

Loneliness and Frailty Among Older Adults Receiving Home Healthcare: A Cross-Sectional Study

Özge Tuncer ¹, Ayça Asma Sakallı ²

¹Department of Family Medicine, HSU Izmir Medical Faculty Bozyaka Education and Research Hospital, Izmir, Turkey; ²Department of Family Medicine, HSU Balıkesir Atatürk City Hospital, Balıkesir, Turkey

Correspondence: Özge Tuncer, Department of Family Medicine, HSU Izmir Medical Faculty Bozyaka Education and Research Hospital, Bahar Mah., Saim Çıkrıkçı Cd. No: 59, Karabağlar/Izmir, 35170, Turkey, Email drozgeucman@gmail.com

Purpose: The aim of this study is to investigate the relationship between loneliness and frailty in older people and to provide a scientific basis for improving the quality of healthcare and social services offered to older people.

Patients and Methods: This cross-sectional study included individuals aged 65 years and over who were receiving home healthcare services in two cities in western Turkey. Convenience sampling was used. Eligibility criteria were age ≥ 65 years, receiving home healthcare services, adequate cognitive function, and voluntary participation. The Loneliness Scale for the Elderly (LSE) and the Clinical Frailty Scale were administered. Statistical analyses included *t*-tests, chi-square tests, ANOVA, Kruskal–Wallis tests, and Spearman correlation analysis.

Results: A total of 533 participants were included, with 288 from Center 1 and 245 from Center 2. Overall, 62.7% of participants reported experiencing loneliness. Participants in Center 2 had significantly higher loneliness scores compared to Center 1. A weak but significant positive correlation was found between frailty and loneliness scores (Spearman's $\rho = 0.175$, $p < 0.001$).

Conclusion: This study demonstrated a weak but significant association between loneliness and frailty among older adults receiving home healthcare. Loneliness was influenced by marital status, polypharmacy, and physical independence, which also contributed to frailty.

Keywords: aging, frail older adults, home health care, loneliness, physical frailty

Introduction

The final stage of the life cycle, old age is characterized by various challenges including physical and cognitive decline, health losses, loss of productivity and independence, and changes in roles and status.¹ During this period, individuals experience significant personal losses, including the death of spouses and peers and may also witness a reduction in their social network and support systems. Changes in the social structure, such as the shift from extended family systems to nuclear family models and the increased involvement of family members in working life, have contributed to the rise in the number of older people living alone. The decline in social relationships leads to the emergence of feelings of loneliness in individuals.² Promoting physical activity in older adults not only benefits physical, psychological, and cognitive health but also strengthens mental health and social cohesion, which may help mitigate loneliness.³ Loneliness can be defined as a subjective emotional distress associated with the dissatisfaction with the quality or quantity of social relationships. It can cause individuals to feel that their lives are meaningless and empty, leading to a profound sense of loneliness and abandonment. Both loneliness and social isolation have been linked to deterioration in health status and increased mortality rates among older people. These conditions become more prevalent with advancing age and deeply affect the lives of older individuals.⁴ Previous studies indicate that one in five older adults experiences chronic loneliness, reflecting the need to address chronic loneliness. Further research, particularly from low- and middle-income countries, is needed on chronic loneliness and social isolation.⁵

Frailty refers to an individual's physical, psychological, and social vulnerability, often associated with limitations such as in daily living activities, chronic diseases, nutritional problems, and difficulties in adhering to health recommendations. Frail older individuals are more prone to adverse outcomes such as falls, disabilities, institutional care, and early death. Strength training, particularly of the lower limbs, has been shown to prevent frailty, reduce fall risk, and improve functional autonomy and quality of life among older adults.⁶ Frailty, along with the decline in their ability to control their life, can render older individuals more vulnerable. Loneliness and social isolation can also exacerbate frailty by depriving older individuals of social support systems. Similarly, frailty can deepen feelings of loneliness by limiting individuals' social interactions. The reciprocal relationship between loneliness and frailty may negatively affect the quality of life for older individuals. Therefore, understanding this relationship is important for improving the quality of life in older adults and enhancing the effectiveness of healthcare services.⁷ Despite the growing recognition of loneliness and frailty as major public health concerns among older adults, there is a lack of research investigating their direct relationship, particularly among individuals receiving home healthcare services. The aim of this study is to investigate in detail the relationship between loneliness and frailty in older individuals, and to provide a scientific foundation for improving the quality of healthcare and social services offered to older people. To address the identified gaps in the literature, we designed a cross-sectional study using the methodology described below.

Materials and Methods

Study Design and Setting

The study, which used a cross-sectional design, was approved by the Health Sciences University Izmir Bozyaka Training and Research Hospital Ethics Committee on 24.04.2024 with decision number 2024/16. The study was conducted between May and August 2024 in two home health care units in Izmir City and Balıkesir City in western Turkey. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Sampling and Participants

The convenience sampling was used in this study. In the city of Izmir (Center 1), there are 2733 individuals aged 65 and above in the Home Healthcare Service (HHS), and 984 individuals in the HHS in Balıkesir at Center 2, making a total of 3717 individuals. The sample size for this cross-sectional study was calculated using the EpiInfo 7.0⁸ program, assuming a prevalence of 30% (based on frailty prevalence studies conducted in Turkey ranging from 10% to 45%,^{9–11} a margin of error of 5%, and a design effect of 1. The sample size was calculated separately for each center, with Center 1 requiring 288 participants and Center 2 requiring 245 participants, for a total of 533 participants. After rigorous data screening and cleaning, the study was completed after reaching a total of 533 older adults. Inclusion criteria include age ≥ 65 years, follow-up by home health services, clear consciousness with a certain reading level, and informed consent along with voluntary participation in the survey. Exclusion criteria are mental illness or a history of mental illness and communication impairment.

Data Collection

Data were gathered between May and August 2024 from individuals who fulfilled the inclusion criteria, using a questionnaire with participants' informed consent. A total of 533 patients, who met the study's inclusion criteria, provided data either through home visits or during their hospital admissions. We utilized both self-administered questionnaires and in person interviews for data collection. Participants had the choice to fill out the questionnaire on their own or receive help from our team during face-to-face interactions. During these interviews, trained healthcare professionals and researchers verbally assisted participants in completing the forms. A 14-item questionnaire on sociodemographic and clinical characteristics, prepared by the researcher through a literature review, was developed as the data collection form. Additionally, the scales specified below were administered to the participants.

Measures

The Barthel Index

This scale is used to assess individuals' capacity to perform activities of daily living (eg eating, dressing, bathing, and using the toilet) independently. It was first developed in 1965.¹² The index provides scores ranging from 0 to 100 based on 10 different activities, with higher scores indicating greater levels of independence. In Turkey, the Barthel Index has been adapted into Turkish, and validity and reliability studies have been conducted.¹³

Loneliness Scale for Elderly (LSE)

The scale consists of 11 items designed to measure social and emotional loneliness. Each item is rated on a 3-point Likert scale to determine the extent to which the described situation is felt by the individual. The scoring for each item is as follows: Yes = 0, Maybe = 1, No = 2. Participants respond by selecting the option that they feel best represents their situation. Five items are scored positively (1, 4, 7, 8, 11), while six items are reverse scored (2, 3, 5, 6, 9, 10). To calculate the overall loneliness score, the emotional loneliness score (items 2, 3, 5, 6, 9, 10) is added to the social loneliness score (items 1, 4, 7, 8, 11). The total score ranges from 0 to 22, with higher scores indicating greater levels of loneliness. The scale's Cronbach's alpha is ≥ 0.85 , demonstrating high reliability. The scale has been adapted into Turkish, and validity and reliability studies have been conducted.¹⁴ In addition to the LSE, a single-item question was used to assess subjective feelings of loneliness. Participants were asked to report their experiences of loneliness and were categorized into four groups based on their responses: (1) never felt lonely, (2) felt lonely a few times, (3) experienced recurring periods of loneliness, and (4) had a constant feeling of loneliness. This classification was used to explore the relationship between subjective loneliness and frailty.

International Falls Efficacy Scale (FES-I)

This scale consists of questions addressing concerns related to the likelihood of falling. Following modifications by the Prevention of Falls Network Europe, it was finalized under the name International Falls Efficacy Scale (FES-I).¹⁵ FES-I evaluates the confidence of older adults in performing daily activities and measures their level of fear of falling. The Turkish validity and reliability study of the scale was conducted in 2012¹⁶ with a Cronbach's alpha reliability coefficient of 0.94. The scale consists of 16 items, each rated from 1 to 4 points: Not at all concerned = 1 point, Somewhat concerned = 2 points, Fairly concerned = 3 points, Very concerned = 4 points. The total score ranges from 16 to 64, with higher scores indicating greater fear of falling.

Clinical Frailty Scale

The Clinical Frailty Scale (CFS) is a practical 9-point scale designed to quickly assess frailty levels in older adults, inspired by the Comprehensive Geriatric Assessment. Scores range from 1 ("Very Fit") to 9 ("Terminally Ill"), with higher scores indicating greater levels of frailty. The classification is based on an individual's general health, physical functionality, independence, and disease burden. The scale has been adapted into Turkish, and its validity and reliability have been confirmed.^{17,18}

Statistical Analysis Methods Section

Statistical analyses were performed using IBM® SPSS® 27 software (Version 27.0. Armonk, NY: IBM Corp. USA). The conformity of variables to a normal distribution was assessed using analytical methods (Kolmogorov–Smirnov/Shapiro–Wilk tests). Descriptive analyses were presented as mean $\pm$ standard deviation for continuous variables and as frequency and percentage (%) for categorical variables. The independent *t*-test was used to compare continuous variables between centers. Although comparisons between centers were conducted to provide contextual information about the study population, these analyses were not related to the primary objective of investigating the relationship between loneliness and frailty. Pearson's chi-square or Fisher's exact chi-square test was employed for the analysis of categorical data. Somer's *d* correlation analysis was conducted for relationships between nominal-nominal variables. One-way ANOVA and post hoc Bonferroni tests were used for the comparison of continuous variables across loneliness classifications. For the comparison of LSE and FES-I scores among frailty ordinal groups, the Kruskal–Wallis test and post hoc Dunn's test

were applied. Additionally, Spearman's rho correlation analysis was used to examine the relationship between frailty ordinal groups and LSE and FES-I scores. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 533 patients participated in the study, with 288 from Center 1 and 245 from Center 2. While gender distribution, living arrangement, chronic disease prevalence, polypharmacy, and fall history were comparable between centers, significant differences were observed in several demographic and clinical parameters. Literacy and primary school education rates, marital status, economic situation, smoking habits, and the use of walking aids differed significantly between the two centers ($p < 0.05$; Table 1).

Table 1 Comparison of Demographic and Clinical Data Among Research Centers

Variables	Subgroups	Center 1 (n=288) n%	Center 2 (n=245) n%	p
Gender	Female	188(65.3)	168(68.6)	0.421
	Male	100(34.7)	77(31.4)	
Education Status	Illiterate	65(22.6)	53(21.6)	<0.001
	Literate	45(15.6)*	22(9.0)	
	Primary school	155(53.8)*	85(34.7)	
	Middle school	8(2.8)	57(23.3)*	
Living Arrangement	High school and above	15(5.2)	28(11.4)*	0.133
	Alone	37(12.8)	27(11.0)	
	With caregiver	4(1.4)	10(4.1)	
Marital Status	With family	247(85.8)	208(84.9)	0.001
	Married	140(48.6)*	85(34.7)	
Economic Situation	Single/divorced	148(51.4)	160(65.3)	<0.001
	Low	106(36.8)*	65(26.5)	
	Medium	42(14.6)	96(39.2)*	
Chronic Disease	High	140(48.6)*	84(34.3)	0.059
	No	13(4.5)	4(1.6)	
Smoking	Yes	275(95.5)	241(98.4)	0.006
	Never smoked	197(68.4)*	135(55.1)	
	Ex-smoker	79(27.4)	93(38.0)*	
Fall History	Still smoking	12(4.2)	17(6.9)	0.538
	No	137(47.6)	110(44.9)	
Loneliness	Yes	151(52.4)	135(55.1)	0.105
	I never felt lonely	119(41.3)	80(32.7)	
	A few times I felt lonely	92(31.9)	102(41.6)	
	I have had recurring periods of loneliness	58(20.1)	47(19.2)	
Walking Aid	I had a constant feeling of loneliness	19(6.6)	16(6.5)	<0.001
	No	80(27.8)	112(45.7)	
	Yes	208(72.2)*	133(54.3)	

(Continued)

Table 1 (Continued).

Variables	Subgroups	Center 1 (n=288) n%	Center 2 (n=245) n%	p
Polypharmacy	No	126(43.8)	127(51.8)	0.062
	Yes	162(56.3)	118(48.2)	

Notes: Bold values indicate statistically significant results ($p < 0.05$). Pearson's chi square test used and $p < 0.05$ considered significant. *indicates statistically significant groups.

In terms of functional status, the Barthel Index scores differed significantly, with higher proportions of severe and slight dependency categories observed in Center 2, whereas Center 1 had more patients in the moderate and independent categories ($p < 0.001$; Table 2). Similarly, frailty classification showed that patients in Center 2 were more often classified as “severely frail” compared to Center 1.

The mean age was significantly higher in Center 1 ($p < 0.001$). Regarding loneliness, participants from Center 2 had significantly higher total LSE scores and higher emotional loneliness scores ($p < 0.001$ and $p = 0.007$, respectively), although no significant difference was observed in social loneliness scores between centers (Table 3).

Comparative analyses of demographic and clinical variables across ordinal loneliness groups are presented in Table 4, while associations with functional and frailty status are detailed in Table 5. Significant differences were observed in LSE scores, its subdimensions, and FES-I scores across loneliness groups ($p < 0.001$), whereas age did not differ significantly between groups (Table 6). Post hoc analyses are presented in Figures 1–4.

A comparison and correlation analysis were conducted for LSE, Social Loneliness, Emotional Loneliness, and FES-I scores among frailty groups. When comparing social loneliness scores between frailty groups, a significant difference was found (Kruskal–Wallis test; K-W; 21.0, $p = 0.004$). Post hoc analysis results are shown in Figures 5–8. A weak, positive, significant correlation was found between frailty ordinal groups and social loneliness scores ($r_s = 0.175$; $p < 0.001$).

Table 2 Comparison of Barthel Index and Frailty Classification Between Research Centers

Variables	Subgroups	Center 1 (n=288)	Center 2 (n=245)	p
		n(%)		
Barthel Index	Total (0–20)	0(0)	1(0.4)	<0.001
	Severe (21–61)	54(18.8)	80(32.7)*	
	Moderate (62–90)	148(51.4)*	95(38.8)	
	Slight (91–99)	27(9.4)	52(21.2)*	
	Independent (100)	59(20.5)*	17(6.9)	
Frailty	Very fit	3(1.0)	2(0.8)	<0.001
	Well	15(5.2)	6(2.4)	
	Managing well	49(17.0)*	31(12.7)	
	Vulnerable	41(14.2)	40(16.3)	
	Mildly frail	52(18.1)	46(18.8)	
	Moderately frail	128(44.4)*	95(38.8)	
	Severely frail	0(0)	22(9.0)*	
	Very severely frail	0(0)	3(1.2)	

Notes: Bold values indicate statistically significant results ($p < 0.05$). Pearson's chi square test used and $p < 0.05$ considered significant. *indicates statistically significant groups.

Table 3 Comparison of Continuous Data Types Among Research Centers

Variables	Center 1 (n=288)	Center 2 (n=245)	p
	Mean±SD		
Age (Years)	84.1±6.2*	81.2±7.9	<0.001
LSE	2.3±2.4	3.6±2.7*	<0.001
Social Loneliness †	4.4±3.1	4.3±3.1	0.769
Emotional Loneliness †	6.8±4.6	7.9±5.1*	0.007
FES-I	34.7±12.6	36.6±13.2	0.090

Notes: Bold values indicate statistically significant results ($p < 0.05$). Independent t test used and $p < 0.05$ considered significant. LSE: Loneliness Scale for Elderly, †LSE sub-dimensions, FES-I: Falls Efficacy Scale International. *indicates statistically significant groups.

Table 4 Comparison of Demographic and Clinical Data Between Loneliness Groups

Variables	Subgroups	I Never Felt Lonely (n=199)	A Few Times I Felt Lonely (n=194)	I Have Had Recurring Periods of Loneliness (n=105)	I Had a Constant Feeling of Loneliness (n=35)	p value
		n(%)				
Gender	Female	110(55.3)	135(69.6*	84(80.0)*	27(77.1)*	<0.001
	Male	89(44.7)	59(30.4)	21(20.0)	8(22.9)	
Education Status	Illiterate	29(14.6)	44(22.7)	34(32.4)*	11(31.4)*	0.003
	Literate	20(10.1)	31(16.0)	12(11.4)	4(11.4)	
	Primary school	107(53.8*	74(38.1)	45(42.9)	14(40.0)	
	Middle school	22(11.1)	32(16.5)*	6(5.7)	5(14.3)	
	High school and above	21(10.6)*	13(6.7)	8(7.6)	1(2.9)	
Living Arrangement	Alone	13(6.5)	23(11.9)	19(18.1)	9(25.7)*	0.004
	With caregiver	4(2.0)	5(2.6)	5(4.8)	0(0)	
	With family	182(91.5*	166(85.6)	81(77.1)	26(74.3)	
Marital Status	Married	110(55.3)	73(37.6)	33(31.4)	9(25.7)	<0.001
	Single/divorced	89(44.7)	121(62.4)	72(68.6)	26(74.3)*	
Economic Situation	Low	57(28.6)	66(34.0)	39(37.1)	9(25.7)	0.357
	Medium	61(30.7)	46(23.7)	24(22.9)	7(20.0)	
	High	81(40.7)	82(42.3)	42(40.0)	19(54.3)	
Chronic Disease	No	10(5.0)	7(3.6)	0(0)	0(0)	0.075
	Yes	189(95.0)	187(96.4)	105(100)	35(100)	
Smoking	Never smoked	120(60.3)	117(60.3)	72(68.6)	23(65.7)	0.579
	Ex-smoker	66(33.2)	66(34.0)	28(26.7)	12(34.3)	
	Still smoking	13(6.5)	11(5.7)	5(4.8)	0(0)	
Fall History	Yes	93(46.7)	112(57.7)	59(56.2)	22(62.9)	0.086
	No	106(53.3)	82(42.3)	46(43.8)	13(37.1)	
Walking Aid	Yes	117(58.8)	126(64.9)	74(70.5)	24(68.6)	0.200
	No	82(41.2)	68(35.1)	31(29.5)	11(31.4)	

(Continued)

Table 4 (Continued).

Variables	Subgroups	I Never Felt Lonely (n=199)	A Few Times I Felt Lonely (n=194)	I Have Had Recurring Periods of Loneliness (n=105)	I Had a Constant Feeling of Loneliness (n=35)	p value
		n(%)				
Polypharmacy	Yes	91(45.7)	103(53.1)	64(61.0)*	22(62.9)*	0.042
	No	108(54.3)	91(46.9)	41(39.0)	13(37.1)	

Notes: Bold values indicate statistically significant results ($p < 0.05$). Pearson's chi square analysis used and $p < 0.05$ considered significant. * indicates statistically significant groups.

Table 5 Investigation of the Relationship Between Loneliness Groups and Barthel Index and Fragility

Variables	Subgroups	I Never Felt Lonely (n=199)	A Few Times a Felt Lonely (n=194)	I Have Had Recurring Periods of Loneliness (n=105)	I Had a Constant Feeling of Loneliness (n=35)	p value	Somer's d
		n(%)					
Barthel Index	Total (0–20)	0(0)	1(0.5)	0(0)	0(0)	<0.001	−0.186
	Severe (21–61)	37(18.6)	53(27.3)	32(30.5)	12(34.3)*		
	Moderate (62–90)	82(41.2)	89(45.9)	57(54.3)	15(42.9)		
	Slight (91–99)	30(15.1)	31(16.0)	13(12.4)	5(14.3)		
	Independent (100)	50(25.1)*	20(10.3)	3(2.9)	3(8.6)		
Fragility	Very fit	3(1.5)	2(1.0)	0(0)	0(0)	0.001	0.179
	Well	14(7.0)*	6(3.1)	1(1.0)	0(0)		
	Managing well	43(21.6)*	28(14.4)	6(5.7)	3(8.6)		
	Vulnerable	35(17.6)	29(14.9)	13(12.4)	4(11.4)		
	Mildly frail	29(14.6)	31(16.0)	27(25.7)*	11(31.4)*		
	Moderately frail	71(35.7)	86(44.3)	52(49.5)*	14(40.0)		
	Severely frail	3(1.5)	11(5.7)	6(5.7)	2(5.7)		
	Very severely frail	1(0.5)	1(0.5)	0(0)	1(2.9)		

Notes: Bold values indicate statistically significant results ($p < 0.05$). Pearson's chi square test and nominal-nominal Somer's d correlation test used. $p < 0.05$ considered significant. * indicates statistically significant groups.

Table 6 Comparison of Age, FES-I and LSE Scores Between Loneliness Groups

Variables	I Never Felt Lonely (n=199)	I Felt a Few Times Lonely (n=194)	I Have Had Recurring Periods of Loneliness (n=105)	I Had a Constant Feeling of Loneliness (n=35)	p value
	Mean±SD				
Age (Years)	85.5±7.9	83.0±6.8	82.9±7.1	82.8±5.8	0.936
LSE	1.4±1.8	3.5±2.5	4.2±2.7	4.6±2.9	<0.001
*Social Loneliness	2.2±2.3	5.0±2.7	6.3±2.7	7.2±3.1	<0.001
*Emotional Loneliness	3.6±3.4	8.5±3.9	10.5±4.3	11.8±4.5	<0.001
FES-I	32.3±12.4	36.0±12.8	40.1±13.1	37.9±11.3	<0.001

Notes: Bold values indicate statistically significant results ($p < 0.05$). One-way ANOVA and post hoc Bonferroni test used. $p < 0.05$ considered significant.

Abbreviations: LSE: Loneliness Scale for Elderly; *LSE sub-dimensions, FES-I, Falls Efficacy Scale International.

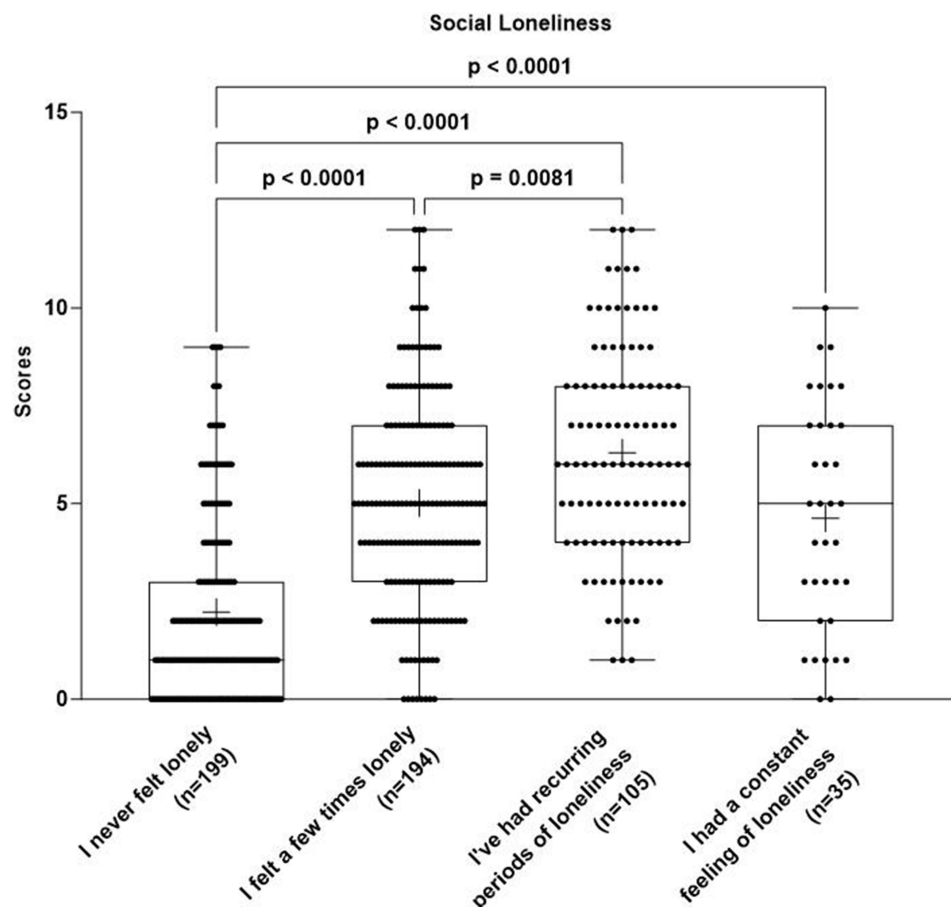


Figure 1 The comparison of social loneliness scores between loneliness ordinal groups.

A significant difference was also found in emotional loneliness scores among frailty groups (K-W; 27.69, $p < 0.001$). When comparing LSE scores between frailty groups, a significant difference was found (KW; 28.51, $p < 0.001$). A significant difference was observed in FES-I scores between frailty groups (K-W; 28.51, $p < 0.001$).

Discussion

This study found a weak yet significant correlation between loneliness and frailty among older adults. Loneliness was associated with reduced physical independence and influenced by socio-demographic factors such as education level, marital status, fear of falling and polypharmacy.

We found a weak but significant positive association between loneliness and frailty, consistent with previous research highlighting the impact of psychosocial factors on geriatric syndromes.^{19,20} In addition, higher degrees of loneliness were associated with reduced physical mobility, supporting the bidirectional relationship between physical function and emotional well-being. No significant relationship was observed between loneliness and economic status, age, or the presence of chronic diseases. Although some studies suggest a U-shaped relationship between loneliness and age, this pattern was not observed in our sample.²¹ This may be due to cultural dynamics, the high dependency levels in our home healthcare population, or limited variation in age-related experiences. Similarly, the lack of association with economic status might be explained by the overall homogeneity in income and chronic disease burden among participants. A significant difference was found in loneliness scale scores between the two centers. Center 1 (Izmir), located in the Aegean region, is Turkey's third-largest city and is adjacent to the Aegean Sea. Center 2 (Balıkesir) is a smaller city in the northern Aegean region, located north of Izmir. Although participants in Center 2 were younger, their overall and

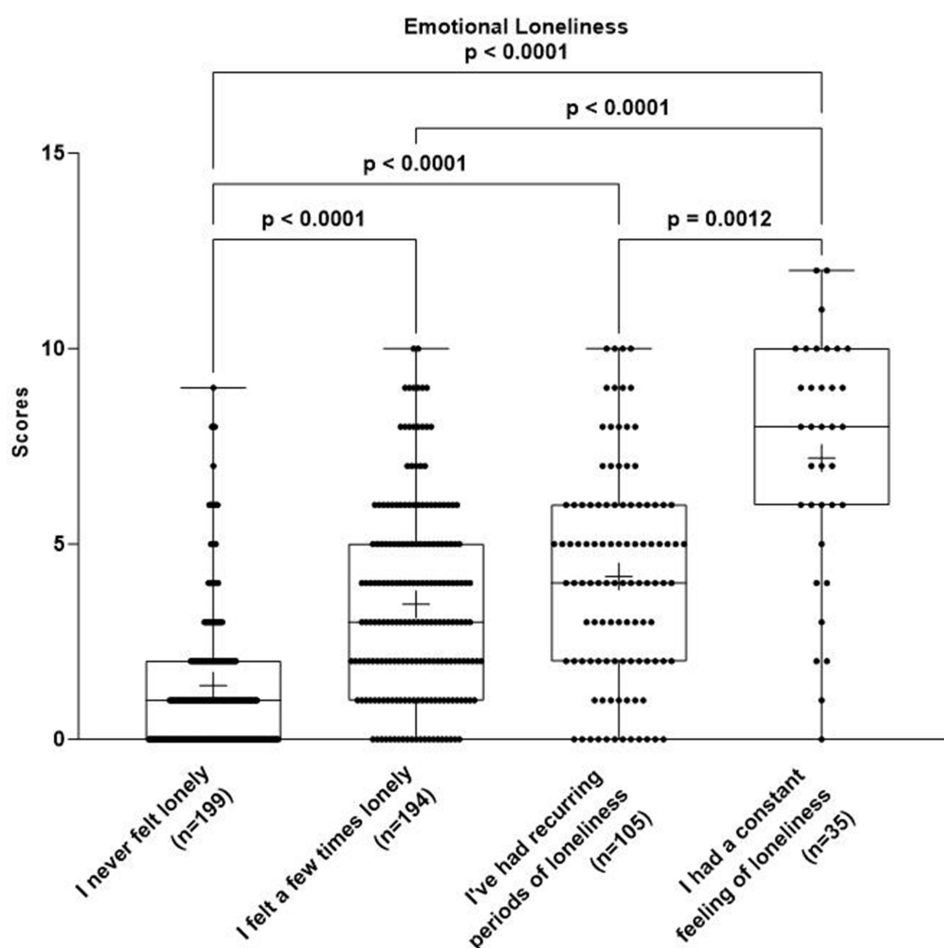


Figure 2 Comparison of emotional loneliness scores between loneliness ordinal groups.

emotional loneliness levels were found to be higher than those in Center 1, suggesting that factors such as lifestyle, social ties, and support systems might differ. While differences between centers were noted, these findings were descriptive and not directly related to the primary objective of investigating the relationship between loneliness and frailty. Additionally, the majority of individuals in Center 2 were not married, which may have led to limited social support. Moreover, the higher levels of frailty and Barthel Index in this group have made these individuals more susceptible to feelings of loneliness, both physically and psychologically. These findings suggest that the perception of loneliness is influenced not only by individual factors but also strongly affected by environmental and sociodemographic factors.

In this study, a statistically significant relationship was found between loneliness and fear of falling (FES-I). This finding suggests that loneliness may be a contributing factor to an increased fear of falling. Individuals who do not feel lonely have significantly lower levels of fear of falling compared to those who experience recurrent loneliness. Zali pointed out that there are significant differences in fear of falling and quality of life among lonely individuals, while Naseri et al found a positive relationship between loneliness and fear of falling.^{22,23} Petersen et al emphasized that falls are associated with loneliness and social isolation.²⁴ These findings suggest that enhancing social support and encouraging physical activity may play a crucial role in reducing loneliness and fear of falling. Mechanistically, loneliness may contribute to frailty through pathways such as decreased mobility, inadequate nutrition, and chronic psychological stress, which in turn can accelerate physical decline. From a theoretical perspective, this relationship can be explained within the biopsychosocial model, where physical, psychological, and social dimensions interact to influence health outcomes in older adults.

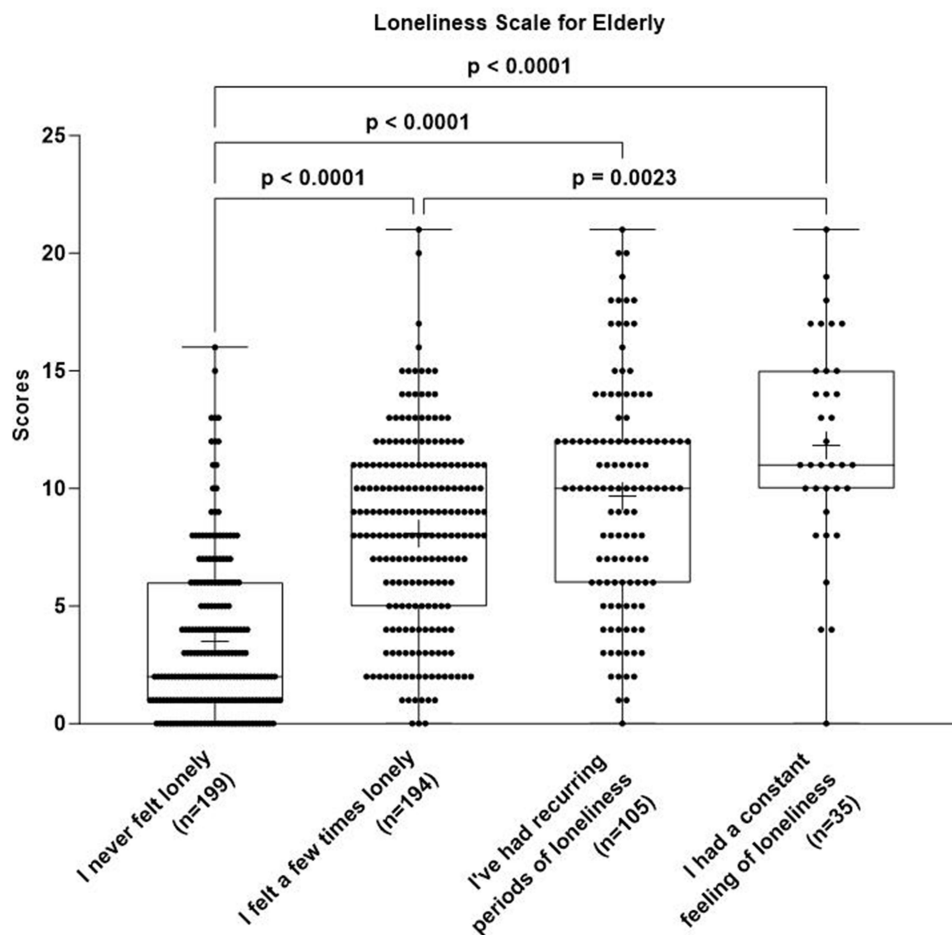


Figure 3 Comparison of LSE scores between loneliness ordinal groups.

The weak positive correlation between frailty ordinal groups and social loneliness, emotional loneliness, and LSE scores supports the reciprocal relationship between loneliness and frailty. Gale et al stated that loneliness increases the risk of physical frailty, while Ye et al emphasized a bidirectional relationship between loneliness and frailty.^{19,25} Teater et al proposed that physical and cognitive health have protective effects on social loneliness however, the same protective effect was not observed for emotional loneliness.²⁶ Zhao et al suggested that, rather than focusing solely on the effect of loneliness on frailty, participation in social and physical activities is more critical in preventing frailty.²⁷ These findings suggest the importance of social support programs and the promotion of physical activities in addressing both loneliness and frailty.

In the literature, fear of falling is recognized as a significant contributor to frailty. Fear of falling serves as a predictor for frailty, and individuals in the community who experience fear of falling in the community have a higher risk of frailty.^{28,29} Merchant et al reported that fear of falling is more pronounced in prefrail and frail individuals, and Qin et al found that individuals with a fear of falling are 7.2 times more likely to be frail.^{30,31} Kamide et al also suggested that FES-I scores are significantly associated with the progression of frailty.³² These findings suggest that fear of falling not only impacts physical limitations but also affects social engagement and quality of life, further contributing to frailty. Regular assessment of fear of falling and interventions to reduce this fear could enhance both physical and social well-being in frail individuals. Therefore, strategies addressing fear of falling should be an integral part of a comprehensive approach to combating frailty.

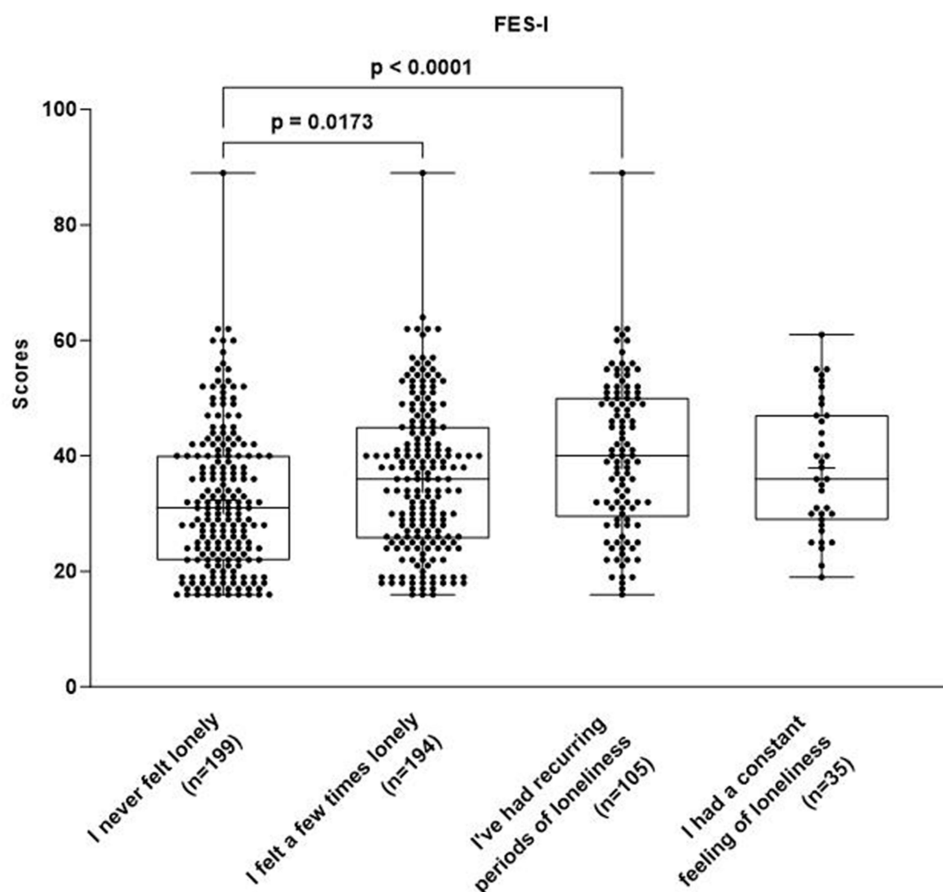


Figure 4 Comparison of FES-I scores between loneliness ordinal groups.

In this study, it was found that women have higher levels of loneliness compared to men. This finding is consistent with the studies by Pagan³³ and Boehlen et al,³⁴ where women reported higher levels of loneliness. Additionally, Igbokwe et al³⁵ indicated that female gender and advanced age are significantly associated with loneliness. However, Maes et al³⁶ and Sánchez-Moreno et al³⁷ reported no difference between genders in terms of loneliness, while Barreto et al³⁸ found that men reported higher levels of loneliness. These conflicting results suggest that loneliness may vary depending on sociocultural and demographic factors. In addition to sociocultural and demographic factors, biopsychosocial factors, such as emotional expressiveness, social network structures, and psychological resilience, may also contribute to gender differences in loneliness.

This study found that education level significantly is related to loneliness, with individuals with lower education levels reporting higher levels of loneliness. This finding is consistent with the literature. For example, Wilson-Genderson et al³⁹ and Pagan and Malo⁴⁰ emphasized that lower education levels are associated with loneliness. Sánchez-Moreno et al³⁷ noted that loneliness is notably higher among unskilled individuals compared to university graduates. Limited social networks and inadequate coping skills in individuals with lower education levels are major contributors to increased loneliness. Lower-educated individuals generally have fewer opportunities for social and work-related activities, which can lead to social isolation and, consequently, loneliness.

Older adults living alone report higher levels of loneliness than those living with family, while married individuals experience less loneliness compared to single or divorced individuals. The impact of living arrangements and marital status on loneliness has been clearly demonstrated in various studies. Qu and de Vaus,⁴¹ as well as Wilson-Genderson,³⁹ found that individuals living alone are more likely to experience loneliness compared to those living with others. It is well-known that living with a partner reduces the risk of loneliness.³⁷ Regarding marital status, married individuals have

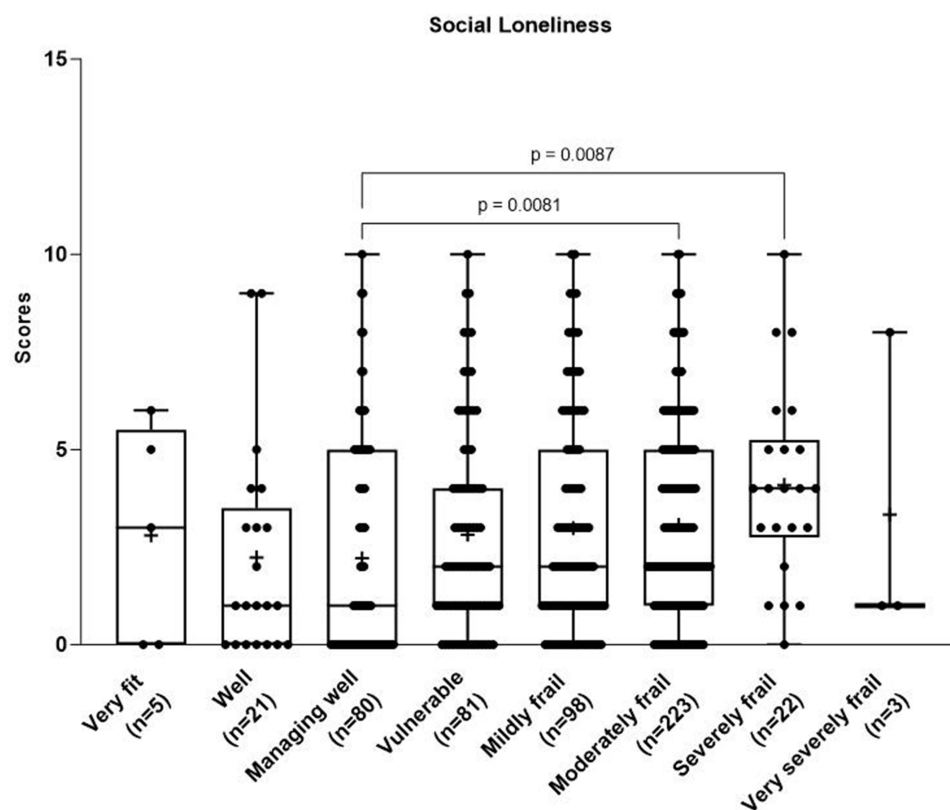


Figure 5 Comparison of social loneliness scores between fragility ordinal groups.

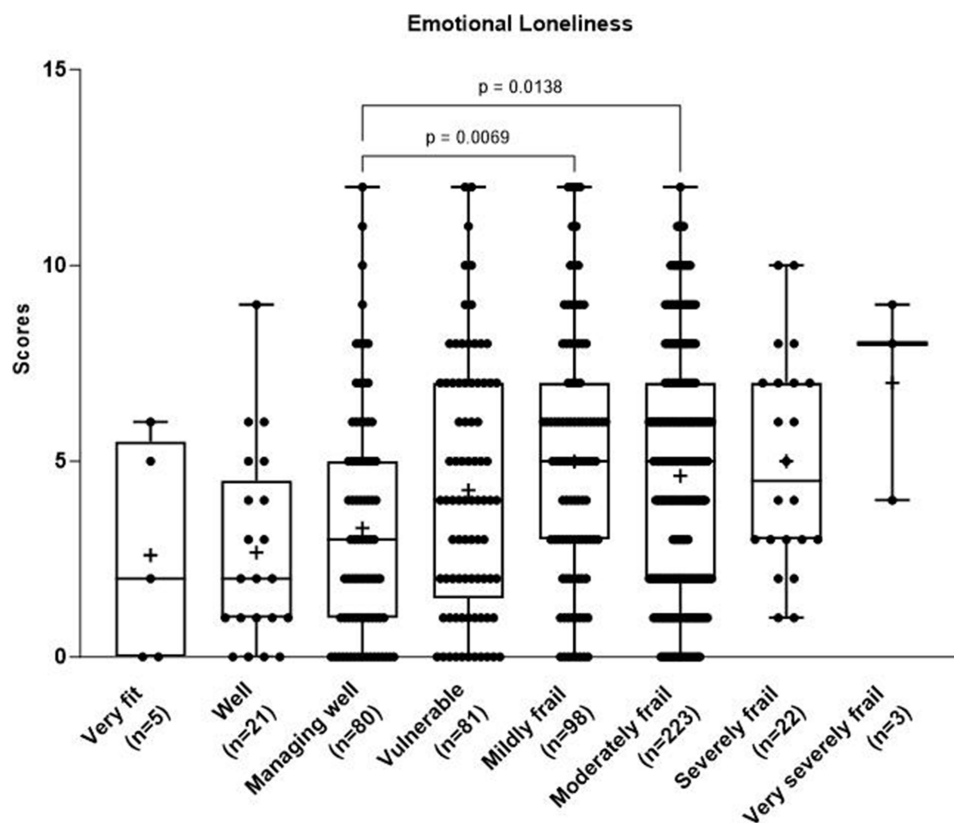


Figure 6 Comparison of emotional loneliness scores between fragility ordinal groups.

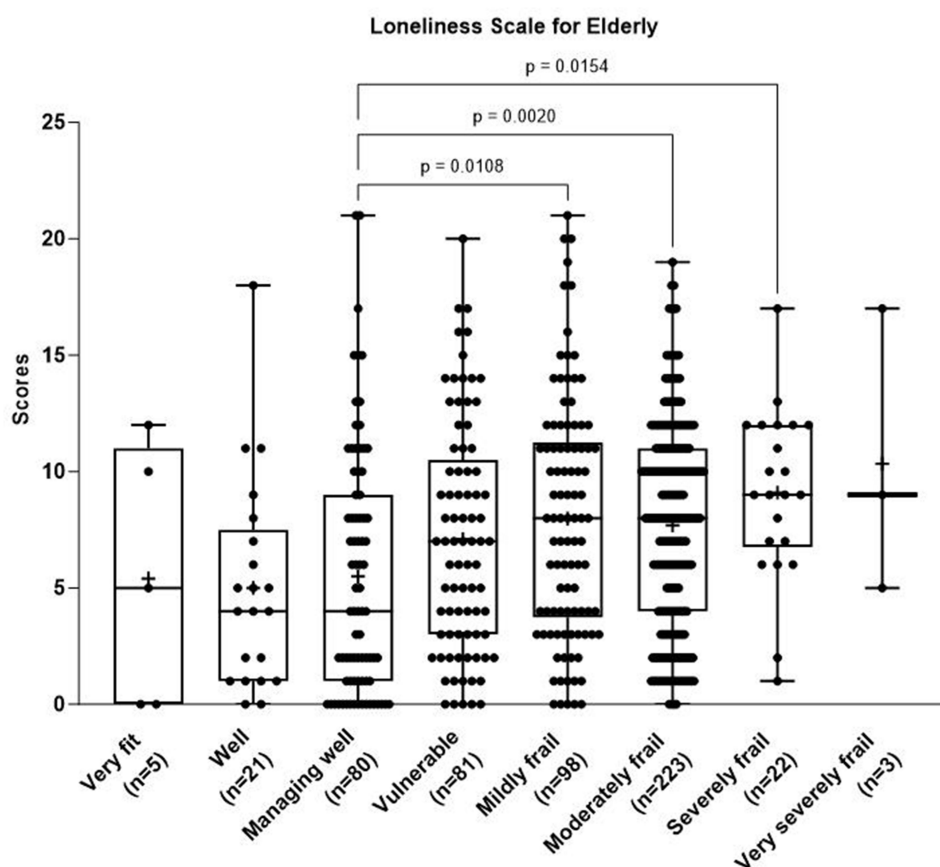


Figure 7 Comparison of LSE scores between fragility ordinal groups.

lower levels of loneliness compared to single, divorced, or widowed individuals.⁴² Liu et al⁴³ found that divorced and widowed older Americans reported higher levels of loneliness during the pandemic compared to their married peers. These findings demonstrate that loneliness is strongly influenced by individuals' living arrangements and marital status. The lower levels of loneliness reported by married individuals and those living with others emphasize the protective effects of social connections and close relationships on loneliness. This suggests the importance of strengthening social support mechanisms for individuals living alone or single.

In this study, no significant relationship was found between loneliness and economic status, smoking status, chronic disease, or history of falls. The lack of a significant relationship between loneliness and chronic disease may be attributed to the fact that nearly all participants in the study had a chronic disease. Similarly, while some studies suggest a complex cyclical relationship between loneliness and chronic diseases,⁴⁴ other studies do not support this relationship.⁴⁵ However, the literature provides a slightly different perspective on these findings. For instance, economic deprivation and low socioeconomic status have been shown to be associated with loneliness^{46,47} and loneliness is more prevalent in societies with higher income inequality.⁴⁸ Nonetheless, it is suggested that this relationship is not solely dependent on income but may also be influenced by an individual's social environment and personal perceptions.

The lack of a significant relationship between smoking and loneliness is also noteworthy, as some studies have emphasized that loneliness may increase the likelihood of engaging in risky health behaviors, including smoking.^{49,50} In this study, polypharmacy was significantly higher in the high loneliness groups. This finding aligns with those in the literature. Im et al⁵¹ found in their study on elderly individuals in Canada that severe loneliness was independently associated with polypharmacy in women, although this was not observed in men. This finding suggests that loneliness may be a more important factor influencing medication use in older women. Furthermore, Svensson et al⁵² demonstrated

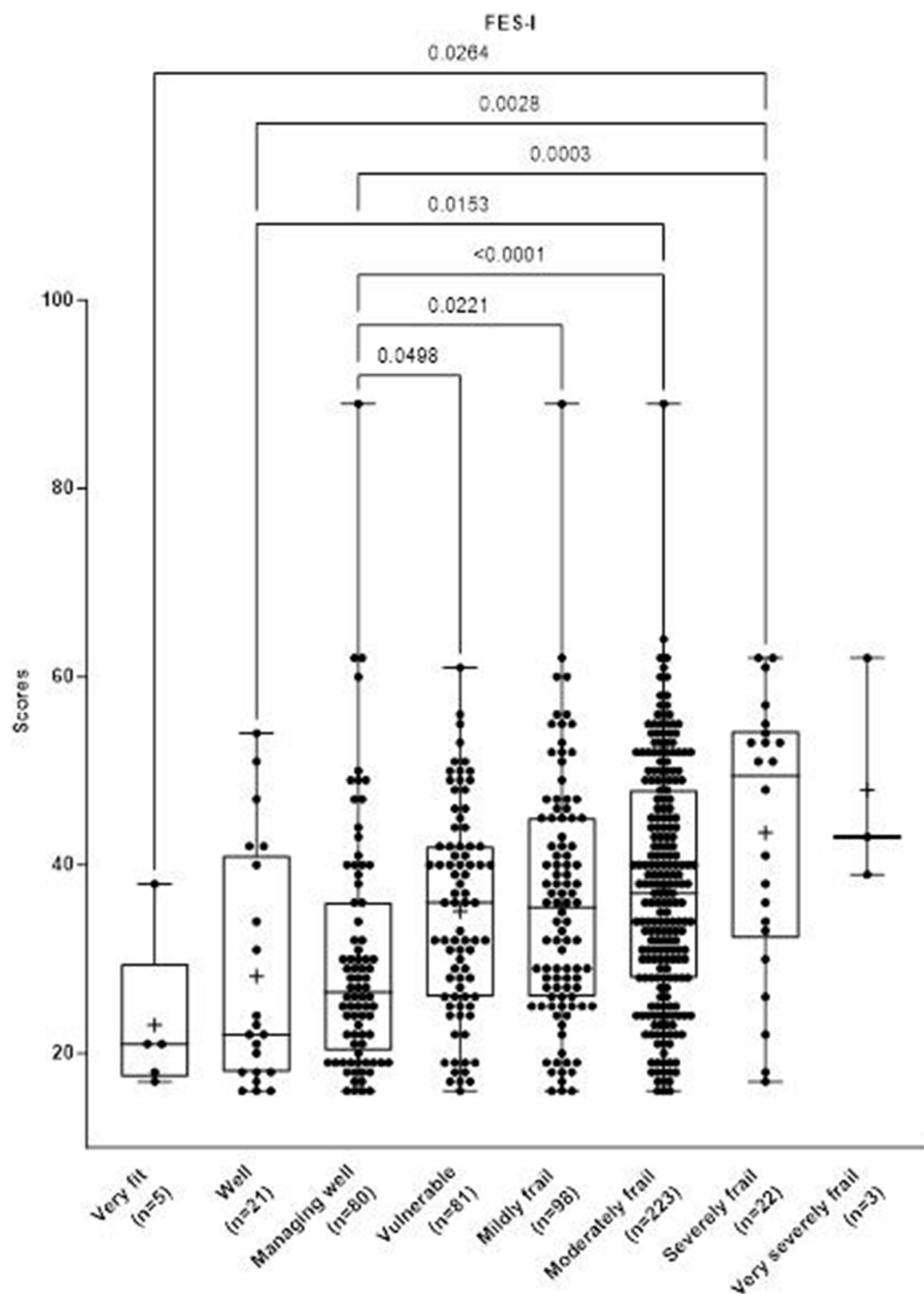


Figure 8 Comparison of FES-I scores between fragility ordinal groups.

that polypharmacy is associated with loneliness and social isolation. Their research emphasized the importance of considering loneliness and social isolation when caring for elderly individuals with polypharmacy. The findings of our study not only support the relationship between loneliness and polypharmacy but also underline the need for these factors to be considered in comprehensive health assessments for elderly individuals. The significant relationship between loneliness and Barthel Index score highlights the impact of physical dependence on loneliness. The finding that individuals with more severe physical dependence report higher levels of loneliness is consistent with the literature, which suggests that physical limitations may contribute to an increased sense of loneliness.^{53,54} This relationship is supported by the view that physical limitations restrict social interactions, thereby enhancing the feeling of loneliness.⁵⁵ Dahlberg et al⁵⁶ found that individuals with mobility restrictions had significantly higher levels of loneliness.

Additionally, McCaffery et al⁵⁷ suggest that loneliness is associated with higher disability symptoms and slower walking speeds.

These findings suggest that the level of physical independence is an important factor in reducing loneliness. Improving physical functionality and maintaining independence can be considered crucial strategies in the fight against loneliness. Recent advances in wearable technology, such as accelerometer-based devices, offer promising tools to monitor and enhance physical activity levels, potentially aiding in the management of frailty among older adults.⁵⁸ These technological innovations could be incorporated into intervention programs aimed at promoting mobility and reducing social isolation among the elderly.

In practical terms, routine screening for loneliness in home healthcare settings, implementing targeted fall-prevention programs, and promoting access to home-based or virtual exercise and social engagement initiatives could significantly contribute to reducing both frailty and loneliness among older adults.

Limitations

This study has several limitations. First, due to its cross-sectional design, it is not possible to establish a causal relationship between loneliness and frailty. Second, the study population consisted only of individuals receiving home healthcare services in two cities in western Turkey, which may limit the generalizability of the findings to broader elderly populations. Third, although validated scales were used, self-reported measures might have introduced subjective biases. Fourth, data on nutritional status (such as malnutrition, calorie and protein intake, and vitamin D levels) and sarcopenia were not collected, although these factors are known to influence both loneliness and frailty. Fifth, multivariate regression analyses were not performed, which could have allowed adjustment for potential confounding factors; future studies should incorporate regression modeling to better clarify these relationships. Finally, the study did not investigate the potential influence of cognitive function, depression, or social network size, which are also associated with loneliness and frailty.

Future longitudinal studies involving larger and more diverse populations, and including comprehensive assessments of nutritional, cognitive, and functional status with multivariate analyses, are needed to confirm and expand upon these findings.

Conclusion

This study examined the relationship between loneliness and frailty among older adults and found a weak yet significant correlation. Loneliness was associated with reduced physical independence, and socio-demographic factors such as education level, marital status, and physical functionality were significant determinants of loneliness. Moreover, a notable relationship was observed between polypharmacy and loneliness. These findings underscore the relevance of considering both physical independence and social support in the context of frailty and loneliness. Strategies such as encouraging physical activity and strengthening social connections may be promising areas for future research. Longitudinal studies incorporating cognitive and psychosocial assessments are needed to clarify these associations and guide intervention development in aging populations.

Abbreviations

AUC, area under the curve; LS, least squares; NE, not estimable; LSE, loneliness scale for the elderly; HHS, home healthcare services; FES-I, the falls efficacy scale-international.

Disclosure

The authors report no potential conflicts of interest in this work.

References

1. Gaviano L, Pili R, Petretto AD, et al. Definitions of ageing according to the perspective of the psychology of ageing: a scoping review. *Geriatrics*. 2024;9(5):107. doi:10.3390/geriatrics9050107

2. Tel H, Koc M, Aydın H T. Determination of loneliness, life satisfaction and death anxiety in elderly living at home. *IBAD J Soc Sci.* 2020;(Special Issue):1–10. doi:10.21733/ibad.760027
3. Parra-Rizo MA, Cigarroa I, Olivera-Sánchez S, et al. Sociodemographic profile of physically active older adults according to the type of physical activities practiced: gymnastic exercises, aquatic activities, yoga, Pilates and dance. *Retos.* 2024;56:280–288. doi:10.47197/retos.v56.102223
4. Ekstrom H, Svensson M, Elmståhl S, Wrangler LS. The association between loneliness, social isolation, and sleep disturbances in older adults: a follow-up study from the Swedish good aging in Skåne project. *SAGE Open Med.* 2024;12:20503121231222823. doi:10.1177/20503121231222823
5. Hajek A, Sutin AR, Posi G, et al. Chronic loneliness and chronic social isolation among older adults. A systematic review, meta-analysis and meta-regression. *Aging Mental Health.* 2024;29(2):185–200. doi:10.1080/13607863.2024.2385448
6. Medina-Pérez O, Trujillo-Jiménez R, Solórzano-Morales S, Rentería-Moreno M, Vega-Ramírez FA. Strength training as a strategy for healthy aging: benefits for frailty, falls, and quality of life in older adults. *Salud Uninorte.* 2024;40(1):131–146. doi:10.14482/sun.40.01.650.452
7. Hiriscau EI, Cauli O, Donca V, et al. The association between functional health patterns and frailty in hospitalized geriatric patients. *Geriatrics.* 2024;9(2):41. doi:10.3390/geriatrics9020041
8. Centers for Disease Control and Prevention (CDC). *Epi Info 7: A Database and Statistics Program for Public Health Professionals.* Atlanta, GA, USA: Centers for Disease Control and Prevention; 2025.
9. Akin S, Mazicioglu MM, Mucuk S, et al. The prevalence of frailty and related factors in community-dwelling Turkish elderly according to modified fried frailty index and FRAIL scales. *Aging Clin Experimental Res.* 2015;27(5):703–709. doi:10.1007/s40520-015-0337-0
10. Eyigor S, Kutsal YG, Duran E, et al. Frailty prevalence and related factors in the older adult-FrailTURK Project. *Age.* 2015;37(3):9791. doi:10.1007/s11357-015-9791-z
11. Ozdemir S, Ozturk ZA, Turkbeyler IH, Sirin F, Gol M. Klinikte yatan geriatrik hastalarda farklı ölçekler kullanılarak kırılganlık prevalansının belirlenmesi. (English: determining the prevalence of frailty in hospitalized geriatric patients using different scales). *KSU Med J.* 2017;12(3):1–5. doi:10.17517/ksutfd.338266
12. Mahoney FI, Barthel DW. Functional evaluation: the Barthel index. *Md State Med J.* 1965;14:61–65.
13. Kucukdeveci AA, Yavuzer G, Tennant A, Suldur N, Sonel B, Arasil T. Adaptation of the modified Barthel index for use in physical medicine and rehabilitation in Turkey. *Scand J Rehabil Med.* 2000;32(2):87–92. doi:10.1080/003655000750045604
14. Akgül H, Yesilyaprak B. “Yaşlılar için yalnızlık ölçeği” nin türk kültürüne uyarlaması: geçerlilik ve güvenilirlik çalışması.(English: adaptation of the loneliness scale for older adults to Turkish culture: validity and reliability study). *Yasli Sorunlari Arastirma Dergisi.* 2015;(1):34–45.
15. Yardley L, Beyer N, Hauer K, Kempen G, Piot-Ziegler C, Todd C. Development and initial validation of the falls efficacy scale-international (FES-I). *Age Ageing.* 2005;34(6):614–619. doi:10.1093/ageing/afi196
16. Ulus Y, Durmus D, Akyol Y, Terzi Y, Bilgici A, Kuru O. Reliability and validity of the Turkish version of the falls efficacy scale international (FES-I) in community dwelling older persons. *Arch Gerontol Geriatr.* 2012;54(3):429–433. doi:10.1016/j.archger.2011.06.010
17. Rockwood K, Song X, MacKnight C, et al. A global clinical measure of fitness and frailty in elderly people. *CMAJ.* 2005;173(5):489–495. doi:10.1503/cmaj.050051
18. Ozsürekli C, Balci C, Kızırlarslanoglu MC, et al. An important problem in an aging country: identifying the frailty via 9 point clinical frailty scale. *Acta Clin Belg.* 2020;75(3):200–204. doi:10.1080/17843286.2019.1597457
19. Gale CR, Westbury L, Cooper C, et al. Social isolation and loneliness as risk factors for the progression of frailty: the English longitudinal study of ageing. *Age Ageing.* 2018;47(3):392–397. doi:10.1093/ageing/afx188
20. Courtin E, Knapp M. Social isolation, loneliness and health in old age: a scoping review. *Health Soc Care Community.* 2017;25(3):799–812. doi:10.1111/hsc.12311
21. Wang Y, Jiang W, Wu L. Association between age and loneliness in different residential type and gender groups: evidence from China. *BMC Psychiatry.* 2023;23(1):Article43. doi:10.1186/s12888-023-04525-1
22. Zali M, Farhadi A, Soleimanifar M, Allameh H, Janani L. Loneliness, fear of falling, and quality of life in community-dwelling older women who live alone and live with others. *Educ Gerontol.* 2017;43(11):582–588. doi:10.1080/03601277.2017.1376450
23. Naseri F, Papi S, Hossein Nattaj A, Ilali ES. The relationship between fear of falling and social isolation and loneliness in diabetic elderly who referred to health centers in Faridonkanar City in 2023. *J Mazandaran Univ Med Sci.* 2024;34(232):123–135.
24. Petersen N, König HH, Hajek A. The link between falls, social isolation and loneliness: a systematic review. *Arch Gerontol Geriatr.* 2020;88:104020. doi:10.1016/j.archger.2020.104020
25. Ye L, Bally E, Korenhof SA, et al. The association between loneliness and frailty among community-dwelling older adults in five European countries: a longitudinal study. *Age Ageing.* 2024;53(10):Articleafae210. doi:10.1093/ageing/afae210
26. Teater B, Chonody JM, Davis N. Risk and protective factors of loneliness among older adults: the significance of social isolation and quality and type of contact. *Soc Work Public Health.* 2021;36(2):128–141. doi:10.1080/19371918.2020.1866140
27. Zhao M, Gao J, Li M, Wang K. Relationship between loneliness and frailty among older adults in nursing homes: the mediating role of activity engagement. *J Am Med Dir Assoc.* 2019;20(6):759–764. doi:10.1016/j.jamda.2018.11.007
28. de Souza LF, Canever JB, Moreira BS, Danielewicz AL, de Avelar NCP. Association between fear of falling and frailty in community-dwelling older adults: a systematic review. *Clin Interv Aging.* 2022;17:129–140. doi:10.2147/CIA.S328423
29. Mo C, Peng W, Luo Y, Tang S, Liu M. Bidirectional relationship between fear of falling and frailty among community-dwelling older adults: a longitudinal study. *Geriatr Nurs.* 2023;51:286–292. doi:10.1016/j.gerinurse.2023.03.022
30. Merchant RA, Chen MZ, Wong BLL, et al. Relationship between fear of falling, fear-related activity restriction, frailty, and sarcopenia. *J Am Geriatr Soc.* 2020;68(11):2602–2608. doi:10.1111/jgs.16719
31. Qin Y, Li J, McPhillips M, Lukkahatai N, Yu F, Li K. Association of fear of falling with frailty in community-dwelling older adults: a cross-sectional study. *Nurs Health Sci.* 2021;23(2):516–524. doi:10.1111/nhs.12840
32. Kamide N, Inoue N, Sakamoto M, Sato H, Shiba Y. Fall-related efficacy is associated with the progression of frailty in community-dwelling older people. *Nihon Ronen Igakkai Zasshi.* 2020;57(3):308–315. doi:10.3143/geriatrics.57.308
33. Pagan R. Gender and age differences in loneliness: evidence for people without and with disabilities. *Int J Environ Res Public Health.* 2020;17(24):9176. doi:10.3390/ijerph17249176

34. Boehlen FH, Heider D, Schellberg D, et al. Gender-specific association of loneliness and health care use in community-dwelling older adults. *BMC Geriatr.* 2023;23(1):502. doi:10.1186/s12877-023-04201-9
35. Igboke CC, Ejeh VJ, Agbaje OS, Umoke PIC, Iweama CN, Ozoemena EL. Prevalence of loneliness and association with depressive and anxiety symptoms among retirees in Northcentral Nigeria: a cross-sectional study. *BMC Geriatr.* 2020;20(1):153. doi:10.1186/s12877-020-01561-4
36. Maes M, Qualter P, Vanhalst J, Van den Noortgate W, Goossens L. Gender differences in loneliness across the lifespan: a meta-analysis. *Eur J Pers.* 2019;33(6):642–654. doi:10.1002/per.2220
37. Sánchez-Moreno E, Gallardo-Peralta L, Barrón López de Roda A, et al. Socioeconomic status, loneliness, and depression among older adults: a cross-sectional study in Spain. *BMC Geriatr.* 2024;24(1):Article361. doi:10.1186/s12877-024-04978-3
38. Barreto M, Victor C, Hammond C, Eccles A, Richins MT, Qualter P. Loneliness around the world: age, gender, and cultural differences in loneliness. *Pers Individ Dif.* 2021;169:110066. doi:10.1016/j.paid.2020.110066
39. Wilson-Genderson M, Heid AR, Cartwright F, Collins AL, Pruchno R. Change in loneliness experienced by older men and women living alone and with others at the onset of the COVID-19 pandemic. *Res Aging.* 2022;44(5–6):369–381. doi:10.1177/01640275211026649
40. Pagan R, Malo MA. Dynamic analysis of loneliness at older ages in Europe by gender. *Appl Res Qual Life.* 2024;19(4):1601–1630. doi:10.1007/s11482-024-10300-5
41. Qu L, de Vaus D. *Living Alone and Personal Wellbeing. (Australian Family Trends No. 10).* Melbourne: Australian Institute of Family Studies; 2015.
42. Kislev E. Aging, marital status, and loneliness: multilevel analyses of 30 countries. *Research on Ageing and Social Policy.* 2022;10(1):77–103. doi:10.17583/rasp.8923
43. Liu H, Copeland M, G N, Chopik WJ, Oh J. Marital status differences in loneliness among older Americans during the COVID-19 pandemic. *Popul Res Policy Rev.* 2023;42(5):Article74. doi:10.1007/s11113-023-09822-x
44. Lewis S, Willis K, Smith L, et al. There but not really involved: the meanings of loneliness for people with chronic illness. *Soc. Sci Med.* 2024;343:116596. doi:10.1016/j.socscimed.2024.116596
45. Meng L, Xu R, Li J, et al. The silent epidemic: exploring the link between loneliness and chronic diseases in China's elderly. *BMC Geriatr.* 2024;24(1):710. doi:10.1186/s12877-024-05163-2
46. Kung CSJ, Pudney SE, Shields MA. Economic gradients in loneliness, social isolation and social support: evidence from the UK Biobank. *Soc Sci Med.* 2022;306:115122. doi:10.1016/j.socscimed.2022.115122
47. Mangot-Sala L, Bartoll-Roca X, Sánchez-Ledesma E, Cortés-Albaladejo M, Liefbroer AC, Pérez K. Emerging socioeconomic correlates of loneliness: evidence from the Barcelona health survey 2021. *Soc Psychiatry Psychiatr Epidemiol.* 2024;60(4):917–929. doi:10.1007/s00127-024-02789-w
48. Tapia-Muñoz T, Staudinger UM, Allel K, et al. Income inequality and its relationship with loneliness prevalence: a cross-sectional study among older adults in the US and 16 European countries [published correction appears in PLoS One. *PLoS One.* 2024;19(12):e0315729. doi:10.1371/journal.pone.0315729
49. Algren MH, Ekholm O, Nielsen L, Ersbøll AK, Bak CK, Andersen PT. Social isolation, loneliness, socioeconomic status, and health-risk behaviour in deprived neighbourhoods in Denmark: a cross-sectional study. *SSM Popul Health.* 2020;10:100546. PMID: 32042889; PMCID: PMC6997896. doi:10.1016/j.ssmph.2020.100546
50. Philip KE, Bu F, Polkey MI, et al. Relationship of smoking with current and future social isolation and loneliness: 12-year follow-up of older adults in England. *Lancet Reg Health Eur.* 2022;14:100302. doi:10.1016/j.lanepe.2021.100302
51. JHB Im, Bronskill SE, Strauss R, et al. Sex-based differences in the association between loneliness and polypharmacy among older adults in Ontario. *Canada J Am Geriatr Soc.* 2023;71(10):3099–3109. doi:10.1111/jgs.18477
52. Svensson M, Ekström H, Elmståhl S, Rosso A. Association of polypharmacy with occurrence of loneliness and social isolation among older adults. *Arch Gerontol Geriatr.* 2024;116:105158. doi:10.1016/j.archger.2023.105158
53. Miyawaki CE, Liu M, Park VT, Tran MT, Markides KS. Social support as a moderator of physical disability and mental health in older Vietnamese immigrants in the U.S.: results from the Vietnamese aging and care survey (VACS). *Geriatr Nurs.* 2022;44:151–158. doi:10.1016/j.gerinurse.2022.01.012
54. Czaja SJ, Moxley JH, Rogers WA. Social support, isolation, loneliness, and health among older adults in the PRISM randomized controlled trial. *Front Psychol.* 2021;12:728658. doi:10.3389/fpsyg.2021.728658
55. Moeyersons M, De Vlieghe K, Huyghe B, De Groof S, Milisen K, de Casterlé BD. 'Living in a shrinking world'-The experience of loneliness among community-dwelling older people with reduced mobility: a qualitative grounded theory approach. *BMC Geriatr.* 2022;22(1):285. doi:10.1186/s12877-022-02998-5
56. Dahlberg L, von Saenger I, Naseer M, Lennartsson C, Agahi N. National trends in loneliness and social isolation in older adults: an examination of subgroup trends over three decades in Sweden. *Front Public Health.* 2024;12:1444990. doi:10.3389/fpubh.2024.1444990
57. McCaffery JM, Anderson A, Coday M, et al. Loneliness relates to functional mobility in older adults with Type 2 diabetes: the Look AHEAD study. *J Aging Res.* 2020;2020:7543702. doi:10.1155/2020/7543702
58. Kumar P. Accelerating frailty management: harnessing advances in accelerometer technology. *Eur Geriatr Med.* 2024;15(3):597–599. doi:10.1007/s41999-024-00977-0

Risk Management and Healthcare Policy

Publish your work in this journal

Risk Management and Healthcare Policy is an international, peer-reviewed, open access journal focusing on all aspects of public health, policy, and preventative measures to promote good health and improve morbidity and mortality in the population. The journal welcomes submitted papers covering original research, basic science, clinical & epidemiological studies, reviews and evaluations, guidelines, expert opinion and commentary, case reports and extended reports. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/risk-management-and-healthcare-policy-journal>

Dovepress
Taylor & Francis Group