

# BMJ Open Global evidence on falls and subsequent social isolation in older adults: a scoping review

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## ABSTRACT

**Background** Falls are a leading cause of injury-related hospitalizations among adults aged 65 years and older and may result in social isolation.

**Objective** To summarise evidence on falls and subsequent social isolation and/or loneliness in older adults through a scoping review.

**Eligibility criteria** Studies were eligible for inclusion if the population had a mean age of 60 years or older, they examined falls and subsequent social isolation, loneliness, fear of falling or risk factors and were primary studies (eg, experimental, quasi-experimental, observational and qualitative).

**Sources of evidence** MEDLINE, CINAHL, Embase, Ageline and grey literature from inception until 11 January 2021.

**Charting methods** A screening and charting form was developed and pilot-tested. Subsequently, two reviewers screened citations and full-text articles, and charted the evidence.

**Results** After screening 4993 citations and 304 full-text articles, 39 studies were included in this review. Participants had a history of falling (range: 11% to 100%). Most studies were conducted in Europe (44%) and North America (33%) and were of the cross-sectional study design (66.7%), in the community (79%). Studies utilised 15 different scales. Six studies examined risk factors for social isolation and activity restriction associated with fear of falling. Six studies reported mental health outcomes related to falls and subsequent social isolation.

**Conclusions** Consistency in outcome measurement is recommended, as multiple outcomes were used across the included studies. Further research is warranted in this area, given the ageing population and the importance of falls and social isolation to the health of older adults.

**Scoping review registration number** 10.17605/OSF.IO/2R8HM.

## INTRODUCTION

Addressing social isolation in older adults is a growing priority in Canada, as over 30% of older adults are at risk of social isolation.<sup>1</sup> Social isolation among older adults is associated with adverse health outcomes including cognitive decline, depression, anxiety and dementia.<sup>2</sup>

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A robust methodology including a thorough and extensive literature search was used to review the literature in the area.
- ⇒ There were no date or language limits for studies eligible for inclusion in this scoping review.
- ⇒ Scoping reviews do not assess the quality of included studies and we cannot confirm the directional causality between falls and social isolation.

Globally, falls are the second leading cause of unintentional injury death, making falls a major public health concern.<sup>3</sup> In Canada, falls are the leading cause of injury-related hospitalisations among adults aged 65 years and older, and 20%–30% of older adults experience at least one fall each year.<sup>4</sup> Falls may result in serious health-related consequences including physical (eg, fractures), physiological (eg, cognitive decline) and psychological (eg, anxiety, depressive symptoms, fear of falling and social isolation) outcomes.<sup>5</sup>

Given the detrimental outcomes associated with both falls and social isolation, there is a need to understand the relationship between falls and subsequent social isolation in older adults. The current scoping review is focused on falling and the subsequent experience of social isolation and/or loneliness and to ascertain whether the COVID-19 context affected the relationship between falls and subsequent social isolation.

## METHODS

### Protocol and registration

The protocol for this scoping review was developed in accordance with the JBI (formerly Joanna Briggs Institute) guidance for scoping reviews and registered with Open Science Framework.<sup>6</sup> An integrated knowledge translation approach was used,<sup>7</sup> whereby



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colleagues from the Public Health Agency of Canada (YJ, KA, MD and AG-B) co-developed the review. The results are reported using the Preferred Reporting Items for Systematic reviews and Meta-analysis (PRISMA) extension to scoping reviews<sup>8</sup> supplemented by PRISMA 2020.<sup>9</sup>

### Patient and public involvement

Through the Strategy for Patient-Oriented Research (SPOR) Evidence Alliance, we collaborated closely with a patient partner who provided feedback on our protocol, participated in full-text screening piloting and provided input on the manuscript (JB).

### Search strategy

An experienced librarian developed our comprehensive literature search strategy, which was peer-reviewed by a second information specialist using the Peer Review of Electronic Search Strategies (PRESS) checklist.<sup>10</sup> MEDLINE, CINAHL, Embase and Ageline were searched from inception until 11 January 2021 (online supplemental appendix 1). References of included studies and relevant reviews were scanned. Grey literature (ie, unpublished or difficult to locate studies) was searched using the Canadian Agency for Drugs and Technologies in Health's Grey Matters checklist.<sup>11</sup>

### Eligibility criteria

The population of interest were older adults with a mean age of 60 years or older. The concept was the relationship between falls and subsequent social isolation or loneliness. As mentioned in our related systematic review on interventions for social isolation after falling, social isolation and loneliness are distinct concepts.<sup>12</sup> Social isolation included a decrease in any of the following: number of social contacts, feeling of belonging, fulfilling relationships, engagement with others and quality of their personal network.<sup>12</sup> We defined loneliness as 'the unpleasant experience that occurs when a person's network of social relations is deficient in some way, either quantitatively or qualitatively'.<sup>13</sup> For our primary objective, the context included any community or institutional setting. For our secondary objective, we limited the context to include studies that specified their consideration of the COVID-19 pandemic. Studies including participants reporting a history of falling (ie, regardless of the proportion of the sample who fell), the role of fear of falling in this relationship, as well as any risk (eg, medication use, frailty) or protective (eg, exercise, gait or balance training) factors were considered eligible for inclusion.

Eligible study designs included primary research studies of experimental (e.g., randomised controlled trials), quasi-experimental (e.g., non-randomised controlled trials, controlled before and after studies and interrupted time series), observational (e.g., cohort studies, case-control studies and cross-sectional studies), qualitative (phenomenological, ethnography, qualitative interview, etc.) and mixed-method (e.g., convergent parallel, embedded and

explanatory sequential) design. No restrictions based on study year, language of publication or study duration were applied.

### Study selection

A screening form was developed and a pilot-test using 50 citations was completed with 80% agreement, and subsequently, all remaining titles and abstracts were screened independently by pairs of reviewers (SMT, AP, JF, GM and AH). Discrepancies were resolved by a third reviewer.

Similarly, two pilot-tests were completed for full-text article screening (achieving 27% and 40% agreement, respectively), screening criteria were revised, and subsequently, full-text articles were assigned to independent pairs of reviewers. Discrepancies were resolved by a third reviewer.

### Data charting

A charting form was developed to capture data on study characteristics, population characteristics and outcomes of interest. Relevant outcomes included any data illustrating the relationship between falls and subsequent social isolation, including the role of fear of falling, and other risk factors or protective factors. A pilot-test was conducted using five studies, sufficient agreement was achieved, and subsequently, full data charting was completed by independent pairs of reviewers. Discrepancies were resolved by a third reviewer.

### Analysis and presentation of results

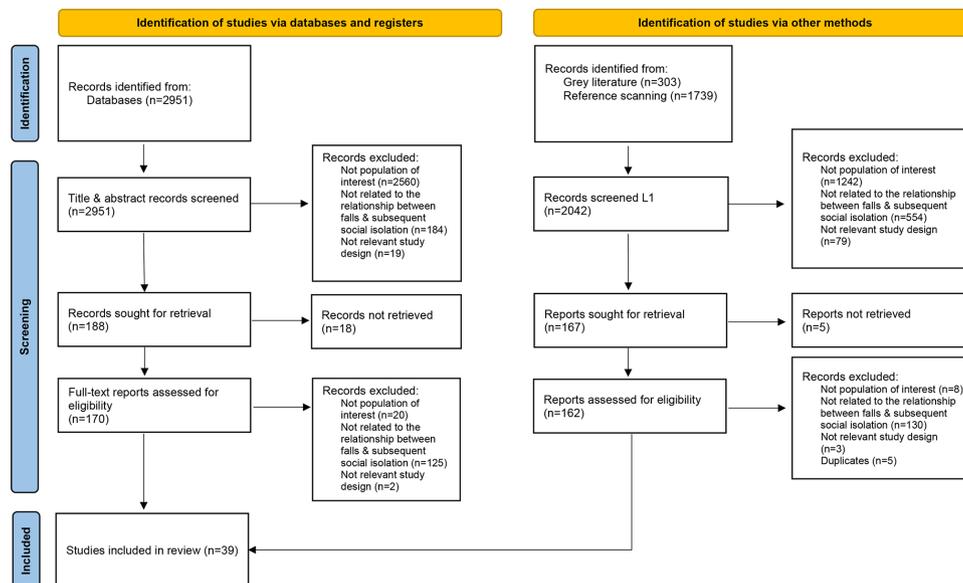
The review findings were summarised descriptively using summary tables.

## RESULTS

After screening 4993 citations and 304 full-text articles against our eligibility criteria, 39 studies were identified as eligible for inclusion based on our primary objective for this review (figure 1). No studies were identified when limiting to the COVID-19 context for our secondary objective. Study and patient characteristics have been summarised in table 1 and detailed data are reported in online supplemental appendices 2 and 3.

### Study characteristics

The publication year for included studies ranged from 1987 to 2020, with more than half published since 2010. Most studies were conducted in Europe (17/39, 44%) and North America (13/39, 33%). More than half of the studies were cross-sectional study design (66.7%) and seven qualitative studies were included. Most were conducted in the community (79%). Studies utilised 15 different scales and a variety of self reported responses to assess variables such as social isolation and loneliness (eg, 18-item Lubben Social Network Scale, 6-item de Jong-Gierveld Loneliness Scale). Six studies identified risk factors for social isolation and for activity restriction due to fear of falling (table 2). Six studies reported mental health outcomes (online supplemental appendix 4).



**Figure 1** PRISMA 2020 study flow diagram. PRISMA, Preferred Reporting Items for Systematic reviews and Meta-analysis.

### Patient characteristics

Across all studies, the number of included patients was 118 702, with an average of 3043 patients per study. Their mean age ranged from 65 to 95 years. Approximately 65% of patients were female. Most studies included participants with a history of falling, ranging from 11% to 100% of the study population.

### Cohort studies

Among the 39 included studies, six were cohort studies (online supplemental appendix 5). Tinetti and Williams<sup>14</sup> demonstrated a significant relationship between multiple non-injurious falls and a decline in social functioning (regression coefficient=-0.538 ( $p<0.05$ )), measured using the Social Activity Scale, in a sample of 770 older adults after 3 years of follow-up.<sup>14</sup> Similarly, Pin and Spini<sup>15</sup> found that in their cohort of 16583 participants, those who fell showed decreased social participation after falling ( $p<0.001$ ), which was no longer statistically significant when frailty was added in the model.<sup>15</sup>

Vellas *et al*<sup>16</sup> compared people who fall versus those who did not in two populations: a retirement home ( $n=118$ ) and older adults living at home ( $n=60$ ).<sup>16</sup> Among the older adults who lived at home, they noted that fewer fallers were able to maintain the same level of activity after 6 months of follow-up when compared with non-fallers ( $p<0.02$ ).

van der Meulen *et al*<sup>17</sup> assessed social participation (using the Frenchay Activities Index) in 260 older adults with low and high levels of concern about falling over 14 months.<sup>17</sup> They reported significant differences (specific results not reported) between the groups, with lower social participation scores in those who had a higher level of concern about falling.

In 4680 older adults, Yu *et al*<sup>18</sup> reported a significant relationship between the number of falls and loneliness scores (measured using the three-item University of

California, Los Angeles (UCLA) Loneliness Scale) across three time points over 4 years ( $B=0.008$ ,  $p<0.05$ ).<sup>18</sup> A cohort study by Hajek and König<sup>19</sup> looked at loneliness (as measured using the Bude and Lantermann scale) and social isolation (measured using the De Jong Gierveld Loneliness Scale) and their link to fear of falling 669 older adults.<sup>19</sup> They compared older adults with an onset of fear of falling, to those who had no fear. Their findings revealed that the end of fear of falling was associated with lower loneliness scores ( $\beta = -0.06$ ,  $p<0.05$ ) and other negative psychosocial outcomes (eg, increased depressive symptoms).

### Cross-sectional studies related to falls and social isolation

Of the 26 cross-sectional studies included in this review, 11 reported on the relationship between falls and social isolation or loneliness (online supplemental appendix 6).

Quach<sup>20</sup> examined the relationship between falls and scores on the Social Relationship Index including 8464 participants. He noted that participants who reported experiencing a fall or multiple falls had a lower social relationship index score (mean, 3.24 and 3.08 respectively) compared with those who had not fallen (mean, 3.34;  $p<0.0001$ ).

Hajek and König<sup>21</sup> examined variables associated with a history of falling in 7808 participants. They found those reporting a fall in the previous 12 months had higher loneliness scores (De Jong Gierveld Loneliness Scale;  $\beta=0.08$ ,  $p<0.001$ ) and social exclusion scores (Bude and Lantermann scale;  $\beta=0.08$ ,  $p<0.001$ ) compared with those who had not fallen.

Schnittger *et al*<sup>22</sup> conducted a study in 579 older adults identifying risk factors for different pathways of loneliness—emotional loneliness, social loneliness (both measured using the De Jong Gierveld Loneliness Scale) and social support (measured using the Lubben Social Network Scale). A history of falls was the only

**Table 1** Summary of study and patient characteristics

Characteristics	Number (%)
<b>Study characteristics (n=39)</b>	
Geographical region	
Asia	5 (12.8)
Australia	1 (2.5)
Europe	17 (43.6)
North America	13 (33.3)
South America	3 (7.7)
Study design	
Cohort	6 (13.8)
Cross-sectional	26 (66.7)
Qualitative	7 (19.4)
Study duration	
Not applicable	29 (74.3)
≤ 1 year	5 (12.8)
≥ 1 year	5 (12.8)
<b>Patient characteristics</b>	
Mean age	
	74.9 (range, 65.0 to 95.0)
Not reported	
	11 (28.2)
65.0–69.9 years	
	4 (10.2)
70.0–74.9 years	
	8 (20.5)
75.0–79.9 years	
	14 (35.9)
≥80.0 years	
	2 (5.1)
Proportion of female participants	
	Mean: 65.3% (range, 42.5 to 88.9)
Sample size	
	Mean: 3043.6 (9 to 43487)
<100	
	11 (28.2)
100–499	
	11 (28.2)
500–999	
	3 (7.7)
1000–1999	
	4 (10.2)
2000–5000	
	4 (10.2)
>5000	
	6 (15.4)
Study setting	
Community	31 (79.4)
Medical	6 (15.4)
Nursing home	1 (2.5)
Multisite	1 (2.5)
Participants living alone	
	44.1% (range, 0 to 100)
Participants with a history of falling	
	Mean: 50.8% (range, 11.2 to 100)
Not reported*	
	11 (28.2)
≤25%	
	6 (15.4)
25–40%	
	10 (25.6)
40–85%	
	5 (12.8)
>85%	
	7 (17.9)
*Not reported for the overall sample.	

biological variable that was identified as a statistically significant risk factor for inclusion in the model for social support (correlation coefficient=−0.247;  $p<0.003$ ).

Stel *et al*<sup>23</sup> reported a statistically significant decline in social activities in 204 older adults who experienced a fall inside their home (OR: 2.6 (95% CI: 1.1 to 6.5);  $p<0.05$ ), and Vanden Wyngaert *et al*<sup>24</sup> reported an association between risk of falls and participation in social roles and activities in 154 older adult haemodialysis patients (PROMIS questionnaire;  $R^2=0.11$ ;  $p=0.01$ ). Finally, Nicholson<sup>25</sup> reported a strong positive relationship between experiencing an injurious fall and increasing social isolation in a sample of 68 older adults (Lubben Social Network Scale;  $\rho=-0.4$ ;  $p<0.05$ ), and highlighted that this relationship was stronger in women ( $\rho=-0.5$ ;  $p=0.01$ ). Additionally, they assessed this relationship using both the Family and Friends subscales of the Lubben Social Network Scale and found that the correlation was specific to the Friends subscale ( $\rho=-0.43$ ;  $p<0.05$ ).

Iliffe *et al*<sup>26</sup> and Robins *et al*<sup>27</sup> found no statistically significant associations between falls and social isolation using the Lubben Social Network Scale in a sample of 3139 older adults and the Friendship Scale for social isolation in a sample of 245 older adults, respectively. Similarly, van Lankveld *et al*<sup>28</sup> and Faria *et al*<sup>29</sup> found no correlation between falls and loneliness, using the De Jong Gierveld Loneliness Scale in a sample of 579 older adults, and the UCLA Scale in a sample of 48 older adults, respectively. Additionally, Finn<sup>30</sup> noted no difference in scores for the Older Americans Resources and Services (OARS) social support scale when comparing fallers to non-fallers in a nursing home setting ( $n=49$ ).

### Cross-sectional studies related to fear of falling and social isolation

Seven studies examined fear of falling linked to falls and social isolation (online supplemental appendix 7). Gagnon *et al*<sup>31</sup> reported a statistically significant positive relationship between fear of falling and social support in a sample of 105 older adults (measured using the confiding-relationships component of the Bedford Life Events and Difficulties Schedule modified for elderly subjects; Wald  $\chi^2=3.77$ ;  $p=0.05$ ). Curcio *et al*<sup>32</sup> reported a strong relationship between fear of falling and low social participation in 1668 older adults (OR, 1.52; 95% CI, 1.20 to 1.92;  $p<0.01$ ). Petrincic *et al*<sup>33</sup> (2020) identified fear of falling as an independent predictor of social functioning (as measured by the Medical Outcomes Study 36-item Short-Form General Health Survey;  $\beta=-0.29$ ) in 108 older adults.

Merchant *et al*<sup>34</sup> and Iliffe *et al*<sup>26</sup> showed no statistically significant relationship between fear of falling and social isolation in 493 older adults and 3139 older adults, respectively. Ferreira *et al*<sup>35</sup> and Kara *et al*<sup>36</sup> showed no

**Table 2** Potential risk factors for social isolation and activity restriction associated with fear of falling

Author, year	Risk factor	Associated evidence
<b>Social isolation after injurious fall</b>		
Nicholson, 2005 <sup>25</sup>	Sex (female)	The authors noted a strong positive correlation between injurious falls and social isolation for women ( $\rho=-0.5$ ; $p=0.01$ ), but this was not significant for men.
<b>Activity restriction due to fear of falling</b>		
Zijlstra, 2007	Aged 80 years or older	OR: 1.56 (95% CI, 1.24 to 1.95)
	Fair perceived general health	OR: 2.92 (95% CI, 2.43 to 3.52)
	Poor perceived general health	OR: 5.7 (95% CI, 3.57 to 9.12)
Curcio <i>et al</i> , 2009 <sup>32</sup>	Poor perceived health	OR: 1.38 (95% CI, 1.06 to 1.79)
	Depression	OR: 1.76 (95% CI, 1.38 to 2.24)
	Low social participation	OR: 1.52 (95% CI, 1.20 to 1.92)
	Difficulties in activities of daily living	OR: 1.65 (95% CI, 1.16 to 2.32)
	Decreased physical activity	OR: 1.35 (95% CI, 1.06 to 1.70)
	Polypharmacy	OR: 1.56 (95% CI, 1.14 to 2.14)
	Below poverty level	OR: 1.32 (95% CI, 1.05 to 1.65)
Dias, 2011	Depression	$\chi^2=15.2$ , $p=0.004$
	Exhaustion (frailty)	$\chi^2=9.2$ , $p=0.01$
	Participation in social activities	$\chi^2=10.4$ , $p=0.016$
Murphy <i>et al</i> , 2002 <sup>40</sup>	Two or more chronic conditions	ARR: 1.34 (95% CI, 1.08 to 1.65)
	Slow-timed physical performance	ARR: 1.44 (95% CI, 1.18 to 1.75)
Merchant <i>et al</i> , 2020 <sup>34</sup>	Sarcopenia	OR, 8.13 (95% CI, 1.52 to 43.41)

ARR, adjusted risk ratio; OR, odds ratio.

association between fear of falling and social participation ( $n=7935$ ) or fear of falling and loneliness ( $n=47$ ), respectively.<sup>35 36</sup>

### Cross-sectional studies related to falls and activity restriction due to fear of falling

Eight studies examined the relationship between falls and activity restriction due to fear of falling (online supplemental appendix 7). Tinetti *et al*<sup>37</sup> and Apikomkon<sup>38</sup> both reported a statistically significant decrease in activity due to fear of falling in individuals who experienced a fall compared with those who had not ( $n=1103$ ,  $\chi^2=13.1$ ,  $p<0.001$ ; and  $n=546$ ,  $\chi^2=5.49$ ,  $p<0.05$ , respectively).<sup>37 38</sup> Similarly, in 1668 older adults, Curcio *et al*<sup>32</sup> demonstrated that those who restricted activity due to fear of falling were more likely to have experienced a fall in the year prior (OR: 1.48 (95% CI, 1.18 to 1.86);  $p=0.001$ ), and Mendes da Costa *et al*<sup>39</sup> demonstrated that activity restriction increased in those with multiple falls over the past year (OR, 3.04; 95% CI, 1.70 to 5.42). Murphy *et al*<sup>40</sup> and Choi and Ko<sup>41</sup> showed that a history of injurious falls was independently associated with activity restriction due to fear of falling ( $n=1064$ , adjusted risk ratio: 1.36; 95% CI, 1.11 to 1.66;  $p=0.003$ ; and  $n=4247$ , OR, 3.03; 95% CI, 1.21 to 7.54,  $p=0.008$ , respectively).

Howland *et al*<sup>42</sup> reported no relationship between the experience of a fall and activity restriction in a sample of 266 older adults (OR: 1.094; 95% CI, 0.376 to 3.177;  $p=0.869$ ), as did Choi and Ko<sup>41</sup> (OR, 2.12; 95% CI, 0.96 to 4.67;  $p=0.062$ ) among 4247 older adults. Similarly, Merchant *et al*<sup>34</sup> (2020) also reported no significant relationship between the number of falls and fear-based activity restriction in 493 older adults (OR, 1.4; 95% CI, 0.94 to 2.20).

### Qualitative studies

Seven qualitative studies were included (online supplemental appendix 8). All participants interviewed were older adults ( $n=124$ ), including 51 stroke survivors<sup>43 44</sup> and 10 experiencing frailty.<sup>45</sup> Common categories identified across these studies were activity restriction to manage fear of falling, changing behaviours to avoid falling,<sup>43 45–47</sup> feeling restricted due to reduced mobility after falling,<sup>43 44 48</sup> increasing dependence on caregivers,<sup>43 45</sup> developing fear of falling,<sup>43 45</sup> feelings of loneliness or isolation<sup>43 48</sup> and a negative impact on identity or autonomy.<sup>47</sup>

### DISCUSSION

We conducted a comprehensive scoping review including 39 studies examining the relationship between falls and



subsequent social isolation. We limited the scoping review to studies that identified social isolation after a fall, this was due to the request of the commissioning knowledge user. More than half of the studies were published since 2010, suggesting increased interest in the relationship between falls and social isolation in older adults. Social isolation and loneliness were measured using a variety of outcome measures across studies, such as degree of activity, varying scales for loneliness, social isolation, social participation and social support. This highlights the growing need for consistency in the measurement of social isolation and loneliness to allow for meaningful comparison across studies. Cornwall and Waite<sup>49</sup> highlight previous efforts to consolidate different measures of social isolation and build off this work. They combined multiple measures of social isolation to develop two scales that measure distinct dimensions of social isolation—social disconnectedness and perceived isolation.

Only a few studies examined risk factors and mental health outcomes related to falls and subsequent social isolation. Risk factors linked to social isolation and activity restriction included age, sex/gender, poor perceived health, poverty, frailty and comorbidity. Few studies also documented an association between activity restriction due to fear of falling and depression. Our findings suggest the presence of gaps in the literature for these important outcomes, highlighting the need for further research. No randomised trials exploring interventions for social isolation after a fall were identified in our scoping review, highlighting another gap in the literature and an area for future research to explore.

We did not identify any studies on falls and subsequent social isolation that were specific to the COVID-19 context, highlighting another gap in the evidence base. A scoping review by Kasar and Karaman<sup>50</sup> suggest that older adults face increased social isolation as a result of pandemic-related restrictions, which can result in increased loneliness and reduced quality of life. They also highlighted how technology can be used to deliver virtual or tele-health support services, and to allow older adults stay connected with their social networks.<sup>50</sup> A systematic review by Larson *et al* assessed the impact of COVID-19 lockdowns on physical activity in older adults and reported that most studies demonstrated a decline in physical activity or an increase in sedentary behaviours in this population. The effectiveness of physical activity and exercise in preventing falls and fractures in older adults is well established in the literature.<sup>51–53</sup> A decline in physical activity in older adults could lead to sarcopenia, and an increased risk of falls or fractures.<sup>53</sup>

There are several strengths to our scoping review, such as the use of the JBI guide, and the PRISMA-extension for scoping reviews. A comprehensive literature search was conducted and several different types of study designs were included. However, limitations include that all studies were conducted in middle-high-income or high-income economy countries. This

suggests that our results may not be generalisable to low-income and middle-income countries, highlighting a gap in the literature. Many of the included studies were cross-sectional and we cannot confirm the directional causality between falls and social isolation without more robust research. Furthermore, none of the included studies specifically focused on culturally and linguistically diverse backgrounds, who might be at greater risk of social isolation after experiencing a fall. Additional research is warranted in this area.<sup>54</sup> In addition, we were unable to update the literature search due to lack of capacity and funding.

In summary, we found a dearth of research, particularly examining risk factors and mental health outcomes related to social isolation and falling in older adults. Further research is warranted in this area, given the importance of falls and social isolation to the health of older adults.

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**Data availability statement** Data are available upon reasonable request. The full dataset is available from the corresponding author upon reasonable request.

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