

## RESEARCH ARTICLE

# The effects of social isolation due to COVID-19 on the fear of movement, falling, and physical activity in older people

Emine Atıcı<sup>1</sup> | Nuray Girgin<sup>1</sup> | Tülay Çevik Saldıran<sup>2</sup>

<sup>1</sup>Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Istanbul Okan University, Istanbul, Turkey

<sup>2</sup>Department of Physiotherapy and Rehabilitation, School of Health Sciences, Bitlis Eren University, Bitlis, Turkey

**Correspondence**

Emine Atıcı, Department of Physiotherapy and Rehabilitation, Faculty of Health Sciences, Istanbul Okan University, Istanbul, Turkey.  
Email: emimert@gmail.com

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**Abstract**

**Objective:** This study investigates the interaction between fear of movement, fall risk, and physical activity levels in ageing individuals who experienced social isolation during the COVID-19 pandemic.

**Methods:** In this descriptive and cross-sectional study, 254 eligible participants used an online background survey. Individuals' fear of movement was evaluated by the kinesiophobia causes scale, fall risk by the falls efficacy scale, and physical activity levels by the physical activity scale for the ageing.

**Results:** The fear of movement had a significant positive interaction on fall risk ( $\beta = 0.471$ ,  $R^2 = 0.495$ ,  $p < 0.001$ ). The fall risk had a negative effect on physical activity ( $\beta = -1.686$ ,  $R^2 = 0.161$ ,  $p < 0.001$ ). The fear of movement and fall risk explained 15.6% of the change in physical activity levels of ageing individuals ( $p < 0.001$ ).

**Conclusions:** These results showed a significant interaction between physical activity levels and fear of movement, with a high fall risk in ageing individuals during the pandemic period.

**KEYWORDS**

accidental falls, aged, fear, movement, physical fitness

## 1 | INTRODUCTION

The main challenges associated with increased age include changes in physiological function, a decrease in general functional capacity, fear of loss of independence, and associated morbidity and mortality rates due to social isolation.<sup>1</sup> Due to the COVID-19 pandemic, in 2020, individuals over the age of 65 were prevented from leaving their homes for their own protection in Istanbul, Turkey. However, the prolongation of stay-at-home orders to reduce the mortality and spread of the pandemic has had negative effects on the physical health, functionality and mental health of older people because their state of health was affected by their ability to continue with their daily life activities and routines.<sup>2</sup>

Immobility is an important factor in physiological and functional decline, and it causes increased fragility

and orthostatic intolerance, as well as increased risk and incidence of falls.<sup>3</sup> It was found that physical activity levels of older people and fear of movement were negatively correlated in a period of physical, mental, and cognitive decline.<sup>4</sup> The individual risk factors for falling were fear of movement and dizziness. It was noted within the scope of that research that a decrease in physical activity increased anxiety associated with falling.<sup>5</sup>

Studies indicate that falls lead to fear of movement (kinesiophobia), severe injuries, fractures, inadequate daily living activities, less confidence, and a less active lifestyle.<sup>6</sup> However, the problems associated with this fear of movement, including those associated with chronic pain, are rarely mentioned. Fear of movement causes a decrease in the physical activity levels of older adults and has a negative effect on their overall quality of life. In the long term, fear of movement causes physical disability, avoidance of

physical activity, functional disability, and an increase in depressive symptoms.<sup>7</sup> There are limited studies on the effects of fear of movement and fall risk on physical activity levels in older people who have experienced social isolation.

Therefore, the aim of this study was to investigate the interaction and relationship between fear of movement, fall risk and physical activity in individuals over the age of 65 who experienced significant isolation during the COVID-19 period.

## 2 | METHODS

### 2.1 | Participants

The study was conducted via an online database (Google Forms) between December 2020 and February 2021 after receiving approval from the Istanbul Okan University Science, Social and Non-Invasive Health Sciences Research Ethics Committee (23.12.2020/130). Two hundred and ninety-nine literate individuals over the age of 65 who had internet access consented to taking part in the study. Forty-five of them were excluded from the study because of their COVID-19 history. The sample size was calculated with RAOSOFT software (5% margin of error; 90% confidence interval), and ultimately 254 individuals were included in the study.

### 2.2 | Study protocol

Individuals who volunteered for the study submitted an informed consent form online. The assessment form was created by combining demographic information with information from questionnaires on physical activity levels, fear of movement, and fall risk evaluations. The age, height, weight, gender, marital status, and chronic diseases of each participant were recorded on the demographic form.

### 2.3 | Evaluation of fear of movement

Fear of movement was evaluated using the Kinesiophobia Causes Scale (KCS). The KCS comprehensively explains the potential biological and psychological barriers to physical activity and their severity.<sup>8</sup> In 2014, Janusz Kocjan et al. developed this 20-question survey, which is based on the holistic definition of health and contains questions relating to physical, social, and mental factors. The average of the scores obtained from the biological and psychological subdimensions gives the total KCS score. The

### Practice Impact

In extraordinary situations such as pandemics, the effects of social isolation on older people should be defined in order to make recommendations for safe physical activity that will contribute positively to their overall health.

new version, which was developed in 2018, uses a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The higher the score on the questionnaire, the more fear the individual has of movement.<sup>9</sup>

### 2.4 | Evaluation of fall risk

The Falls Efficacy Scale-International (FES-I), was used to evaluate fall risk. This scale provides information about the fall risk of an individual in their daily life. Each question is scored between 1 and 4, and the scale contains 16 questions in total. If the total score is below 24, there is no risk of falling; a score of 24 or above indicates a fall risk.<sup>10</sup>

### 2.5 | Evaluation of physical activity level

Physical activity levels of the participants were evaluated using the Physical Activity Scale for the Elderly (PASE). This scale is used in epidemiological studies conducted with participants older than 65 years.<sup>11</sup> The PASE total consists of a combination of scores, including leisure activities, walking, exercise, housework, yard work, and caring for others. It is a self-scoring scale that records the activities performed each week, and it was completed by phone, mail, or in person. Scores were derived from the data obtained from electronic physical activity monitors, activity logs, or from the self-assessed activity levels of the participants. This scale is also used to evaluate the effectiveness of any intervention. PASE scores range from 0–400, and the validity and reliability of the scale has been established.<sup>12</sup> It uses frequency, duration, and intensity levels of activity over the previous week to assign a score, with higher scores indicating greater physical activity.

### 2.6 | The hypothesized model

Several hypotheses were developed to examine the relationship between physical activity levels, risk of falling, and fear of movement among older people. First, this

study assumed that there would be a negative relationship between physical activity levels, fear of movement, and risk of falling. Second, it hypothesized that a higher level of fear of movement would increase the risk for falls among older people who experienced social isolation due to COVID-19. In total, predicted outcomes of the analyses included the following:

H1: Fear of movement affects the risk of falling among older people who experience social isolation due to COVID-19.

H2: The risk of falling negatively affects the levels of physical activity among those who experience social isolation due to COVID-19.

H3: Fear of movement negatively affects the levels of physical activity among older people who experience social isolation due to COVID-19.

H4: Fear of movement and risk of falling may, together, have a negative impact on the physical activity levels of those who experience social isolation due to COVID-19.

## 2.7 | Statistical analysis

IBM SPSS 22 software was used for statistical analysis. Frequency and percentage analysis (gender, marital status, living environment, chronic disease history, knee or hip prosthesis history, and smoking status) was performed with the Fisher exact test. The Shapiro–Wilk test was used to check normality. The Spearman correlation test was used in the analysis of correlation, as no distribution normality was observed in the KCS, FES-I, and PASE scores. Mean height, weight, body mass index, KCS, FES-I, and PASE score averages were shown as mean ( $X$ )  $\pm$  standard deviation (SD). Differences between participants' FES-I, PASE, and KCS scores were analysed by gender using the Mann–Whitney  $U$  test. The linear regression model was used to examine the effect of fear of movement on fall risk, fall risk on physical activity levels, and fear of movement on physical activity levels. The effects of both fear of movement and fall risk on the level of physical activity were analysed using the multiple regression model. Before the regression analysis, multilinked linearity inspection (variation inflation factor, VIF) and correlation level investigations (0.7) were performed. Statistical significance was taken as  $p < 0.05$ .

## 3 | RESULTS

Analysis was completed with the data from 254 participants. Demographic information, age, gender, marital

status, living environment, the type of house in which they lived, the presence of chronic illness, prosthesis history, as well as physical activity, fear of movement, and falling risk scores of the participants are shown in Table 1. The participants' fear of movement score was high (KCS score,  $54.55 \pm 16.71$  points), and the fall risk score was in the high-risk ( $\geq 24$  points) category (FES-I score,  $31.48 \pm 11.20$  points). The physical activity level average score was low (PASE score,  $182.86 \pm 47.05$  points).

In the correlation analysis, a weak to moderate negative correlation was found between the physical activity level and fear of movement ( $\rho = -0.345$ ) and also fall risk ( $\rho = -0.426$ ). There was a strong positive correlation between the fear of movement and fall risk scores ( $\rho = 0.681$ ,  $p < 0.001$ ), as shown in Table 2.

Among the independent variables included in the model, the FES-I score ( $t = -6.954$ ;  $p < 0.001$ ) and KCS score ( $t = -5.139$ ;  $p < 0.001$ ) significantly affect the physical activity level (PASE). While the fear of movement had a positive interaction on fall risk ( $\beta = 0.471$ ,  $R^2 = 0.495$ ,  $p < 0.001$ ), it was also observed that fall risk had a negative effect on physical activity ( $\beta = -1.686$ ,  $R^2 = 0.161$ ,  $p < 0.001$ ). According to multiple regression analysis results, it was observed that the FES-I and KCS explained 15.6% of the change on PASE ( $p < 0.001$ ).

Gender-based differences in fear of movement, fall risk, and physical activity levels in the study participants are displayed in Table 3. A statistically significant gender-based difference was observed between the fear of movement scores ( $p < 0.001$ ). The average KSC scores of female participants were higher than those of men. Female participants had a higher fall risk compared to men ( $p = 0.001$ ). These differences were not present in the physical activity levels of the participants.

## 4 | DISCUSSION

Based on the study results, older people who had to stay at home for a long time during the pandemic experienced high fear of movement, an elevated risk of falling, and low physical activity levels. It was observed that the level of physical activity decreased as the fear of movement and risk of falling increased. There was an important connection between physical activity levels and fear of movement, with a high falls risk in older people. Additionally, it was observed that over the age of 65, women experienced fear of movement and concerns about falling more often than men.

Isolated older people are less physically active and exhibit more sedentary behaviour than do non-isolating people.<sup>1</sup> Akosile et al.<sup>13</sup> reported that the physical activity levels of older people who are living in nursing homes were lower than their community-dwelling counterparts;

TABLE 1 Demographic and clinical characteristics of the participants

Gender					
Female, <i>n</i> (%)		171 (67.3%)			
Male, <i>n</i> (%)		83 (32.7%)			
Age (years)					
65–70, <i>n</i> (%)		146 (57.5%)			
71–75, <i>n</i> (%)		35 (13.8%)			
76–80, <i>n</i> (%)		43 (16.9%)			
≥81, <i>n</i> (%)		30 (11.8%)			
		<b>X ± SD</b>		<b>Min–Max</b>	
Height (cm)		163.61 ± 8.76		140–187	
Weight (kg)		76.16 ± 13.54		45–130	
BMI (kg/m <sup>2</sup> )		28.51 ± 5.08		19.03–52.07	
<b>Chronic illness, <i>n</i> (%)</b>		<b>Existing</b>		<b>Absent</b>	
		177 (69.7%)		77 (30.3%)	
<b>Knee/hip prosthesis, <i>n</i> (%)</b>		37 (14.6%)		217 (85.4%)	
<b>Smoking</b>		<b>Yes</b>		<b>No</b>	
		47 (18.5%)		164 (64.6%)	
				43 (16.9%)	
<b>Marital status</b>		<b>Married</b>		<b>Single</b>	
		157 (61.8%)		5 (2.0%)	
				92 (36.3%)	
<b>Living environment</b>		<b>With spouse</b>		<b>With spouse and children</b>	
		95 (37.4%)		51 (20.1%)	
		56 (22.0%)		49 (19.3%)	
				3 (1.2%)	
<b>House inhabited, <i>n</i> (%)</b>		<b>Apartment</b>		<b>Detached house</b>	
		198 (78.0%)		56 (22%)	

however, their falling anxiety was higher. Falls, which are the most common cause of morbidity and mortality in older people, have a complex structure that is affected by more than one factor.<sup>14</sup> Cruz et al.<sup>15</sup> analysed the prevalence of fear of falling and its relationship with age; they found that it was 95.2% and that there was a positive correlation between fear of falling and age. About one-third of people over the age of sixty-five fall each year, and recurrent falls count for half of all falls.<sup>14</sup> Our results showed that fear of movement could explain 49.5% of the fear of falling. Fear of movement is cited as a health problem that is equal in importance to falling, as it can affect society in terms of the use of healthcare and increasing costs.<sup>16</sup> For these reasons, it is important to evaluate both the risk and fear of falling.

Korhonen et al.<sup>17</sup> found that an increase in the number of falls positively correlated with the fear of falling and that, as the physical activity levels of individuals decreased, the risk of falling increased. The results of a study conducted in Brazil showed that the adoption of social isolation policies due to the COVID-19 pandemic caused an increase in loneliness and sedentary behavior in the older

adult population, but that this did not affect the number of falls.<sup>18</sup> We observed that the estimated effect of fear of movement on the level of physical activity in older people who were exposed to social isolation during the pandemic period was 9.5%. Also, the fall risk observed in this population could explain 16.1% of individuals' physical activity levels. Additionally, the fear of movement and the risk of falling together affected the physical activity of older adults at a level of 15.6%. These results show that older people living in social isolation during the pandemic, such as those living in nursing homes, are more at risk of being inactive and that an increased risk of falling added to their fear of movement. The social isolation of those over 65 years of age that resulted from measures taken to reduce the risk of transmission of the COVID-19 virus may have created a fear of movement or of leaving the house. A high rate of fear of movement restricts mobility and has been reported as the most important barrier to physical activity.<sup>19</sup> The isolation measures imposed on those who were older than 65 years in Istanbul, Turkey during the COVID-19 pandemic in 2020, and the continuous reporting of older people as the group most vulnerable to the

TABLE 2 Interactions between the participants' physical activity level, fear of movement, and fall risk

PASE						
	$\rho$					$p^c$
KCS	–0.345					<0.001
FES-I	–0.426					<0.001
FES						
	$\rho$					$p^c$
KCS	0.681**					<0.001
The hypothesis results						
<b>H1:</b> Fear of movement affects the risk of falling among older people who are in social isolation due to COVID-19						
FES-I						
	$\beta$	$t$	$R^2$	VIF	$F$	$p^b$
KCS	0.471	15.718	0.495	1.00	247.069	<0.001
<b>H2:</b> The risk of falling negatively affects the levels of physical activity level among those who experienced social isolation due to COVID-19						
PASE						
	$\beta$	$t$	$R^2$	VIF	$F$	$p^b$
FES-I	–1.686	–6.954	0.161	1.00	48.351	<0.001
<b>H3:</b> Fear of movement negatively affects the levels of physical activity among older people who experienced social isolation due to COVID-19						
PASE						
	$\beta$	$t$	$R^2$	VIF	$F$	$p^b$
KCS	–0.867	–5.139	0.095	1.00	26.405	<0.001
<b>H4:</b> Fear of movement and risk of falling together led to a decrease in the physical activity level of those who experienced social isolation due to COVID-19						
PASE						
	Stand. $\beta$	$t$	Adj. $R^2$	VIF	$F$	$p^a$
FES-I	–0.365	–4.495	0.156	1.98	24.313	<0.001
KCS	–0.051	–0.625				

Abbreviations: Adj, adjusted; FES-I, falls efficacy scale–international; KCS, kinesiophobia causes scale;  $p^a$ , multiple regression model;  $p^b$ , linear regression model;  $p^c$ , Spearman correlation; PASE, physical activity scale for the elderly; Stand  $\beta$ , standardized  $\beta$  coefficient; VIF, variation inflation factor.

TABLE 3 Comparisons of fear of movement, fall risk, and physical activity level by gender

	Female $n = 171$	Male $n = 83$	$p^a$
	Mean $\pm$ SD	Mean $\pm$ SD	
KCS	57.04 $\pm$ 17.35	49.41 $\pm$ 14.05	<0.001
FES-I	33.00 $\pm$ 11.31	28.34 $\pm$ 10.34	0.001
PASE	180.85 $\pm$ 41.60	187.01 $\pm$ 56.70	0.551

Note:  $p^a$ :Mann–Whitney  $U$  Test.

Abbreviations: FES-I, falls efficacy scale–international; KCS, kinesiophobia causes scale; PASE, physical activity scale for the elderly.

COVID-19 virus, may have triggered a fear of movement during the pandemic resulting in a decrease in aerobic capacity and an increase in negative emotions. This situation can be attributed to a decrease in the level of physical activity, as is evident in our results. Accordingly, we think that the level of physical activity should also be examined

as a fall risk factor and social projects should be carried out to increase physical activity in older people.

In a study carried out in Chile to determine the factors associated with falls in older people being older than 75 years of age, female, and having a disability, or a hearing or vision impairment, were stated as risk factors for falls.<sup>20</sup> Domaradzki et al.<sup>21</sup> reported that the risk of falling doubled in women with insufficient muscle strength, especially in the upper part of the body, but did not find a significant relationship between functional independence and fall risk in men. A study by Korhonen<sup>17</sup> reported that the risk of falling was lower in older men than in older women, and that the risk was higher for those with chronic diseases and who used walking aids. In the study conducted by Oliveira et al.<sup>22</sup> to evaluate functional capacity in day care centers, the capacity decreased as age and the number of diseases increased, but unlike the findings of the present study, they reported no correlation between gender and functional dependence. Although it has been reported that older people



have a high risk and fear of falling and that they are in a higher risk group in terms of falling characteristics, there is no clarity on gender-based differences. According to our study findings, the fear of movement and falling risk catalyzed by social isolation was found to be significantly higher in women. Instead of pain-based fear of movement, our study examined a fear of movement caused by the restrictions associated with the COVID-19 virus. Age-related injuries and falls have a more destructive effect on women,<sup>23</sup> which may increase their fear of movement and explain why the female participants in our study expressed a higher fear of movement and of falling than did the males. The physical activity levels of the participants did not differ according to gender, as both sexes were exposed to social isolation and had to limit their physical activities to their homes.

The limitation of this study was that the participants were not asked about their history of falls. In addition, accounts of the participants' daily activities, which were thought to be related to the risk of falling, were not documented, and the level of daily independence exhibited by each participant remains unknown.

## 5 | CONCLUSIONS

The results of this study showed that older people who socially isolated themselves during the pandemic undertook less physical activity, and experienced an increased fear of falling. Indeed, in older people, there is a high rate of fear of movement. Since a direct association has been made between sedentary time and time spent at home,<sup>24</sup> recommendations should be made to prevent negative health consequences associated with social isolation during the COVID-19 pandemic. Multidisciplinary approaches that incorporate the interconnected nature of fear of movement, risk of falling, and physical activity should be utilized to protect and maintain the health of older people. Those who experienced social isolation should be encouraged to take safe physical activity without anxiety.

### CONFLICTS OF INTEREST

No conflicts of interest declared.


### DATA AVAILABILITY STATEMENT

Data can be shared when deemed necessary.

### ORCID

Emine Atıcı  <https://orcid.org/0000-0002-6547-4798>

Nuray Girgin  <https://orcid.org/0000-0002-4321-1241>

Tülay Çevik Saldıran  <https://orcid.org/0000-0003-4048-1251>

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