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Determinants of Social Interaction in Older Adults: The Roles of Physical Activity, Depression, and Health-Related Quality of Life

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Abstract

Objective

Social interaction is a key dimension of healthy aging and is thought to be related to activity levels, psychological well-being, and quality of life. However, evidence on the factors that remain independently associated with social interaction in community-dwelling older adults is still limited. This study aimed to identify the independent determinants of social interaction, including physical activity, depressive symptoms, health-related quality of life, and demographic characteristics, among community-dwelling older adults aged 65 years and over.

Material and Method

In this cross-sectional study, 292 community-dwelling older adults (≥65 years) were assessed. Social interaction was measured using the Index of Social Interaction (ISI). Physical activity, health-related quality of life, and depressive symptoms were evaluated with the Physical Activity Scale for the Elderly (PASE), the SF-12 Health Survey, and the Beck Depression Inventory, respectively. Associations were examined using Pearson's correlations, and independent correlates of ISI were explored with multiple linear regression.

Results

Poorer social interaction (higher ISI scores) was associated with greater depressive symptoms, lower physical activity, and worse physical health-related quality of life (all $p<0.05$). In the adjusted model ($R^2=0.35$), depressive symptoms showed the largest independent association with poorer social interaction ($\beta=0.38$, $p<0.001$). Lower physical activity, poorer physical quality of life, older age, and female sex were also independently related to higher ISI scores.

Conclusion

Social interaction in later life appears to reflect a combination of psychological, physical, and demographic influences. Addressing depressive symptoms and supporting physical functioning may be essential strategies for promoting social engagement and successful aging in later life.

Keywords: Social interaction, Older adults, Physical activity, Quality of life, Depression

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Introduction

Globally, societies are undergoing a rapid aging process, representing one of the most significant demographic transformations of the modern era (1). Advances in health care and technology have led to substantial improvements in the management of chronic diseases, thereby extending life expectancy. However, the growing proportion of older adults has also rendered functional decline and psychosocial challenges increasingly visible (2). Contemporary perspectives on healthy aging extend beyond the mere absence of disease and emphasize the preservation of physical, cognitive, and social functioning. Within this framework, social interaction has emerged as a key determinant of well-being in later life (3).

During the aging process, experiences such as role loss, retirement, spousal loss, and reduced mobility may contribute to declines in social participation. A reduction in social activities has been associated with lower levels of physical activity, increased morbidity, and heightened vulnerability to mental health problems (4). In particular, social isolation and loneliness have been identified as major risk factors for depressive symptoms, functional decline, and loss of independence among older adults (5). Conversely, maintaining meaningful social relationships and continued engagement in community life play a supportive role in enhancing psychological resilience and functional independence (6). Social participation is also closely linked to cognitive health (7). Previous studies have demonstrated that older adults with stronger social networks exhibit lower risks of cognitive impairment and dementia (8). Behaviors reflecting social curiosity and engagement—such as reading newspapers and books, pursuing hobbies, maintaining motivation for an active lifestyle, and participating in social activities—are considered important contributors to cognitive reserve.

Depression represents another prevalent condition in the geriatric population and has a substantial impact on quality of life. Depressive symptoms are closely associated with social withdrawal, physical inactivity, and functional decline (9). It is well established that reduced social interaction increases the risk of depression, while lower levels of physical activity adversely affect mental health. These findings suggest the presence of a reciprocal and complex relationship among social interaction, physical activity, and depression.

Within the framework of active and successful aging, it is essential to examine the interrelationships between social interaction, physical activity, depression, and quality of life comprehensively. Clarifying these associations may contribute to the identification of modifiable factors capable of supporting functional independence and psychological well-being in later life. Although previous studies have frequently evaluated social interaction as a predictor of health-related outcomes, limited research has examined social interaction itself as an outcome associated with physical, psychological, and demographic factors among community-dwelling older adults. Therefore, this study aimed to investigate the independent associations of depressive symptoms, physical activity, physical quality of life, and demographic characteristics with social interaction levels in older adults. It was hypothesized that poorer psychological and physical health indicators would be associated with lower levels of social interaction among community-dwelling older adults.

Material And Method

This cross-sectional study was reported in line with the STROBE recommendations for observational research. A total of 292 community-dwelling older adults who volunteered to participate and completed all assessments were included in the analyses. All participants provided written informed consent, and the protocol was approved by the Bingöl University Health Sciences Scientific Research and Publication Ethics Committee (Approval No. 24/4; Date: 06 March 2024).

Participants and Data Collection

This cross-sectional study was conducted in the urban area of Isparta Province between April and December 2025. A non-probability convenience sampling method was used to access the community-dwelling older adults who were accessible to the research team. Although a convenience sampling approach was used, participants were recruited from multiple community settings, increasing sample heterogeneity and representativeness. Recruitment was carried out consecutively in community settings such as primary care facilities, social centers, and residential neighborhoods.

The inclusion criteria were being 65 years or older, being able to communicate verbally, and providing informed consent. Older adults with severe cognitive impairment, acute medical conditions that could interfere with participation, and an inability to communicate verbally were excluded from the study. A total of 322 older adults were initially recruited, and the study was completed with 292 participants. Of the 30 participants who were not included in the final analysis, 20 did not complete the assessment process, while 10 were excluded due to missing data.

Measurements
Sociodemographic data of the participants were collected using a Personal Information Form. The data were obtained through face-to-face interviews conducted by researchers.

Social Interaction
Social interaction was evaluated with the Index of Social Interaction (ISI). The ISI was developed to assess multiple dimensions of social engagement (4, 10). The Index consists of 18-items with five subdomains: independence and active life orientation, social curiosity, interaction with family and non-family members, participation in society, and sense of safety and perceived social support. A lower level of social interaction was indicated by higher total scores, with negative responses scoring one point. The Turkish adaptation of the ISI was conducted using forward–backward translation procedures, and the scale demonstrated acceptable internal consistency for exploratory research in the present study (Cronbach's $\alpha = 0.68$).

Physical Activity
Physical activity was evaluated with the Physical Activity Scale for the Elderly (PASE). This instrument captures participation in leisure, household, and work-related activities during the past week, taking into account how often and how long individuals engaged in each activity type. The Turkish adaptation of the PASE has shown acceptable validity and reliability in older adults. PASE scores are calculated by weighting reported activity frequencies. Higher scores indicate higher levels of physical activity (11, 12).

Quality of Life
Health-related quality of life was measured using the 12-item Short Form Health Survey (SF-12) (13). The SF-12 yields two summary indices—physical and mental component scores—based on items addressing general health perception, physical functioning, role limitations, pain, vitality, social functioning, and mental health. Higher scores represent a better perceived quality of life. The Turkish version of the SF-12 has previously been validated and found reliable (14).

Depressive Symptoms
Depressive symptoms were assessed with the Beck Depression Inventory (BDI), a 21-item self-report scale in which each item is rated from 0 to 3 (15). Total scores range from 0 to 63, and higher scores indicate more severe depressive symptoms. The Turkish version of the BDI has demonstrated good psychometric properties (16).

Sample Size
The adequacy of the sample size was evaluated based on commonly accepted guidelines for multiple linear regression analysis. It is generally recommended to include at least 10–15 participants per predictor variable to ensure sufficient statistical power. In the present study, the final regression model included nine predictor variables, requiring a minimum of 135 participants. With a total sample size of 292 participants, the study exceeded these recommendations, indicating adequate statistical power to detect moderate effect sizes.

Statistical Analysis
All analyses were conducted using IBM SPSS Statistics. Continuous variables are reported as mean ± standard deviation, and categorical variables as frequencies and percentages. The internal consistency of the Social Interaction Index (ISI) was evaluated using Cronbach's alpha. Pearson's correlation was used to explore bivariate relationships between ISI, physical activity, quality of life, and depressive symptoms. To determine independent predictors of social interaction, multiple linear regression analysis was performed with ISI total score as the dependent variable. Variables included in the regression model were selected based on theoretical relevance and previous literature, including demographic characteristics, living arrangement (living alone or living with family members), depressive symptoms, physical activity, and quality of life variables. Statistical significance was set at $p<0.05$.

Results

The study was completed with the participation of 292 older participants with an average age of 71.27±6.96 years. The sociodemographic characteristics of the participants are presented in Table 1.

Pearson correlation analyses revealed significant associations between social interaction, depression, physical activity, and health-related quality of life. Higher ISI scores were moderately correlated with higher depression scores ($r=0.50$, $p<0.001$). In addition, poorer social interaction was associated with lower physical activity levels ($r=-0.28$, $p<0.001$) and poorer physical quality of life ($r=-0.40$, $p<0.001$). No significant association was observed between social interaction and the SF-12 mental component score ($r=0.06$, $p=0.332$) (Table 2).

A multiple linear regression analysis was conducted to identify independent predictors of social interaction. The ISI total score was entered as the dependent vari-

Table 1 The Sociodemographic Characteristics of the Participants

		X±SD
Age (years)		71.27±6.96
Body Mass Index (kg/m²)		27.48±4.60
		N(%)
Gender	Female	133 (45.7)
	Male	159 (54.3)
Education	Primary	149 (51.2)
	Secondary	121 (41.6)
	Post Secondary	22 (7.2)
Daily Smoker	Yes	51 (17.8)
	No	241 (82.2)
Alcohol	Yes	16 (5.5)
	No	276 (94.5)
Marital Status	No Spouse	98 (33.6)
	Having Spouse	194 (66.4)
Living Condition	Alone	53 (18.2)
	With Family	239 (81.8)

Table 2 Correlations among Social Interaction, Physical Activity, Quality of Life, and Depression

Variable		ISI total	PASE	SF-12 Physical	SF-12 Mental	Depression
ISI Total Score	r	1.00				
	p					
PASE	r	-0.28**	1.00			
	p	<0.001				
SF-12 Physical	r	-0.40**	0.25**	1.00		
	p	<0.001	<0.001			
SF-12 Mental	r	0.06	0.09	0.03	1.00	
	p	0.332	0.14	0.616		
Depression	r	0.50**	-0.10	-0.37**	0.11	1.00
	p	<0.001	0.078	<0.001	0.060	

ISI: Index of Social Interaction (Higher ISI scores reflect poorer social interaction),
PASE: Physical Activity Scale for the Elderly. Values represent Pearson correlation coefficients. ** p < 0.01.

Table 3 Multiple Linear Regression Model Predicting Social Interaction

Predictor	B	SE	β	t	p
Depression	0.143	0.021	0.378	6.74	<0.001
PASE	−0.008	0.002	−0.165	−3.15	0.002
SF-12 Physical	−0.051	0.020	−0.149	−2.61	0.009
Age	0.055	0.027	0.115	2.03	0.044
Gender	0.760	0.360	0.117	2.11	0.035
Body mass index	−0.022	0.038	−0.029	−0.57	0.569
Marital status	−0.107	0.234	−0.031	−0.46	0.649
Living Arrangements	−0.086	0.497	−0.010	−0.17	0.862
SF-12 Mental	0.000	0.000	0.038	0.75	0.453

Dependent variable: ISI total score. ISI: Social Interaction Index (higher scores indicate lower social interaction), PASE: Physical Activity Scale for the Elderly, BMI: Body Mass Index

able, while depression, physical activity, physical and mental quality of life, body mass index, age, gender, and living arrangements were included simultaneously as covariates. The overall model was statistically significant ($R^2 = 0.35$, adjusted $R^2 = 0.33$, $F = 16.33$, $p < 0.001$) (Table 3).

Higher depression scores were independently associated with poorer social interaction ($\beta = 0.38$, $p < 0.001$). In addition, lower physical activity levels ($\beta = -0.17$, $p = 0.002$) and poorer physical quality of life ($\beta = -0.15$, $p = 0.009$) were significant predictors of reduced social interaction. Older age ($\beta = 0.12$, $p = 0.044$) and female gender ($\beta = 0.12$, $p = 0.035$) were also independently associated with lower levels of social interaction. Body mass index, mental quality of life, and living arrangement were not significant predictors in the adjusted model (Table 3).

Discussion

The present study indicated that depressive symptoms, physical activity, physical quality of life, age, and gender were independently associated with social interaction levels, explaining approximately one-third of the variance in social interaction scores. Social interaction was correlated with physical activity, health-related quality of life, and reduced depression levels. Depression was the strongest predictor of the lower levels of social interaction above the other variables.

With advancing age, a variety of factors may contribute to the development of depressive symptoms in older adults. Experiences such as loneliness, spousal loss, and living alone may lead individuals to derive less pleasure from previously enjoyable activities (17). These circumstances can increase depressive symptoms and promote a more withdrawn emotional state among older individuals. Older adults exhibiting depressive symptoms tend to reduce their engagement with society, which may subsequently restrict their level of social integration (18). Consistent with this evidence, one of the key findings of the present study was the significant association between lower levels of social integration and depression. Furthermore, depression was identified as the strongest determinant of social integration in the studied population.

Interestingly, the mental component of the SF-12 was not significantly associated with social interaction. One possible explanation is that depressive symptoms may reflect more specific aspects of emotional distress and social withdrawal related to social engagement than the broader mental health perception assessed by the SF-12 Mental Component. In addition, cultural or sample-specific characteristics may also have influenced this relationship.

Physical activity is a key determinant of healthy aging. Beyond its direct physiological benefits, older adults who remain physically active may have greater opportunities to engage in community activities, sustain

interpersonal relationships, and fulfill social roles. For instance, evidence from Sawada et al. (4) indicates that more frequent outdoor activity is associated with the preservation of physical functioning. Similar findings have been reported by Fujita et al (19). The results of the present study are consistent with these observations, underscoring the importance of physical activity in maintaining social participation. In line with this, physical activity was independently associated with social interaction in our analysis, with lower activity levels predicting poorer social engagement.

Functional limitations, pain, and reduced physical capacity can impede older adults' ability to leave their homes, participate in social gatherings, or sustain prolonged social interactions. As physical health constraints worsen with age, these barriers may lead to diminished engagement in social activities and a decline in overall quality of life (20, 21). In particular, frail older adults with functional limitations are less likely to engage in community participation, which in turn has been associated with increased loneliness and poorer psychosocial outcomes (20, 22). Consistent with this evidence, our findings demonstrated that lower levels of social interaction were associated with poorer physical health–related quality of life. These results underscore the importance of preserving physical capacity to promote social engagement and improve overall quality of life in later life.

Age and gender also showed independent associations with social interaction. Increasing age was associated with reduced social interaction, which may reflect age-related declines in health, shrinking social networks, and the loss of significant social roles. Female gender was associated with poorer social interaction in the present sample, which may be influenced by sociocultural factors, caregiving responsibilities, or differences in social role expectations. These results suggest that demographic characteristics continue to shape social engagement patterns in older adulthood, even after accounting for health-related factors. These findings point to gender-based inequalities in social participation among older adults and emphasize the importance of considering sociocultural expectations while developing adequate and accessible social spaces to support engagement in parallel with the current literature (23, 24).

The association between depressive symptoms, physical activity, and social interaction can be better understood through a biopsychosocial perspective. In older adulthood, declines in physical activity may not only reduce physical capacity but may also negatively affect motivation, independence, self-confidence, and participation in everyday social roles. Similarly, depressive symptoms may increase social withdrawal, reduce willingness to engage in interpersonal communication, and contribute to a more sedentary lifestyle. Over time, these interconnected factors may reinforce one another and create a cycle that adversely affects both psychosocial well-being and social participation. Previous studies have similarly emphasized that psychological health, physical functioning, and social engagement are closely interrelated components of healthy aging (25, 26). Therefore, social interaction among older adults should be considered a multidimensional construct shaped by physical, psychological, and social determinants rather than an isolated social outcome.

From a clinical and public health perspective, these findings underscore the importance of addressing social interaction as a multidimensional outcome influenced by both psychological and physical factors. Interventions aimed at improving social engagement in older adults should not focus solely on increasing opportunities for social contact but should also incorporate strategies to identify and manage depressive symptoms and support physical functioning. Programs that integrate mental health screening, physical activity promotion, and community-based participation may be particularly effective in mitigating social isolation. Routine depression screening may be beneficial in community-based older adult programs aimed at promoting social participation. In addition, physical activity interventions designed as group-based activities may provide both physical and social benefits by encouraging interpersonal interaction and community engagement.

This study has several limitations. First, because the design was cross-sectional, the findings should be interpreted as associations rather than evidence of causality, and the direction of the relationships cannot be determined. Second, participants were recruited through convenience sampling from a single urban area, which may limit generalizability and increase the risk of selection bias, as individuals who were healthier, more socially engaged, or more willing to participate may have been overrepresented in the sample. Nevertheless, the relatively large sample size and inclusion of community-dwelling older adults with diverse characteristics support the robustness of the analyses. In addition, although the Turkish adaptation of the ISI was conducted using forward–backward translation procedures, comprehensive psychometric validation analyses were not performed; therefore, the findings obtained using this scale should be interpreted with caution. Further prospective studies are needed to clarify the longitudinal relationships between de-

pressive symptoms, physical activity, physical health, and social interaction. Despite these limitations, this study simultaneously evaluated depressive symptoms, physical activity, physical health–related quality of life, and demographic factors in relation to social interaction among community-dwelling older adults, providing a comprehensive perspective on factors associated with social engagement in later life.

Conclusion

In conclusion, depressive symptoms appear to play a central role in reduced social interaction among community-dwelling older adults, highlighting the importance of integrating psychological well-being into strategies aimed at promoting social participation and healthy aging. By conceptualizing social interaction as an outcome rather than solely a determinant, this study provides a novel perspective on the multidimensional factors shaping social engagement in later life. Future longitudinal studies are needed to further clarify the complex relationships between psychological well-being, physical functioning, and social participation in older adults.

Conflict of Interest Statement
The authors declare no conflicts of interest.

Ethical Approval
Ethical approval was obtained from the Bingöl University Health Sciences Scientific Research and Publication Ethics Committee (Approval No. 24/4; Date: 06 March 2024). Written informed consent was obtained from all participants in accordance with the Declaration of Helsinki.

Consent to Participate and Publish
Following the provision of detailed information regarding the study, written informed consent was obtained from all participants.

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Availability of Data and Materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Artificial Intelligence Statement
The authors used generative artificial intelligence only for translation and language polishing. It was not used to generate or modify the scientific content, and it was not used to create images, graphics, tables, or captions.

Authors Contributions
ME: Conceptualization, Investigation, Formal analysis, Visualization, Writing – review & editing.

TK: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft.

ZB: Supervision, Validation, Writing – review & editing.

FB: Supervision, Validation, Writing – review & editing.

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