

## ORIGINAL ARTICLE

# Impact of Social Isolation on Falls and Hospitalization among Individuals aged 50 years and older with and without knee Osteoarthritis: 1 Year Phone-Call Follow-Up Study

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## ABSTRACT

**Background & Objectives:** Despite growing recognition of social isolation as a public health issue, limited research has examined its combined impact with knee OA on falls and hospitalizations, especially in the Malaysian context. This study aimed to determine the impact of social isolation on the risk of falls and hospitalization among older adults with and without knee osteoarthritis (OA) in Malaysia. **Methods:** A longitudinal study with a one-year follow-up was conducted among adults aged 50 years and above in Klang Valley and Selangor. Baseline data included demographic information, clinical examination for knee OA, and the Lubben Social Network Scale to assess social isolation. After 1 year, participants were contacted by telephone to collect information on falls and hospitalizations. **Results:** The study included 174 participants: 113 (65%) had knee OA, and 61 (35%) did not. No significant association was observed between social isolation and the risk of falls or hospitalization, regardless of knee OA status. Gender, social engagement, and living arrangement did not significantly modify these outcomes. **Conclusion:** Social isolation did not significantly affect falls or hospitalizations among older adults with or without knee OA over a 1-year period. These findings should be interpreted with caution due to limitations, such as recruitment from socially active community centres and a relatively short follow-up period. Future studies should consider longer follow-up periods, diverse recruitment settings, and the role of physical activity and functional status in influencing these outcomes.

**Keywords:** Knee Osteoarthritis, social isolation, older adults, fall, hospitalization

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## INTRODUCTION

Osteoarthritis (OA) is a common age-related musculoskeletal disorder that particularly affects older adults. Nearly 40% of individuals aged 65 years and above experience symptomatic OA (Gay et al., 2016). Although OA is often regarded as a condition affecting the elderly, multiple intrinsic and extrinsic factors contribute to its development. OA has traditionally been described as a “wear-and-tear” disease, primarily attributed to ageing rather than inflammation (Lespasio et al., 2017). Progressive degeneration of articular cartilage eventually leads to bone-on-bone contact, resulting in pain and functional limitation (Mayo Clinic, 2021). Currently, there is no definitive cure for OA; however, exercise remains one of the most effective non-pharmacological interventions for symptom management. Identifying factors that aggravate symptoms and strategies that alleviate pain

is particularly important for older adults.

Knee OA has been consistently associated with an increased risk of falls among older adults. Individuals with severe knee OA and reduced knee strength experience higher pain levels, which negatively affect balance and mobility—key contributors to fall risk. Previous studies have demonstrated that individuals with self-reported OA exhibit poorer postural stability and reduced knee extension strength (Foley et al., 2006). Consequently, OA is recognised as one of the leading contributors to falls in the older population. In Malaysia, approximately 75% of older adults had registered with public primary healthcare institutions by December 2014 and underwent health screenings addressing physical, emotional, and cognitive health (Yunus et al., 2017). Despite this, falls remain a significant public health concern.

Social isolation has emerged as an important psychosocial factor influencing health outcomes among older adults, including fall risk. Social isolation is objectively characterised by limited social networks, low participation in social activities, infrequent outings, or living alone. Coyle et al. reported that socially isolated individuals were 43% more likely to report fair or poor health. The prevalence of social isolation among older adults has increased over time and was further exacerbated by the COVID-19 pandemic, during which many older adults experienced bereavement and reduced social interaction. Additional contributing factors include retirement, functional limitations, loss of peers, changes in family structure, and reduced mobility (Courtin & Knapp, 2017). Loneliness associated with social isolation has been linked to adverse health outcomes such as coronary heart disease and stroke, and is associated with a 26–50% increased risk of mortality.

Falls pose serious consequences for older adults, affecting not only individuals but also their families and caregivers. Age-related physiological changes, multiple comorbidities, and delayed functional recovery contribute to increased vulnerability to falls (Ambrose et al., 2013). While 30–50% of falls result in minor injuries such as bruises or lacerations, 5–10% lead to serious injuries, including fractures and traumatic brain injury (TBI). Falls are the leading cause of TBI in older adults and account for 46% of fall-related TBI deaths (Ambrose et al., 2013).

For older adults with knee OA, the consequences of falls may be further compounded by social isolation, particularly when immediate assistance is unavailable. Despite the growing recognition of social isolation as a public health issue, limited research has examined its combined impact with knee OA on falls and hospitalization, especially within the Malaysian context. Hospitalization itself is associated with functional decline; approximately one in three older adults experiences deterioration in activities of daily living (ADL) following hospital admission (Van Grootven et al., 2020). Prolonged hospital stays often involve extended bed rest, leading to deconditioning and reduced muscle strength, thereby increasing the risk of further adverse outcomes. Therefore, the objective of this study was to determine the impact of social isolation on the risk of falling and hospitalization among older adults with and without knee OA.

## MATERIALS & METHODS

### *Study Design*

This was a comparative longitudinal study in which assessments were conducted in person in the community between 2021 and 2023, and a phone interview was conducted one year later with the same group of participants to follow up on the hospitalization questionnaires. Data collection was conducted by trained research assistants and physiotherapy

students.

### *Study Samples*

The study population was Malaysian older adults aged 50 years and above residing in Kuala Lumpur, Selangor, and Putrajaya. A convenient and purposive sampling method was used in this study. The recruitment of older adults was conducted in person in communities, such as mosques and temples, within the selected areas, based on the inclusion and exclusion criteria. The participants had undergone a 1-time face-to-face interview, which included an information sheet and questionnaires.

The inclusion criteria for the study were as follows: Malaysians aged 50 or older, able to speak Malay or English, living in Kuala Lumpur, Selangor, or Putrajaya, and independently mobile, with or without walking aids. In addition, older adults must have the mental capacity to give consent. The following were the exclusion criteria: (i) non-Malaysian citizens, (ii) residents outside of Kuala Lumpur, Selangor, and Putrajaya, (iii) wheelchair users, (iv) severe cognitive impairment/dementia assessed by certified medical officers, (v) severe impairment in communication.

### *Baseline assessments*

Data collection included demographic characteristics (age, sex, ethnicity, marital status, and living arrangement), comorbidities, current medication use, and history of falls, obtained through structured questionnaires. Knee osteoarthritis (OA) status was determined using two methods: self-reported physician diagnosis, based on an affirmative response to the question “Have you ever been told by a doctor that you have or have had osteoarthritis?”, and clinical assessment according to the American College of Rheumatology (ACR) clinical criteria, incorporating relevant history and physical examination findings. Participants meeting either criterion were classified as having knee OA.

Social isolation was assessed using the Lubben Social Network Scale–6 (LSNS-6), a self-report instrument that measures social engagement with family and friends. (Lubben J, 1988) The LSNS is available in 6-item and 12-item versions; the present study used the 6-item version. The LSNS-6 evaluates the size, closeness, and frequency of social interactions and consists of six items scored on a six-point scale, yielding a total score ranging from 0 to 30. A score of  $\leq 12$  indicates a high risk of social isolation, reflecting both limited social contact and self-selected social withdrawal. The LSNS-6 has demonstrated good internal consistency (Cronbach's  $\alpha = 0.83$ ), with reported reliability coefficients ranging from 0.84 to 0.89 for family-related items and 0.80 to 0.82 for non-kin items. The LSNS has also shown good construct validity, with scores correlating with mortality, all-cause hospitalization, health behaviors, depressive symptoms, and overall physical health. (Lubben J et al, 2006) Permission to use the LSNS was obtained prior to data collection

Based on knee OA status and social isolation status, participants were classified into four groups: knee OA with social isolation (OA+SI+), knee OA without social isolation (OA+SI-), no knee OA with social isolation (OA-SI+), and no knee OA without social isolation (OA-SI-).

**One-Year Telephone Follow-up**

A follow-up assessment was conducted 12 months after baseline via telephone interview. The interview followed a standardized script consisting of six questions that captured participants' history of falls and hospitalizations during the preceding 12 months.

**Statistical Analysis**

Data were analyzed using IBM SPSS Statistics software (version 20). Descriptive statistics were used

to summarize participant characteristics, which are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Group comparisons by knee osteoarthritis (OA) status and social isolation status were performed using the independent-samples t-test for continuous variables and the chi-square test for categorical variables, as appropriate. Multiple logistic regression analysis was conducted to examine the association between social isolation and outcomes of interest, namely falls and hospitalization, among older adults with and without knee OA. Results are presented as odds ratios (ORs) with 95% confidence intervals (CIs). A two-tailed p-value of <0.05 was considered statistically significant.

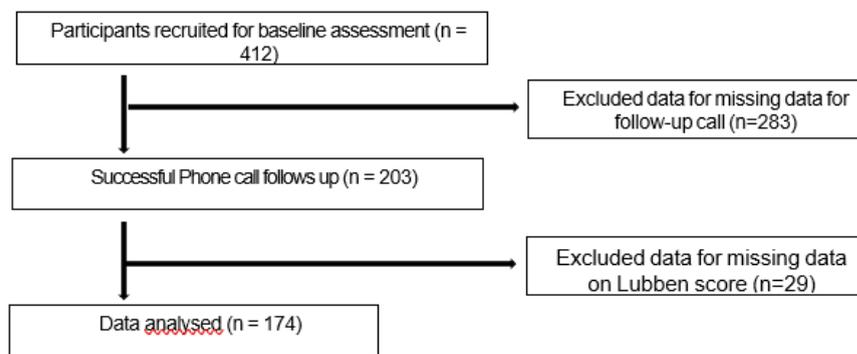


Figure 1: Participants recruitment

**RESULTS**

**Participants' Characteristics**

Figure 1 presents the participant recruitment and data inclusion process. Of the 412 participants recruited at baseline, 283 were excluded due to missing data from the follow-up telephone call, leaving 203 participants with successful follow-up. A further 29 participants were excluded because of incomplete Lubben Social Network Scale-6 (LSNS-6) data. Consequently, the final analytical sample comprised 174 participants. Based on knee osteoarthritis and social isolation status, participants were categorized into four groups: knee osteoarthritis with social isolation (OA+SI+), knee osteoarthritis without social isolation (OA+SI-), no knee osteoarthritis with social isolation (OA-SI+), and no knee osteoarthritis without social isolation (OA-SI-). The proportions of participants in these groups were 16%, 49%, 9%, and 26%, respectively. (Figure 1)

As presented in Table 1, participants with knee osteoarthritis had a mean (standard deviation) age of 65.47 (5.08) years, while those without knee osteoarthritis had a mean (standard deviation) age of 66.41 (6.21) years. The majority of participants were

Malay (63.1%) and female (68.4%). A statistically significant association was observed between gender and knee osteoarthritis ( $p < 0.05$ ), indicating a higher prevalence of knee osteoarthritis among female participants compared with males. (TABLE 1)

**Social Isolation according to OA status and demographic data**

Table 2 presents comparisons of demographic characteristics, including age, gender, ethnicity, marital status, and living arrangement, across the four groups. Among individuals without knee OA, those who were socially isolated were significantly older than those who were not. No significant associations were found between gender, knee osteoarthritis (OA), and social isolation. Similarly, ethnicity, marital status, and living arrangement showed no significant differences across groups, with all p-values above 0.05. (TABLE 2)

Table 3 shows that no significant association between social isolation and the risk of falls was observed in either the unadjusted analysis among individuals with and without knee OA.

Table 1: Study participants' characteristics

Table 1: Study participants' characteristics	ALL	With Knee OA	Without Knee OA	p-value
<i>Age mean±SD<sup>a</sup></i>		65.47±5.075	66.41±6.211	0.19
<i>Gender, n (%)</i>				<b>0.04</b>
Male,	55 (31.6)	27 (23.9)	28 (45.9)	
Female,	119 (68.4)	86 (76.1)	33 (54.1)	
<i>Ethnicity, n (%)</i>				0.72
Malay	110 (63.2)	73 (64.6)	37 (60.7)	
Chinese	45 (25.9)	29 (25.7)	16 (26.2)	
Indian	18 (10.3)	10 (8.8)	8 (13.1)	
Others	1 (0.6)	1 (0.9)	0 (0)	
<i>Marital status, n (%)</i>				0.467
Single	10 (5.7)	7 (6.2)	3 (4.9)	
Married	104 (59.8)	67 (59.3)	37 (60.7)	
Live with spouse	11 (6.3)	6 (5.3)	5 (8.2)	
Separated	1 (0.6)	1 (0.9)	0 (0)	
Divorced	6 (3.4)	6 (5.3)	0 (0)	
Widow/widower	42 (24.1)	26 (23)	16 (26.2)	
<i>Living Arrangement, n (%)</i>				0.95
Alone	19 (10.9)	12 (10.6)	7 (11.5)	
With families	138 (79.3)	89 (78.8)	49 (80.3)	
With others	17 (9.8)	12 (10.6)	5 (8.2)	

\*Bolded reading indicates significant value,  $p < 0.05$ . An independent Student's t-test was used to compare mean age. Categorical variables (e.g., gender, ethnicity, marital status, living arrangement) were compared using the chi-square test.

Table 2: Comparisons of demographic characteristics and living arrangements among the four groups.

Variable	With Knee OA, n =113			Without Knee OA n =61		
	Socially isolated, n =28	Non-socially isolated, n =85	p-value	Socially isolated, n =15	Non-socially isolated, n =46	p-value
<i>Mean Age± (SD)<sup>a</sup></i>	65.61±5.4	65.42±5.00	0.864	69.67±8.30	65.35±5.0	<b>0.018</b>
<i>Gender, n (%)</i>			0.874			0.207
Male	7 (25)	20 (23.5)		9 (60)	19 (41.3)	
Female	21 (75)	65 (76.5)		6 (40)	27 (58.7)	
<i>Ethnicity, n (%)</i>			0.206			0.180
Malay	15 (53.6)	58 (68.2)		7 (46.7)	30 (65.2)	
Chinese	8 (28.6)	21 (24.7)		4 (26.7)	12 (26.1)	
Indian	5 (17.9)	5 (5.9)		4 (26.7)	4 (8.7)	
Others	0 (0)	1 (1.2)		0 (0)	0 (0)	
<i>Marital status, n (%)</i>			0.287			0.544
Single	1 (3.6)	6 (7.1)		1 (6.7)	2 (4.3)	
Married	18 (64.3)	49 (57.6)		9 (60)	28 (60.9)	
Live with spouse	0 (0)	6 (7.1)		0 (0)	5 (10.9)	
Separated	0 (0)	1 (1.2)		0 (0)	0 (0)	
Divorced	0 (0)	6 (7.1)		0 (0)	0 (0)	
Widow/widower	9 (32.1)	17 (20)		5 (33.33)	11 (23.9)	
<i>Living Arrangement, n (%)</i>			0.505			0.843
Alone	3 (10.7)	9 (10.6)		2 (13.3)	5 (10.9)	
With families	24 (85.7)	65 (76.4)		11 (73.3)	38 (82.6)	
With others	1 (3.6)	11 (12.9)		2 (13.3)	3 (6.5)	

\*Bolded reading indicates significant value,  $p < 0.05$ . An independent Student's t-test was used to compare the mean age. Categorical variables (e.g., gender, ethnicity, marital status, living arrangement) were compared using the chi-square test.

Table 3: Associations between social isolation with risk of falling and hospitalization in one year follow up in older people with and without Osteoarthritis

Variable		Risk of Falls (Unadjusted)			Risk of Falls (Adjusted)			Risk of Hospitalization (Unadjusted)			Risk of Hospitalization (Adjusted)		
		OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
With OA	Socially Isolated vs Non-socially isolated (reference)	2.125	0.806, 6.086	0.123	2.11	0.756, 5.889	0.15	0.673	0.134, 3.379	0.631	0.673	0.134, 3.379	0.631
Without OA	Socially Isolated vs Non-socially isolated (reference)	1.571	0.132, 18.665	0.72	1.348	0.108, 16.766	0.816	UTC	UTC	UTC	UTC	UTC	UTC

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This finding remained non-significant after adjustment for gender and living arrangement. Similarly, hospitalization risk was not significantly associated with social isolation in either the unadjusted or adjusted models

## DISCUSSION

This study aimed to determine the impact of social isolation on falls and hospitalizations among older adults with and without knee osteoarthritis (OA) during a 1-year follow-up period. The findings showed that social isolation was not significantly associated with falls or hospitalization, regardless of knee OA status. These results remained unchanged after adjustment for gender and living arrangement, indicating that social isolation did not independently influence the risk of falls or hospitalization in this population. In addition, no significant differences in social isolation were observed between participants with and without knee OA.

One possible explanation for these findings relates to the characteristics of the study population, particularly the recruitment of participants from community-based centres such as Pusat Aktiviti Warga Emas (PAWE). The Malaysian government has established numerous PAWE centres nationwide, all of which are fully funded by the Department of Social Welfare. These centres promote active ageing through organised social, recreational, and health-related activities. Government policy also recognises community-based initiatives as a preventive approach to social isolation (Kelly et al., 2019). As a result, many participants in this study may have maintained adequate social engagement, which could have reduced the variability in social isolation and limited its observable impact on falls and hospitalization.

In relation to knee OA, although individuals with OA often experience pain and functional limitations, this study found that knee OA did not significantly alter the relationship between social isolation and adverse outcomes. Older adults with knee OA may reduce their physical activity due to pain and fear of symptom exacerbation, leading them to spend more time at home. However, the availability of communication technologies such as telephones and internet access may allow continued social interaction despite reduced mobility. Previous studies have shown that individuals with hip and/or knee OA experience declining mobility and are at baseline risk of social isolation (Siviero et al., 2019). In this context, social isolation among older adults with knee OA may arise more from physical limitations rather than deliberate social withdrawal.

Evidence from earlier studies suggests that the relationship between falls and social isolation may operate in the opposite direction to that initially hypothesised. Falls have been shown to increase loneliness and social isolation among older adults, as

individuals who experience falls may avoid daily activities due to fear of falling (Hacihasanoglu, Yildirim, & Karakurt, 2012). This may explain why social isolation was not found to be a predictor of falls in the present study. Nevertheless, social relationships remain important, as strong social support can facilitate access to healthcare and rehabilitation services and help address environmental hazards that contribute to fall risk (Bu, 2020).

Reduced physical activity among older adults with knee OA is another important consideration. Pain-related movement avoidance may lead to declines in lower limb muscle strength and balance, both of which are recognised contributors to fall risk. Although these factors did not translate into increased falls or hospitalizations during the one-year follow-up period, their effects may become more evident over a longer period. Physical activity has been shown to improve balance, coordination, muscle strength, and reaction time in older adults (Karlsson, 2008). Future studies should therefore explore the role of physical activity and functional performance as potential mediators in the relationship between social isolation, knee OA, and adverse health outcomes.

### *Limitation*

Participants were recruited from socially active community centres such as PAWE, which may have introduced sampling bias. This approach likely reduced variability in social isolation levels and may limit the generalizability of the findings to the broader population of community-dwelling older adults in the Klang Valley, especially those who are socially withdrawn or less engaged in community activities. In addition, the one-year follow-up period may have been too short to fully capture the incidence of falls and hospitalizations, which may occur less frequently over a short timeframe. Despite these limitations, the study addresses an underexplored area by examining the intersection between social isolation, falls, and hospitalization among older adults with and without knee OA. By focusing on community-dwelling older adults, the study provides practical insights into a population often targeted by preventive health strategies. The inclusion of both individuals with and without OA enables comparative analysis, enhancing understanding of how social factors may interact with physical health conditions.

## CONCLUSION

In summary, this study did not find a significant association between social isolation and the risk of falls or hospitalization among older adults with or without knee osteoarthritis (OA) over a one-year follow-up period. However, these findings should be interpreted with caution due to several limitations, including the relatively short follow-up period. Future research with longer follow-up periods, more diverse participant recruitment, and incorporation of factors such as physical

activity and functional status is needed to better understand the relationship between social isolation, knee OA, and adverse health outcomes.

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