical activity and mental health

Participants' mental health status improved due to their increase in physical activity. Table 3 shows the baseline and re-test scores for mental health in all participants. The mean of total GHQ-28 score was 8.01 ± 0.41 before intervention, and it was 5.67 ± 0.34 after 3 months, and the difference, like all GHQ subscales, was statistically significant ($P < 0.001$).

In contrast baseline, mental health disorders prevalence has statistically significant difference in two groups after intervention [Figure 2].

Table 4 gives the changes that have taken place in mental health status due to physical activity intervention after 3 months in the two groups. The mean score of GHQ-28 and all its subscales had improved 3 months after the intervention in the two groups separately and the improvement was better in GB physical activity group. In GB group, the decrease in GHQ-28 total score was 3.61 ± 2.28 , 3 months after the intervention and it was significant ($P < 0.001$). In HB group, this reduction was 1.20 ± 2.32 during the same period ($P < 0.001$). The difference in these "before-after differences" between the two groups in the GHQ-28 and all its subscales was statistically significant ($P < 0.001$).

Table 3: GHQ-28 and its subscales' mean scores (SD) before and after the intervention

	Before intervention	3 months after intervention	P value
Somatization	2.20 (1.85)	1.46 (1.52)	<0.001
Anxiety	2.00 (1.74)	1.50 (1.43)	<0.001
Social dysfunction	1.92 (2.00)	1.37 (1.53)	<0.001
Depression	1.87 (1.87)	1.33 (1.55)	<0.001
Total	8.01 (5.53)	5.67 (4.58)	<0.001

GHQ=General Health Questionnaire, SD=Standard deviation

Table 4: Between and within group GHQ-28 mean differences

Variable	Before-after mean difference (physical activity)				Difference of before-after difference between two groups (diff of diff)	
	Home-based		Group-based		Mean	P value
	Mean (SD)	P value	Mean (SD)	P value		
Somatization	-0.36 (1.04)	<0.001	-1.16 (0.99)	0.001	0.80	<0.001
Anxiety	-0.15 (0.78)	<0.001	-0.89 (0.95)	0.054	0.73	<0.001
Social dysfunction	-0.34 (0.76)	<0.001	-0.77 (1.13)	<0.001	0.43	0.004
Depression	-0.34 (0.66)	<0.001	-0.77 (0.79)	<0.001	0.43	<0.001
Total	-1.20 (2.32)	<0.001	-3.61 (2.28)	<0.001	2.40	<0.001

GHQ=General Health Questionnaire, SD=Standard deviation

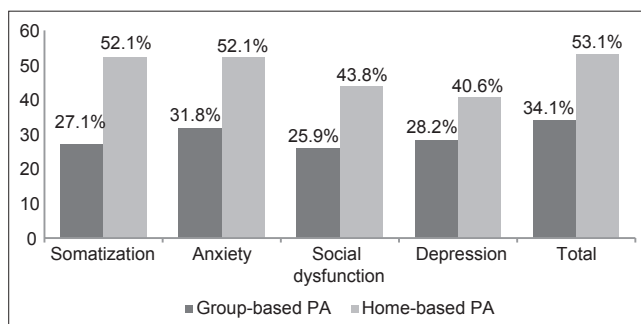


Figure 2: Prevalence of mental health disorders 3 months after intervention

Table 5 shows the effects of GB physical activity on mental health compared with HB physical activity adjusted for related baseline variables. As shown in our study, the odds of mental disorders in GB were lower than in HB physical activity.

DISCUSSION

Based on the interpretation of the results, it is seen that physical activity programs have great influence on mental health condition in the elderly. Our data are consistent with previous studies showing that physical exercise is associated with good mental health and negatively associated with symptoms of anxiety or depression.^[15,26-30] But some studies have not found similar results because of several reasons such as: The relationship was assessed in a specific sub-population and the analyses were adjusted for different sets of confounders.^[31-33]

Moreover, this study demonstrated that physical activity improved the total mean score of GHQ-28 and all its subscales, especially somatization.

Table 5: Effect of group-based physical activity on mental health

Variable	Adjusted OR	95% CI
Somatization	0.217 ^a	(0.090, 0.527)
Anxiety	0.155 ^b	(0.049, 0.486)
Social dysfunction	0.136 ^c	(0.030, 0.611)
Depression	0.082 ^d	(0.016, 0.429)
Total	0.298 ^e	(0.119, 0.747)

^aAdjusted for somatization score before intervention, past psychological disorders history, ^bAdjusted for anxiety score before intervention, education, social dysfunction, past psychological disorders history, ^cAdjusted for social dysfunction score before intervention, age, gender, education, marriage, social dysfunction, life statuses, ^dAdjusted for depression score before intervention, gender, marriage, social dysfunction, past psychological disorders history, ^eAdjusted for total score of GHQ-28 before intervention, gender, education, marriage, social dysfunction, past psychological disorders history. OR=Odd ratio, CI=Confidence interval

ten Have *et al.*, in their study, found comparable results to our study.^[30] Rezaeeshirazi *et al.* showed the group that performed aerobic exercises experienced improvement in all the psychological disorders present in the general health questionnaire.^[34] Abbas *et al.* demonstrated a significant decrease in the mean GHQ-12 scores in their study.^[35] Moreover, Salmon emphasized on the positive role of sports in general health,^[36] and the present research added information to previous researches as the sample in our study included elderly people who have a special condition in comparison with young people.

Also, the data of pre-test and post-test analysis of the two groups in this study showed that GB

physical activity in the stage of post-test resulted in lesser mental health disorder than the second one, HB physical activity, and this result was not confounded by baseline characteristics. Major differences were found between the two groups in somatization, followed by anxiety.

Ashworth *et al.* assessed the effectiveness of home-based versus group-based physical activity programs on the health of older adults. They showed that different kinds of physical activity can potentially have various effects on the people based on the various medical conditions that they have (e.g., cardiovascular disease, osteoarthritis).^[37] In another study, McCarthy *et al.* revealed that the supplementation of a home-based exercise program with a group-based exercise program led to clinically significant superior improvement in participants' health status.^[38]

Blumenthal *et al.* showed that group exercise training in older patients with major depression was as effective as antidepressant treatment. Most remarkable is the finding that the 10-month relapse rate was significantly lower in the exercise group.^[39,40]

There are several limitations in this study. Our participants may not be representative of the general population because they were selected from urban health center's registry, therefore the coverage was not complete and it would be a potential source of selection bias.

As mentioned before, due to participants' special condition, they were not randomly divided. However, this limitation did not affect the results because of the nonsignificant difference between the two study groups' baseline characteristics.

Selection bias might also have occurred because of missing those who were not included in the beginning of study or miss to follow up during the survey due to any undiagnosed mental health disorders. Moreover, we could not blind the interviewers and participants to the type of study intervention, which might be a source of information bias. The other important limitation is that we cannot separate the effects of physical activity and environmental factors, such as peer groups' meeting, on mental health.

CONCLUSIONS

Physical activity can improve the mental health in the elderly. Furthermore, group-based programs

are more effective than home-based ones. Therefore, designing and implementation of group-based physical activity program is acknowledged as an important and effective strategy to promote old people's health status.

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