RESEARCH

EFFECTS OF THE *STAY AT HOME—TAKE A STEP* PROJECT FOR SEDENTARY ELDERLY PERSONS IN THE COVID-19 PANDEMIC: A RANDOMIZED CONTROLLED STUDY

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Abstract

Introduction: During the Covid-19 pandemic, a program was developed to encourage older adults, the population likeliest to become sedentary due to stay-at-home policies, to remain active. The aim of the current study was to investigate the effects of the average number of steps taken daily on quality of life and stress levels.

Materials and Methods: A randomized controlled study selected 69 participants aged 65 and over (mean 69.39 ± 4.61)—35 in the intervention group and 34 in a control group—and their sociodemographic data were collected. The stay-at-home step program was applied to the intervention group. Quality of life, stress level, and body mass index were assessed pre- and post-test, and their daily step counts were recorded.

Results: A significant correlation was found between number of steps and the quality of life scores in the intervention group ($p<0.05$). There was a significant difference between the groups in favor of the intervention group in the mean number of steps in weeks 4 and 8 of the intervention ($p<0.05$). The mean number steps 2024.71±605.18 in intervention, 1946.63±511.37 in control group.

Conclusion: The study found that the *Stay at Home—Take a Step* program was effective in increasing the number of steps taken daily by elderly participants who were inactive during the Covid-19 pandemic and initiated an improvement in their quality of life. Healthcare professionals who play a central role in supporting the elderly can be advised to use the program to promote healthy aging and physical activity.

Keywords: Aged; Physical Activity; Exercise; Quality of Life.

INTRODUCTION

Old age, the last stage of human life, is the period following development in which physiological and psychological changes occur and chronic diseases and losses are experienced (1). Changes in this period can bring about a decline in physical activity and a sedentary lifestyle (2). In 2022, the World Health Organization's global status report on physical activity reported that 47% of men and 65% of women over the age of 70 in the United States were classified as sedentary; in Turkey, 34% of men and 55% of women over age 70 are sedentary (3). A study by Kaplan and Demirçay (2021) conducted during the pandemic found that although 52% of elderly individuals over the age of 65 engage in physical activity in their free time, a very high rate (48%) remains who do not (4).

In older adults, a sedentary lifestyle is associated with an increased incidence of all-cause mortality, cardiovascular disease, cancer, and type 2 diabetes. In addition, studies have shown that many health problems, such as psychological and mental regression, occur more frequently in sedentary elderly people and that their quality of life is negatively affected (2,5,6). Encouraging older people to engage in more physical activity is an important strategy for healthy and active aging (2).

For sedentary seniors, regular physical activity can reduce the risk of health problems, improve quality of life, reduce healthcare costs, and help improve cognitive function. It also facilitates socialization by reducing social isolation, which is beneficial for physical and mental health (2). Increasing physical activity in sedentary elderly people has been targeted by government programs and non-state actors in accordance with the UN Decade of Healthy Aging, the WHO Global Action Plan on Physical Activity 2018–2030, and Turkey's Physical Activity Guide 2014 (2,7,8,9).

Ricci et al. (2020) defined physically inactive individuals, in the context of the Covid-19 pandemic, as those with low-intensity activities of daily living and moderate-intensity activities of less than 10 minutes per day, and suggested that it may be appropriate to focus on reducing their sedentary behavior (6). The World Health Organization report stated that walking can be a good way for sedentary elderly people to start and gradually increase their physical activities (2). No expensive equipment or gym membership is required to walk; most people can incorporate it into their daily lives. In addition, people can easily change the amount of energy they exert by adjusting the frequency, intensity, and duration of their walks according to their needs. Rather than compelling physical exercise in sedentary elderly people, even providing a change in walking behavior will contribute significantly to their healthy aging processes (1).

Previous studies have determined that to achieve behavioral change in the elderly, the important determinants of commitment are self-efficacy, social support and communication, self-monitoring, past exercise behavior, location of exercise, easy access, and reasonable cost (10). These predictors point to the need for programs that incorporate motivation, effective communication/interaction, and follow-up. With the goal of encouraging elderly individuals who had become sedentary at home during the pandemic, the Stay at Home—Take a Step program was developed, which is based on motivational interviews, mobile reminders, follow-up-based self-monitoring, and interactions with young people. This community-centered study evaluated the effects of the program on the elderly. We hypothesized that the Stay at Home—Take a Step intervention would increase the daily number of steps of the elderly, enhance their quality of life, and decrease their stress levels.

MATERIALS AND METHODS

This study was designed as a double-blind randomized controlled trial. The study period coincided with the Stay at Home Turkey campaign,

which was carried out to minimize contact during the Covid-19 pandemic. Individuals over the age of 65 comprised the study population. To recruit participants, information was distributed between May 15 and June 1, 2021, to university undergraduate students who were continuing their studies through distance education, asking them to invite people aged 65 and over of their acquaintance who met the inclusion criteria to participate in the study (*n* = 116). All potential participants were contacted by phone, and their conformity with the inclusion and exclusion criteria was evaluated. The inclusion criteria were willingness to participate in the study, no cognitive problems that impede communication, literacy in Turkish, familiarity with a smartphone, no muscle or joint problems that interfere with physical activity, no neuropsychiatric disorder, no Covid-19 diagnosis, ability to carry out activities of daily living independently, sedentariness (2,500 or fewer steps per day), and being 65 years old or older. Participants were excluded from the study if they had insulin-dependent type 2 diabetes, hypertension not controlled with medication, or had been diagnosed with heart failure, chronic obstructive pulmonary disease, asthma, or cancer.

The sample size was calculated using the G Power program and considering previously published research (11) in which similar interventions were applied. The amount of type 1 error was 0.05, test power was 0.95, and effect size was 0.83. The minimum number of participants required was 64—32 each in the experimental and control groups. Post-hoc power analysis resulted in the following findings for groups of 35 controls and 34 tested: power (1-β) was 0.947 with α=0.05 and effect size = 0.79 (according to t-test in independent groups for number of steps). The power suggests that this sample size was sufficient (12). All participants who met the inclusion criteria during the data collection period were included in the study. A simple randomization method was performed using the Random Online Allocation Software program (www.Graphpad.com), with a 1:1 randomization between the two groups (intervention, *n*=45; control, *n*=45) performed by a statistician not involved in the study. The participants did not know whether they belonged to the intervention group or the control group. The double-blind method was applied by enabling a statistician outside the study to analyze the data.

Ethics committee and institutional permissions for the research were obtained, and the participants provided voluntary informed consent using a consent form prepared in accordance with the Declaration of Helsinki. For pre-testing, the "Socio-demographic information form," "EQ-5D-3L General Quality of Life Scale," and "Perceived Stress Scale (PSS)" questionnaires were administered online to all participants who met the inclusion criteria. In addition, height and weight information for the previous week were recorded. A pedometer device was provided to all participants in both groups, and the details of its usage were explained in a video. Participants were asked to record the number of their daily steps for 2 months on the chart provided. Only the intervention group attended the four-week Stay at Home—Take a Step (SHTS) program. A post-test that included EQ-5D-3L and PSS was applied to both groups immediately after the program. One month after the intervention was completed, changes in the step counts and weight values of the participants were calculated.

Stay at Home—Take a Step (SHTS) program

The aim of the SHTS initiative is to increase the number of steps taken daily by the elderly, to avoid the negative effects of being sedentary, to adopt a more active lifestyle, to enhance the quality of life during the pandemic, and to reduce stress. The opinions of five experts were obtained regarding the suitability of the program's content. To test the comprehensibility of the program, a pilot study was conducted with five elderly people,

and the study was adjusted according to their feedback. Participants in the pilot study were not included in the study. The initiative was intended to take one month and be supported in different ways, including via mobile messages, videos, and phone calls. Motivational mobile interviews were conducted once a week in line with a guide prepared by researchers with motivational interviewing technique certificates. SMS messages containing reminders to encourage walking were sent to the participants by four university students between the ages of 20–24. Daily step count and weight were discussed to ensure the interaction of the participants with young people.

Data collection tools

1. Sociodemographic information form

The descriptive questionnaire was developed by the researchers in line with the relevant literature. The form includes questions about the sociodemographic characteristics of the participants.

2. EQ-5D-3L general quality of life scale

This scale was developed to assess health-related quality of life. The EQ-5D-3L scale consists of two parts: a descriptive system and the EQ VAS. The descriptive system focuses on five dimensions of health: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension contains three responses according to difficulty. The responses for the five dimensions can be combined into a five-digit number that describes the respondent's health status in the descriptive system (13). In this study, we applied the value set obtained for Europe because there was no value set for Turks. The second part presents a scale (EQ VAS) ranging from 0 (worst imaginable health) to 100 (best imaginable health), on which respondents rate their current state of health. The Cronbach's alpha coefficient of the scale was 0.860.

3. Perceived stress scale (PSS)

The validity and reliability of the PSS was conducted by Erci (2006), who determined that it was adapted to Turkish society and appropriate. The scale consists of 10 items, and each item is ranked with 1, 2, 3, 4, or 5 points, thus total scores range between 10 and 50. A score of 30 or above indicates stress. Higher scores reflect increasing stress levels. The validity and reliability analysis of the scale determined that the test–retest correlation was 0.88 (14). The Cronbach alpha coefficient of the scale was 0.808.

Statistical analysis

The SPSS 21.0 (Statistical Package for Social Sciences, version 21) program was used for the statistical analysis of the data obtained in the study. Descriptive statistics for the continuous variables considered in the study were mean and standard deviation; categorical variables were expressed as numbers and percentages. For statistical significance, the paired sample t test, an independent sample t test, and analysis of variance in repeated measurements were performed to compare continuous numerical variables within and between groups. A chi-square test was used to compare categorical variables within and between groups. The results were evaluated at the 95% confidence interval and $p < 0.05$ was considered significant.

Ethical approval

The study was approved by the Republic of Turkey Ministry of Health, and ethics committee approval was obtained from the Faculty of Medicine's Non-invasive Clinical Research Ethics Committee (No. 2021.148.05.21). Written and verbal informed consent was obtained from each participant. It was registered with the U.S. National Library of Medicine Registry of Clinical Trials (NCT05110560).

RESULTS

In this community-centered study, 116 elderly people volunteered to participate. They were evaluated with regard to the inclusion and exclusion criteria, and 22.41% were excluded. Ninety participants were randomized into intervention and control groups. The eight-week study program was completed by 76.66% of the participants. Participant flow through the trial is summarized in a CONSORT flow diagram (Fig. 1).

The mean age of the participants was 69.39 ± 4.61, the mean age they perceived was 53.06 ± 14.41, and the average number of people in their households was 2.51 ± 1.09. The intervention group consisted of 52.9% women, and the control group consisted of 54.3% men. The marital status of 82.6% of the participants was married/living together,

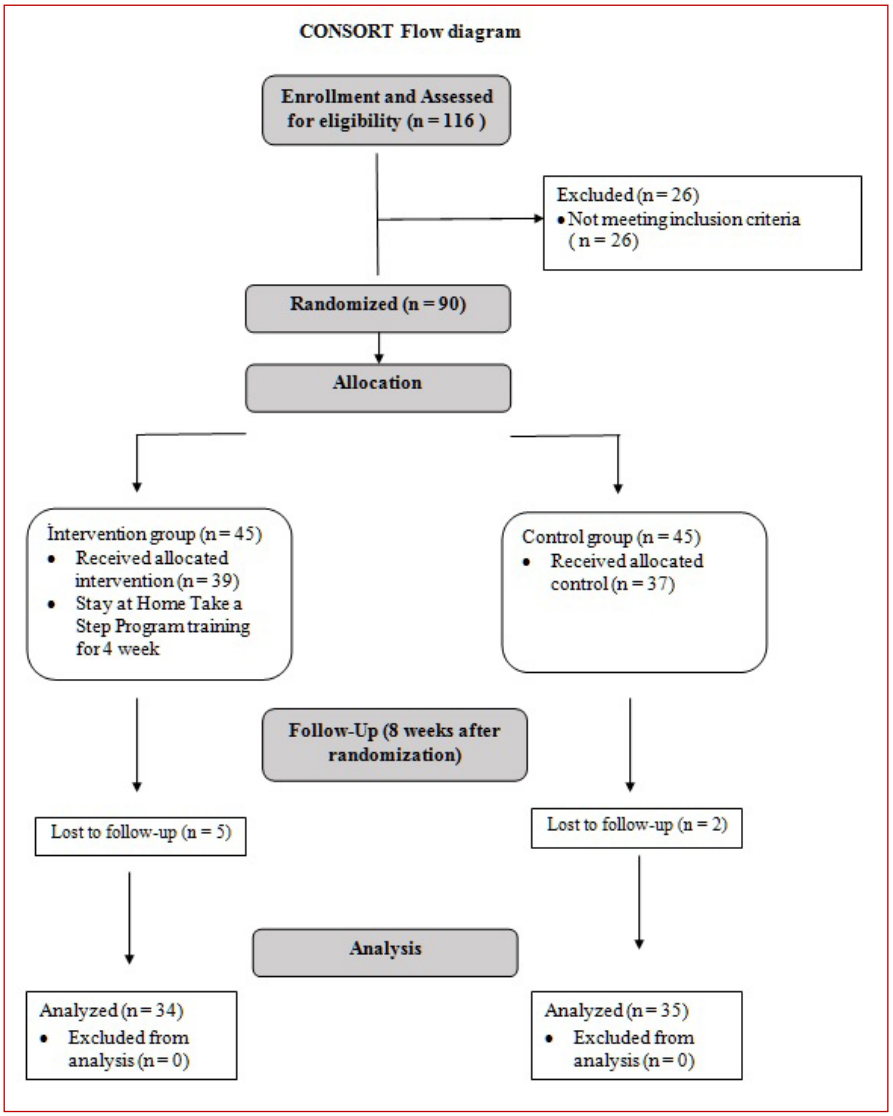

Figure 1. CONSORT flow diagram

Table 1. Baseline socio-demographic characteristics

	Total (n = 69)	İntervention Group (n = 34)	Control Group (n = 35)	p value
Age (Mean±SD)	69.39±4.61	69.94±4.80	68.86±4.41	.332[a]
Perceived age (Mean±SD)	53.06±14.41	53.68±15.83	52.46±13.08	.728[a]
Gender				.360[b]
Female	35 (50.7%)	18 (52.9%)	16 (45.7%)	
Male	34 (49.3%)	16 (47.1%)	19 (54.3%)	
Marital status				.603[b]
Widowed /Divorced	12 (17.4%)	6 (17.6 %)	6 (17.2%)	
Married/ Living together	57 (82.6 %)	28 (82.4%)	29 (82.9%)	
Educational Status				.190[b]
Primary school and below	36 (52.2%)	21 (61.8 %)	15 (42.9 %)	
Middle School	12 (17.4%)	6 (17.6 %)	6 (17.1 %)	
High school and university	21 (30.4%)	7 (20.6 %)	14 (40.0 %)	
Income level				.064[b]
Income less than expenses	14 (20.3%)	7 (20.6%)	7 (20%)	
Income more than or equal to expenses	55 (79.7%)	27 (79.4%)	28 (80%)	
Number of people living together	2.51±1.09	2.53 ±1.23	2.49±0.95	.870[a]

[a]: independent sample t test
[b]: ki kare

52.2% had primary school education or less, and 79.7% reported that their income meets or exceeds their expenses.

There were no significant differences between the groups in terms of age, perceived age, gender, marital status, educational status, household income, and number of people living with them (Table 1).

There were significant differences in the mean scores of the number of steps, EQ-5D-3L General Quality of Life Scale descriptive system, and the EQ VAS within the intervention group ($p < 0.05$). Within the control group, significant differences were found in the mean number of steps ($p < 0.00$). In comparing the groups, there was a significant difference in favor of the intervention group in the mean number of steps in post-intervention weeks 4 and 8 ($p < 0.05$). In addition, when the mean EQ VAS scores of the groups were compared at week 4 after the intervention, a significant difference was found in favor of the intervention group ($p < 0.05$, Table 2).

DISCUSSION

The mobility restrictions during the Covid-19 pandemic drove many people into loneliness and

Table 2. Intra-group and inter-group trends in variables of body mass index. Number of steps. PSS. EQ-5D-3L and EQ VAS

Variable	Group	Baseline Mean±SD	Post 4 weeks Mean±SD	Post 8 Weeks Mean±SD	Within group p value	Between group post intervention 4. week p value	Between group post intervention 8. week p value
Body mass index	İntervention	29.51±3.65	-	29.27±3.67	.125[a]	-	.454[b]
	Control	29.02±4.96	-	28.49±4.82	.055[a]		
Number of steps	İntervention	2024.71±605.18	4469.18±1732.91	4558.25±1859.69	**.000**[c]	**.002**[b]	**.001**[b]
	Control	1946.63±511.37	3212.55±1416.05	3158.41±1298.15	**.000**[c]		
PSS	İntervention	34.91±6.40	35.411±4.50	-	.700[a]	.364[b]	-
	Control	35.63±4.75	34.40±4.69	-	.179[a]		
EQ-5D-3L	İntervention	0.753±0.212	0.795±0.179	-	**.022**[a]	.541[b]	-
	Control	0.766±0.180	0.823±0.192	-	.095[a]		
EQ VAS	İntervention	7.76±1.72	8.38±1.46	-	**.016**[a]	**.027**[b]	-
	Control	7.74±1.65	7.60±1.42	-	0.586[a]		

EQ-5D-3L: EQ-5D-3L General Quality of Life Scale descriptive system points; EQ VAS: EQ-5D-3L General Quality of Life Scale EQ VAS points; PSS: Perceived Stress Scale; SD: Standard deviation

[a]: paired sample t test

[b]: independent sample t test

[c]: Analysis of variance test in repeated measurements

triggered physical health problems related to inactivity, especially among the elderly (1). A study by Kaplan and Demirçay (2021) of elderly individuals during the pandemic revealed that a very high rate (48%) of their participants over the age of 65 did not engage in any physical activity (4). The current study evaluated the effectiveness of the SHTS program, which was implemented to increase the number of daily steps taken by sedentary elderly participants through motivational interactions. The main contribution of this study is validation of the strategy adopted by the SHTS program to strengthen the active aging process during current or future pandemics by enhancing the psychosocial wellbeing of the elderly through intergenerational interaction.

Although the effects of the Covid-19 epidemic on physical activity are not fully known, a sharp decline in the number of steps, ranging from 12% to 38%, has been reported in many countries (15). A worldwide study based on a smartphone app showed that within 10 and 30 days after the declaration of the Covid-19 outbreak, average daily steps decreased by 5.5% to 27.3% in different regions (16). The most important finding obtained in this study was the significant increase in the number of steps taken

daily by participants in the SHTS intervention group. Moreover, this significant increase continued in the 4th week follow-up. It can be surmised that the motivational interviews and follow-up with young people offered by the SHTS program promoted interaction and self-management and increased the direct communication between practitioners and participants. Therefore, if problems arose that could affect behavior change commitment, they could be addressed and resolved in a timely manner. Another study demonstrated that collaborative interaction centered on counseling elderly people, encouraging mutual participation, and focusing on problem solving tends to increase their commitment to behavior change (10).

The current study also noted a significant increase in the number of steps in the control group. In parallel with our work, a study of 68 elderly women in Japan found that accelerometer feedback on physical activity intensity helped increase physical activity levels (17). Similarly, a study conducted with overweight adults at risk of type 2 diabetes concluded that tracking with mobile applications and pedometers increased the number of steps taken by their participants (18). Another study using pedometers observed that total sedentary time decreased and minutes spent walking increased in sedentary elderly individuals (19). All three systematic reviews concluded that the number of steps/day of pedometer users increased by 2,000–2,500 (20,21,22). This suggests that the reason for the significant increase in the number of steps in this study's control group was because they were given pedometers and asked to record their daily step counts.

It is widely acknowledged that the significant decline in the physical activity levels of the elderly during the Covid-19 pandemic negatively affected their quality of life (5). Moreover, a study conducted in Japan revealed that psychological problems resulted from decreased physical activity due to Covid-19, and that the public health measures enforced to prevent transmission created increasing concern among the elderly, which also adversely affected their quality of life (23). An important finding in this study was the significant increase in quality of life in the intervention group. In addition, there was a significant difference between the groups in favor of the intervention group in the quality of life visual comparison scores. This finding can be interpreted as reflecting the positive relationship between physical activity and quality of life; the level of physical activity positively influences quality of life. Studies investigating the effect of exercise on quality of life in the Covid-19 pandemic found that individuals who exercise enjoy a richer quality of life than those who do not (5).

On the other hand, the study found that the SHTS program had no effect on body mass index. A similar study conducted on young adults with a healthy and physically active lifestyle (>10,000 steps/day) reported that reducing the daily number of steps to approximately 1,500 steps/day for 14 days did not cause any change in body weight (24). The short follow-up period in this study is thought to be the reason for the lack of effect of the SHTS program on body mass index. A study by Richardson et al. (2008), based on pedometers, underscored that longer intervention and follow-up had a greater effect on weight loss (25). Furthermore, the SHTS program produced no observable effect on the stress levels of the elderly. Similar studies have likewise shown no effect of increased physical activity on depression or anxiety (19).

CONCLUSION

The Stay at Home—Take a Step initiative was found to be an effective intervention that succeeded in increasing the number of daily steps taken and improving the quality of life of sedentary elderly persons. Healthcare professionals who play a central role in supporting older adults can be advised to include the SHTS program in their practice to motivate daily physical activity for healthier aging.

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