

ORIGINAL ARTICLE

IJPHY

Risk-Taking and Risk of Falls in Community-Dwelling Older Adults: A Scoping Review

¹Diane Bégin, MRSc²Ashley Morgan, PT, Ph.D.³Jocelyne Labonté, RD, MSc⁴Julie Richardson, PT, Ph.D.⁵Luciana G. Macedo, PT, Ph.D.⁶Sarah Wojkowski, PT, Ph.D.

ABSTRACT

Background: Risk-taking behaviors have emerged as a target for fall prevention. However, the risk-taking concepts are complex, and several approaches exist to identify risk-taking behaviors. In addition, studies of fall-related risk-taking behaviors have not yet been systematically evaluated.

Methods: This scoping review was conducted in accordance with Joanna Briggs Institute's methodology for scoping reviews. Six electronic databases were searched to identify studies published between 2000 and 2020. Studies were included in our review if they were conducted on community-dwelling older adults (≥ 65 years) and discussed fall-related risk-taking behaviors. Data extraction and analyses were completed using a table developed a priori by the research team.

Results: Self-reported behaviors using qualitative methodology were the most common approach to identifying risk-taking behaviors in community-dwelling older adults. Generally, older adults are aware of their fall risk and tend to adopt behaviours to help mitigate it. However, older adults also described moments of deliberate risk-taking driven by the potential benefits of this behavior. Factors associated with risk-taking include an individual's abilities, personal values, and physical and social environment.

Conclusion: This review demonstrated that fall-related risk-taking behaviors are a highly individualized concept influenced by a number of factors. Therefore, future research should evaluate how risk appraisal, risk attitudes, and risk propensity predict fall-related risk-taking behaviors in community-dwelling older adults.

Keywords: behaviors, fall risk, risk appraisal, risk propensity, risk attitudes.

Received 01st May 2022, accepted 09th November 2022, published 09th June 2023



www.ijphy.org

10.15621/ijphy/2023/v10i2/1325

¹McMaster University, School of Rehabilitation Science.
begin@mcmaster.ca

²McMaster University, School of Rehabilitation Science.
morgaa2@mcmaster.ca

³Mount Saint Vincent University, Department of
Human Nutrition. jocelyne.labonte@msvu.ca

⁴McMaster University, School of Rehabilitation Science.
jrichard@mcmaster.ca

⁵McMaster University, School of Rehabilitation Science.
macedol@mcmaster.ca

CORRESPONDING AUTHOR

⁶Sarah Wojkowski, PT, Ph.D.

McMaster University,
School of Rehabilitation Science.
e-Mail: wojkows@mcmaster.ca



INTRODUCTION

Falls affect one in three older adults annually and typically occur due to the interaction of biological factors with behavioral and environmental risks [1, 2]. In 1999, behavioral risk, such as risk-taking in older adults, started to gain considerable attention in the gerontology literature [3, 4]. Consequently, risk-taking behaviors emerged as a consideration for fall prevention education [1, 2, 5]. However, given the subjectivity of risk-taking, concerns about stigma and ageism related to this topic have been raised, particularly when the focus is placed on safety and risk avoidance [4, 6, 7].

Across all domains (i.e., ethical, financial, health/safety, recreational, and social) have examined risk-taking from scientific-medical and socio-cultural perspectives [4, 7, 8]. The scientific-medical perspective conceptualizes risk as objective, external, measurable, and predictable [3]. The individual rationalizes their behavior and explicitly evaluates potential benefits and harms.⁷ This perspective views risk-taking as unfavorable, often discouraging these behaviors from mitigating harm [4, 7, 9]. Conversely, the socio-cultural perspective views risk-taking as a constructive and important aspect of life that promotes autonomy and self-determination [4, 7, 10, 11]. Risk-taking behaviors are viewed as a product of an individual's subjective perception, judgment, and meaning of risk and emphasize the role of emotions and values in the decision-making process [4, 7, 11].

Bran and Vaidis [11] proposed a new typology for risk-taking that considers both the scientific-medical and socio-cultural perspectives of risk [8, 12]. This typology outlines four core concepts of risk-taking: behaviors, propensity, attitudes, and appraisal.[11] Risk-taking behaviours refer to the actions, or inactions, involving potential risks and are measured through reported behaviours (e.g., self-reports); projected behaviours (e.g., decisions in hypothetical scenarios); and actual behaviours (e.g., direct observation of behaviours). [11] Risk-taking propensity is the degree to which individuals exhibit these behaviors. This propensity can be general (e.g., "I take chances") or specific to a particular domain (e.g., "I gamble") [11]. Risk-taking attitudes, expressed in cognitive, affective, and behavioral responses, reflect the degree of preference to which an individual will favor or avoid risk [11]. Cognitive responses refer to the information, knowledge, or beliefs about risk-taking [11]. Affective responses are the emotions and feelings evoked by taking risks, while behavioral responses are the willingness and motivation to take or avoid risks [11]. Finally, risk appraisal (i.e., risk perception) describes the subjective assessment of the potential benefits and harms in a specific situation [11]. Several models exist to explain risk appraisal (e.g., the risk-as-feeling model) [13].

Prominent reports discuss fall-related risk-taking behaviors from a scientific-medical perspective [1, 5] encouraging avoidance of specific activities (e.g., climbing ladders). However, these claims are supported with little evidence and fail to acknowledge the socio-cultural perspective of

risk-taking. Risk-taking behaviors are relatively new in fall research; with no reviews on this topic, this scoping review will provide a comprehensive understanding of fall-related risk-taking behaviors in community-dwelling older adults. Scoping review methodology allows a systematic yet iterative approach to determine the extent and nature of a research topic [14–17]. Scoping reviews are employed to identify the types of available evidence, key characteristics, and concepts or examine how research is conducted on a topic [16].

Aims and Research Questions

This study aims to systematically review published studies discussing risk-taking behaviors related to falls in community-dwelling older adults. The questions guiding this review are:

1. What approaches have been used to identify fall-related risk-taking behaviors in community-dwelling older adults?
2. What fall-related risk-taking behaviors have been identified for community-dwelling older adults?
3. What factors influence fall-related risk-taking behaviors in community-dwelling older adults?

METHODS

This study was conducted per Joanna Briggs Institute scoping review methodology¹⁷ to identify key risk-taking concepts within the fall literature to provide a framework to guide future research and clinical guideline development for fall prevention strategies for community-dwelling older adults. An a priori protocol for this review was published [18] and registered on Open Science Framework (osf.io/r9f7v). In addition, the PRIMSA Extension for Scoping Reviews (PRIMSA-ScR) [19] guided the reporting of this scoping review (see Supplementary Materials).

Identifying Relevant Studies

As risk-taking behaviors gained considerable attention in geriatric literature in 1999–2000, a search strategy was developed in consultation with a health science research librarian to identify qualitative and quantitative studies published from 2000 onward. First, a preliminary search of Ovid MEDLINE used the terms 'risk-taking behavior' and 'falls' to identify articles on the topic (Supplementary Materials). Then, the text word contained in the titles and abstracts of relevant articles and the index terms used to describe the articles were used to develop a full search strategy adapted for each database [18].

Six databases were searched on August 3, 2020, to identify articles for the review: Ovid AMED (2000 – August 2020), Ovid EMBASE (2000– August 2020), Ovid MEDLINE (2000 – August 2020), Ovid PsychInfo (2000– August 2020), EBSCOhost CINAHL (2000 – August 2020), EBSCOhost AgeLine (2000 – August 2020).

Study Selection

Study selection was conducted using Covidence (Veritas Health Innovation, Melbourne, Australia). Studies were included in our review if they were conducted on

community-dwelling older adults (≥ 65 years) and discussed fall-related risk-taking behaviors. Three reviewers (DB, AM, SW) independently reviewed the first 20 titles and abstracts and compared findings to ensure agreement and consistency in applying the inclusion criteria (Table 1). Then, two reviewers (DB and AM) independently screened the remaining titles and abstracts for relevancy against the inclusion criteria. Seven article full texts were selected for assessment by three reviewers (DB, AM, SW) to ensure clarity and consistency with the inclusion criteria. Finally, two reviewers assessed the remaining English (DB, AM) and French (DB, JL) full texts for eligibility. Full-text

studies not meeting the inclusion criteria were excluded, and reasons for exclusion were noted. Disagreements between reviewers at abstract or full-text screening were resolved through discussion between two reviewers or, when needed, with a third reviewer (SW).

studies ($n = 83$) discussed circumstances of falls not related to risk-taking behaviors (e.g., locations and type of falls) (Figure 1). A total of 30 articles were included for data extraction and synthesis [20-49].

Figure 1: PRISMA 2009 Flow Diagram

Table 1: Inclusion and Exclusion Criteria

	Include	Exclude
Study Year	Year 2000 and onwards	
Study Design	Original Study	Fear of Falling/Fall Efficacy/Balance Confidence
Population	Community-Dwelling Older Adults (≥ 65 years)	Studies that describe circumstances of falls but do not describe the behaviour (e.g., slipping on water is not risk-taking, unless associated with a deliberate action –choosing to walk through the water)
Setting	Community	Studies that describe situations where a service provider was neglectful that results
	Laboratory	
	Hospital If fall occurred in the community/ population is community-dwelling older adults	
Context	Falls	
Concept	<p>Risk-taking behaviour: <i>engagement in any observable movement associated with a degree of uncertainty about the outcomes of the behavior</i></p> <p><u>Includes:</u> Behaviours that involve moderate to high-short term gain, followed by the potential for greater long-term loss (Leather, 2009)</p> <ul style="list-style-type: none"> - Deliberate acts against recommendations from HCP (e.g., participant was advised to remove rug in the living room but has not removed it) - Recognizing their own risk and not seeking aid (e.g., purchasing a used assistive device/ not getting it fitted/education on proper use) - Participants are asked to choose between two imaginary options or choose a level of risk that they would tolerate in a hypothetical situation. - Participants report how often they engaged in various risky behaviours/ describe situations where they took a risk that led to a fall. - Participant's behaviours are observed by the researcher - Participant's behaviours are evaluated in a laboratory setting <p><u>Outcome Measures:</u></p> <ol style="list-style-type: none"> A) Researcher must identify the measure (or component) as measuring risk-taking behaviours OR B) The measure evaluates the likelihood/tendency of the person engaging in behaviours that have been identified as risky (e.g., climbing ladders) 	

Data Extraction and Analysis

Three reviewers (DB, AM, SW) independently completed data extraction for five full-text articles using the extraction tool developed a priori. The form extracted information on study characteristics, the research aims, assessment description, rationale, and factors associated with risk-taking behaviors (Supplementary Materials) [18]. Upon completion of this exercise, slight modifications were made to the data extraction form: delineation of the four core risk-taking concepts and who identified the behavior.

One reviewer (DB) completed data extraction for all included full texts. A second reviewer assisted (SW or JL) if uncertainties arose during data extraction. Information extracted from the articles was organized to explore the

approaches and methods used to identify fall-related risk-taking behaviors and categorized according to Bran & Vaidis [11] four core concepts of risk-taking: risk-taking behaviors (i.e., actions or inaction involving potential risk), risk appraisal (i.e., the subjective assessment of risk), risk-taking propensity (i.e., tendency to engage in risk situations), and risk-taking attitudes (i.e., tendencies to evaluate risk with some degree of favor or disfavor).

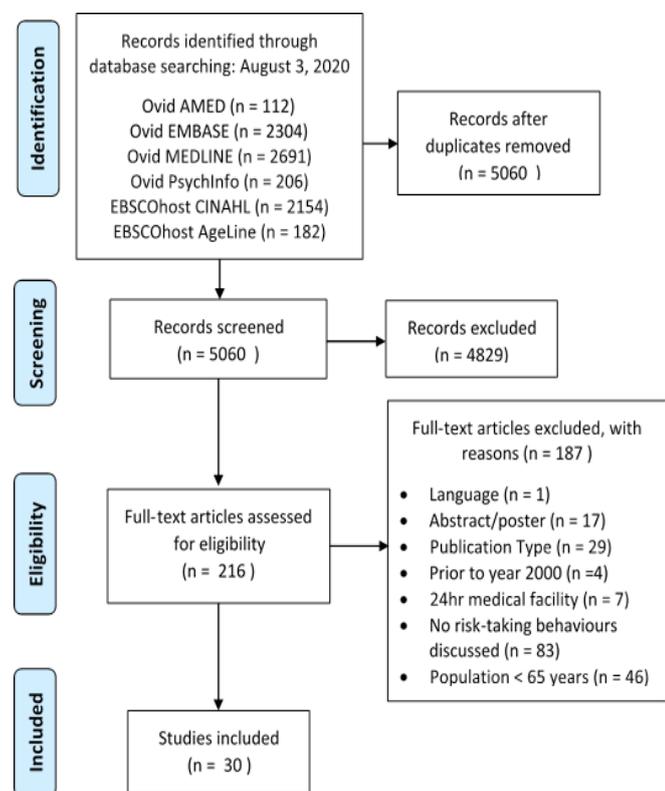
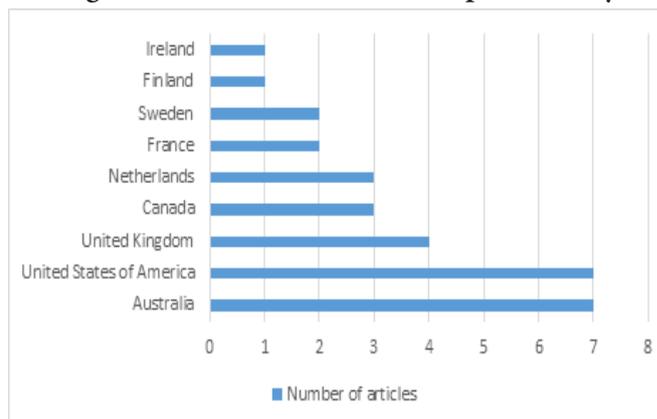
RESULTS

The search identified 7649 citations for 5060 titles after removing duplicates. Following title and abstract screening, 216 articles were identified as potentially relevant and uploaded to Covidence for full-text review. Of the full text uploaded, 187 were excluded, as the majority of these

Characteristics of Included Studies

All 30 studies selected in this scoping review were conducted in high-income countries (See Figure 2). Most articles were from Australia (23.3%, n = 7) [22, 23, 25, 31, 36, 46, 47] and the United States of America (23.3%, n = 7) [20, 24, 28, 33, 39, 40, 43]. Additionally, most studies included a sample with ≥ 50% female participants (90%, n = 27). A summary of each study’s publication year, geographical location, population, and falls data collection is presented in Table 2.

Figure 2: Distribution of Studies per Country



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA

Table 2: Characteristics of Included Studies

Author (Year)	Country	Population			Falls Collection	Risk-Taking			
		Sample Size	% Female	Age		Behavior	Propensity	Attitudes	Appraisal
Qualitative Studies (n = 14)									
Azzarello & Hall (2016)	US	11	64.0%	Minimum 65 years Maximum 89 years	N/A				X
Bailey et al (2013)	IE	8	62.5%	Minimum 70 years Maximum 87 years	N/A	X			X
Berlin Hallrup et al (2009)	SE	13	100.0%	Minimum 76 years Maximum 86 years	N/A	X	X		
Brundle et al (2015)	UK	54	70.3%	Mean Age 83 years	N/A	X			
Cayado & Chahbi (2015)	FR	50	Mostly female	Mean Age: 77 years	N/A	X			X
Chaumon et al (2016)	FR	63	88.0%	Mean Age 84 years	N/A	X			
Clemson, Manor, et al (2003)	AU	15	100.0%	Mean Age 78 years	Retrospective	X			
Dollard et al (2012)	AU	9	66.6%	Minimum 65 years Maximum 86 years	N/A				X
Horton (2007)	UK	40	50.0%	Minimum 65 years Maximum 94 years	Retrospective	X			X
Kilian et al (2008)	CA	8 older adults 6 adult children	87.5%	Older Adult Mean Age: 81.4 years Adult Children Mean Age: 56.5 years	N/A	X	X	X	X
Nyman et al (2013)	UK	44	84.0%	Mean Age: 78 years	N/A	X			

Pohl et al (2015)	SE	18	55.0%	Mean Age 74.6 years SD = 3.5 years	Retrospective	X		X	X
Robson et al (2018)	AU	26	Interview: 84.6% Focus Group: 76.9%	Minimum 65 years Maximum 84 years	N/A	X			X
Roe et al (2008)	UK	27	81.5%	Mean Age 87 years	N/A	X			X
Quantitative Studies (n = 13)									
Blalock et al (2016)	US	124	75.6%	Mean Age 79.6 years SD = 8.1 years	Retrospective				X
Bleijlevens et al (2010)	NL	333	69.0%	74.9 years SD = 6.4 years	N/A	X			
Butler et al (2011)	AU	415	55.4%	Mean Age 77.3 years SD = 4.5 years	Prospective and Retro- spective	X			
Butler et al (2015)	AU	300	52.3%	Mean Age 77.4 years SD = 4.6 years	Prospective	X	X		
Clemson, Cumming et al (2003a)	AU	418	77.0%	Mean Age 76.8 years	N/A		X		
Crenshaw et al (2017)	US	125	100.0%	Mean Age 77.1 years SD = 7.5 years	Prospective and Retro- spective	X			
Kluft et al (2017)	NL	27	59.3%	Mean Age 77.4 years SD = 5.6 years	Retrospective	X			
Lehtola et al (2006)	FI	555	77.0%	Median Age: 88 years	Prospective	X			
Mackenzie et al (2002)	AU	309	44.7%	70-80 years: 73.5% ≥ 80 years: 26.5%	Prospective	X			
Nachreiner et al (2007)	US	263	100.0%	Minimum 70 years Maximum 99 years	Prospective	X			
Stevens et al (2014)	US	328	72.3%	65-74: 30.2% 75-84: 48.2% 85+: 21.6%	Prospective	X			
Tomczak et al (2020)	US	51	37.0%	Mean Age 72.2 years SD = 4.8 years	Prospective	X			
Weijer et al (2019)	NL	269	68.8%	Median Age 69.9, IQR = 7.1 years	N/A	X			X
Mixed-Methods Studies (n = 2)									
Kim & Ahrentzen (2017)	US	14	100.0%	Mean Age 88 years	Retrospective	X			
Sattar et al (2019)	CA	100	38.0%	Median Age 76 years	Prospective	X			
"Other" (n = 1)									
Zecevic et al (2009)	CA	15	73.0%	Mean Age 79 years SD = 7 years	Prospective	X			

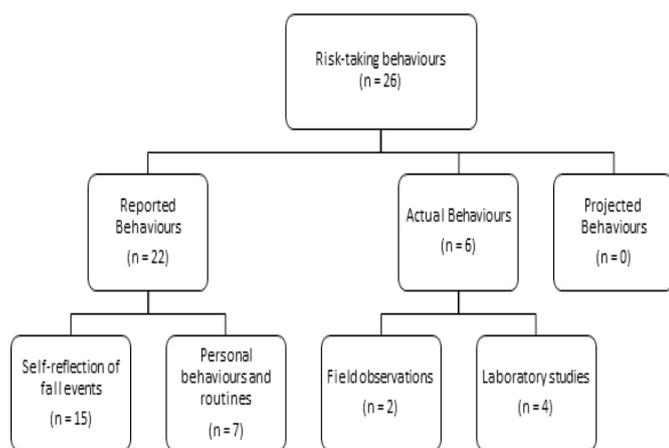
AU = Australia, CA = Canada, FI = Finland, FR = France, IE = Ireland, NL = Netherlands, SE = Sweden, UK = United Kingdom, US = United States of America

SD = standard deviation , N/A = Not assessed

Risk-Taking Behaviours

This review aimed to identify approaches used in the literature to assess or explore older adults' risk-taking behaviors concerning falls. Using the Bran & Vaidis [11] framework, two approaches to categorizing fall-related risk-taking behaviors in community-dwelling older adults were used: reported [21, 22, 24, 26–28, 30–40, 42, 44, 45, 48, 49] and actual [21, 29, 41, 46–48] (Figure 3). None of the included studies used projected behaviors (i.e., intentions or decisions in a hypothetical situation) to measure fall-related risk-taking behaviors in community-dwelling older adults. As the methods used to identify fall-related risk-taking behaviors influenced how behaviors were perceived, risk-taking behaviors are also reported below.

Figure 3: Assessments of Risk-Taking Behaviours



*Note two studies (Bailey et al., 2011; Cayado & Chahbi, 2015) included evaluations for reported and actual behavior

Reported risk-taking behaviors. Individuals' self-reports of past or current behaviors were the most common approach (n = 22) to identify fall-related risk-taking behaviors. These studies explored risk-taking behaviors through self-reflection of fall events (n = 15) [22, 24, 28, 30, 31, 33, 34, 37–40, 42, 44, 45, 49] and open-ended discussions regarding personal behaviors and routines (n = 7) [21, 26, 27, 32, 35, 36, 48].

Seven studies gathered information on fall events using qualitative methods to explore older adults' perceived causes of an experienced fall [22, 28, 34, 37, 38, 45, 49]. The findings from qualitative studies identified various factors leading to a fall, which included risk-taking behaviors. In these studies, older adults' perceived causes of falls were typically attributed to cognitive factors, including misjudgments, rushing unnecessarily, inattention, or carelessness. However, some participants also discussed engaging in risk-taking behaviors as the cause of their falls, which usually involved climbing objects such as step ladders or chairs.

An event sequencing study analyzed fall incidents using a Seniors Falls Investigation Methodology (SFIM), which investigated safety deficiencies that contributed to falls using a systems approach [42]. This systems approach explores the events that contributed to the fall and places

unsafe acts or decisions within the physical and social environment [42].

Quantitative studies (n = 8) that explored risk-taking behaviors focused on reporting the distribution of falls that occurred during specific activities (e.g., riding a bicycle, gardening) or movements (e.g., walking, climbing stairs, turning) [24, 30, 31, 33, 38–40, 44]. Nachreiner et al. [33] identified cognitive factors such as inattentiveness and rushing/hurrying as common contributors to falls. The authors also considered behaviors such as carrying objects in both hands, reaching for objects, and climbing a ladder or step stool as risk-taking behaviors for falls [33]. Lehtola et al. [30] identified 'undertaking a risky task' as the cause of nine falls in their study; however, it is unclear which tasks were viewed as risky.

Seven studies collected information on risk-taking behaviors by discussing daily routines using face-to-face interviews or focus groups [21, 26, 27, 32, 36, 48, 50]. Older adults described themselves as responsible and capable of making rational decisions based on their physical abilities and the potential risks of their behaviors. In some studies, participants described modifying their behaviors in response to age-related changes to mitigate their falls risk while engaging in activities of daily living [26, 27, 32, 35, 37]. This included increased caution and awareness, pre-planning activities, using 'common sense,' seeking support when necessary, and modifying their physical environment [26, 27, 32, 35, 37]. However, older adults also described deliberate risk-taking, such as climbing onto a step ladder or chair to accomplish tasks such as cleaning or reaching for objects [32, 35, 36, 45, 48]. In these situations, older adults viewed the importance of maintaining a clean environment and completing maintenance work such as changing a lightbulb or accessing items high off the ground as outweighing the potential negative consequences of falling from an elevated surface [32, 35, 36, 45, 48].

Actual Risk-Taking Behaviours. Direct observation of behaviors by a research team was the second approach (n = 6) to identify fall-related risk-taking behaviors [21, 29, 41, 46–48]. Two studies utilized field observations in participants' homes to observe behaviors and daily routines that might increase the risk of falling [21, 48]. The findings from these studies displayed a discrepancy between researchers' and older adults' subjective assessment of risk-taking behaviors (research question 2). In addition, the research from these two studies identified several behaviors as risk-taking that the older adults did not recognize or considered risk-taking behavior (e.g., using a step ladder to reach for an object).

Four studies evaluated discrepancies between self-perceived and actual ability in a research laboratory [29, 41, 46, 47]. Three studies evaluated the degree of misjudgment between perceived and actual step width, [29, 41] step over ability, [41] and reached distance [47] as a proxy measure for fall-related risk-taking behaviors. The authors of these studies hypothesized that an overestimation of one's ability could lead to excessive risk-taking [29, 41, 47]. These studies

asked participants to judge their maximal ability (e.g., step over height), followed by performing the task (stepping over a hurdle) until they reached their maximal ability [29, 41, 47]. The degree of misjudgment was calculated as the difference between perceived and actual ability. Butler et al. [47] found that 15.2% of their study population overestimated their reach distance, but misjudgment of reach ability was not associated with retrospective ($p = 0.76$) or prospective fall rates ($p = 0.59$). Butler et al. [46] had a unique approach to evaluating risk-taking behaviors using a choice task involving participants' judgment of their ability. In this study, participants chose between six walking paths to reach a visible destination as quickly as possible. Each path required the participant to cross a plank, with the shortest path having the most challenging plank [46]. A significant but moderate association was found between the everyday risk-taking scale and more difficult path choices ($r = 0.45$, $p < 0.001$) [46]. However, individuals who took more significant objective behavioral risks (i.e., had a higher probability of falling off the chosen path) reported lower risk-taking behaviors on the everyday risk-taking scale ($p < 0.05$) [46].

Factors Associated with Risk-Taking Behaviours

We categorized articles according to the three concepts of risk-taking; risk appraisal (i.e., the subjective assessment of risk), risk-taking propensity (i.e., a consistent tendency to engage in risk situations), and risk-taking attitudes (i.e., tendencies to evaluate risk with some degree of favor or disfavor) as these concepts are strongly linked to risk-taking behaviors [10, 11, 51].

Risk Appraisal. Eleven articles explored or evaluated older adults' subjective assessment of risk associated with fall situations and were categorized under risk appraisal [20, 21, 25–27, 35–37, 43, 45, 48]. Individuals typically appraise risks according to the severity of the potential consequences, the likelihood that these negative consequences will occur (i.e., vulnerability), and the potential rewards of the risk. [11] These studies discussed various factors that influenced an older adult's appraisal of risk, in which we identified four main sub-themes: the value of upholding personal identity, prior experiences, environmental influences, and others.

Nine studies [20, 21, 25–27, 35–37, 48] discussed the influence of upholding identity on older adults' appraisals of risks. In these studies, most participants viewed the loss of independence and autonomy as a more significant consequence than the potential consequences of a fall. This resulted in adopting protective behaviors (e.g., modifying pace) to risk-taking (e.g., climbing a step ladder to reach an object).

Five studies [35–37, 45, 48] demonstrated the role of prior experiences on older adults' risk appraisal. For example, previous fall experience often influences an older adult's perception of both risk severity and vulnerability, frequently resulting in the uptake of protective behaviors [35–37, 45]. In three studies, [35, 36, 48] participants also discussed how prior success in an activity promoted

engaging in behaviors that another individual may view as risk-taking [36, 48].

Three studies [26, 36, 45] also discussed how the environment influences an individual's risk appraisal. For example, participants discussed walking within familiar environments as low risk, whereas walking outside of typical environments was associated with a greater risk of falling [26, 45].

Two studies [20, 43] were grouped under the sub-theme of 'other' due to their unique approach to understanding older adults' perceptions of fall risk factors. Azzarello & Hall [20] explored older adults' situational awareness (i.e., how an individual perceives and interprets the meaning of risk in the environment) during a video simulation of an older woman performing daily activities. Throughout the scenario, most participants (81.8%) identified one or more risks; yet none were interpreted in the context of falls [20]. For example, the older woman walking in socks was viewed as a risk for a foot injury [20]. This demonstrates that most older adults may recognize risks in their daily routine yet may not interpret them in the context of falls. Blalock et al. [43] explored the relationship between the perceived risk of falling, measured by a single-item question, and the adoption of precautions to reduce fall risk. This study found men had a lower perceived risk of falling than women ($p < 0.10$) and an association between awareness of risk-prevention behaviors and a higher perceived risk of falling [43].

Risk-Taking Attitudes. Two articles that explored older adults' degree of preference for engaging in behaviors that increased the likelihood of falls were categorized using the theme of risk-taking attitudes [11]. Participants from both studies [27, 35] described strong affective responses evoked when deliberately ignoring their fall risk. In addition, deliberate acts of risk-taking were often expressed as defiant behavior to uphold their image and combat patronizing comments from others – particularly comments from their children [27, 35].

Risk-Taking Propensity. Four articles assessed consistent tendencies of engaging in behaviors that exposed an older adult to falls and were grouped under risk-taking propensity [11]. Two studies objectively measured older adults' fall-related risk-taking propensity using a scale [23, 46]. Both scales measure the frequency of risk-taking behaviors listed, with response options of never, sometimes, often, always – and do not apply as an additional option for the Falls Behavioral Scale for Older People (FaB) scale [23]. The FaB is a 30-item scale developed for healthcare professionals to prompt discussion on risk-taking behaviors and guide education on behavioral change [23]. The FaB has demonstrated good internal consistency (Cronbach's $\alpha = 0.84$) and test-retest reliability (ICC_{2,1} = 0.94, 95% CI not provided). The Everyday Risk-Taking Scale is a 10-item scale with good internal consistency (Cronbach's $\alpha = 0.7$) and test-retest reliability (ICC_{3,1} = 0.85, 95% CI 0.71-0.92) in community-dwelling older adults [46]. Both studies

found significant differences in risk-taking propensity between males and females, with males reporting greater engagement in everyday behaviors and actions that could increase fall risk [23, 46].

Two studies [27, 32] indirectly addressed risk-taking propensity through open-ended discussions on routine behaviors. In these studies, older adults described their natural tendencies to engage or not engage in fall-related risk-taking behaviors. Prior fall experience and the value of maintaining independence were dominant factors that influenced participants' risk-taking propensity [27, 32].

DISCUSSION

This scoping review aimed to provide a comprehensive overview of fall-related risk-taking behaviors in community-dwelling older adults. This was accomplished by investigating the methods used to identify or measure fall-related risk-taking behaviors, exploring behaviors marked as risk-taking for falls, and the factors associated with these behaviors. Findings from this review demonstrate that older adults are generally aware of their fall risk and tend to adopt behaviors to help mitigate it [21, 26, 27, 32, 35, 36, 48]. Nevertheless, older adults also described deliberate acts of risk-taking, which are driven by the potential rewards of the behavior [27, 35].

Self-reported behaviors gathered through qualitative methodologies were the most common approach to identifying fall-related risk-taking behaviors in community-dwelling older adults. Specifically, this review identified two sub-approaches to collecting data on self-reported risk-taking behaviors: i) open-ended discussions on everyday behaviors or ii) self-reflection of fall events. The first approach involved gathering information on older adults' everyday behaviors through open-ended discussions [21, 26, 27, 32, 35, 36, 48]. Although these studies did not directly aim to explore fall-related risk-taking behaviors, participants openly discussed their perceptions of fall risk and everyday behaviors, including risk-taking. The second approach involved gathering information on older adults' perceived causes of falls [22, 28, 31, 34, 37, 38, 42, 45, 49]. Not surprisingly, participants in these studies described a wide range of factors that could have contributed to their falls. The use of self-reported behaviors identified by this review is consistent with the literature, which explores risk-taking across all domains (i.e., ethical, economic, social, health/safety, and recreational) [10–12, 52]. However, qualitative methodologies are not the primary method used in other domains of risk-taking literature as standardized scales have been developed (e.g., the Domain-Specific Risk-Taking Scale) [52], and the research focus has shifted towards quantifying and predicting risk-taking behaviors [53–55]. In general, qualitative methodologies are used to explore risk-taking behaviors in new contexts or further explore the contextual factors of known risk-taking behaviors [56].

Discrepancies in perceptions of risk-taking behaviors between older adults and researchers were also identified

in this review. These discrepancies are important to consider when assessing risk-taking behaviors, as an individual's subjective perception of risk may not align with the perceptions of the larger community [12]. Societal views on aging directly impact older adults' behaviors and self-perceptions [57–59]. Despite evidence that the aging process is individualized and only loosely associated with chronological age, older adults are often depicted as a homogenous group [1]. Negative stereotypes and stigma are often perpetuated through generalizations about aging, especially in regard to falls [6, 58, 60]. Labeling an older adult as a “faller” seriously threatens their self-identity [21, 25–27, 32, 36, 48]. This concept of identity is a crucial explanatory variable in understanding fall-related risk-taking behaviors in community-dwelling older adults [61–63]. Older adults strive to be viewed by society as physically competent and independent, influencing various risk-taking behaviors, including wearing high heels and climbing step ladders [21, 25–27, 32, 36, 37, 48, 58]. In these situations, the benefits of being viewed positively by society appear to outweigh the potential risk of a fall.

Another important consideration when assessing risk-taking behaviors relates to an individual's skill level – or in the case of falls, an individual's physical abilities [12]. Reports on falls in older adults classify behaviors such as climbing objects (e.g., ladders) as risk-taking behaviors [1, 5]. However, an older adult's physical abilities and familiarity with an activity will influence the risk associated with day-to-day activities. This review demonstrates that older adults who regularly climb chairs without adverse events do not consider this risk-taking. It remains unclear whether these behaviors are truly risk-taking or discredited as such. Although functional decline is part of the natural aging process, it is neither linear nor consistent, and thus functional abilities in older adults are highly varied [64]. To illustrate this variability, a systematic review by Mckendry et al. [65] demonstrated that master endurance athletes (defined as athletes ≥ 60 years) exhibited comparable aerobic capacity (i.e., VO_{2max}) as young, healthy controls and master strength/power athletes exhibited comparable maximal voluntary contraction as young, healthy controls. Several studies have demonstrated a relationship between higher levels of physical activity and lower rates of disability in community-dwelling older adults [66–69]. In addition, the literature identifies that exercise interventions are effective at increasing older adults' physical abilities [70–75]. Older adults' physical abilities should be viewed in the same way as skilled actions; through practice and repetition (i.e., regular physical activity), older adults at risk of falling can improve their physical abilities and reduce the risk of falling during many day-to-day activities.

A third consideration when assessing risk-taking behaviors, as highlighted by Byrnes et al. [12], relates to the contextualization of behaviors. How an action is performed may increase or decrease the associated risk [12]. This review identified how rushing, inattention, and carelessness could increase the risk associated with a relatively basic action

(e.g., walking). The SFIM demonstrates the complexity and diversity of fall incidents [42]. The SFIM placed unsafe acts and risk-taking behaviors within a broader context, revealing systemic factors contributing to risk-taking behaviors. For example, shutting off lights was considered unsafe, yet participants considered it necessary to reduce their electricity bill [42]. Similarly, Chaumon et al. [49] demonstrated how social circumstances conditioned risk-taking. This finding is consistent with the literature exploring risk-taking behaviors from a socio-cultural perspective [10, 62].

Implications for future research

Considering the concerns described above (i.e., subjective perception of risk, self-perception, physical abilities, and the context of the behaviors), and in conjunction with the complex nature of falls, developing standardized measures of fall-related risk-taking behaviors can be challenging. For example, the FaB scale [23] has many items directly related to physical function. Older adults who can perform activities without the additional assistance described in the scale (e.g., using a handrail to climb stairs) might inappropriately be flagged as risk-takers. Additional research is required to understand the relationship between physical function and FaB scale scores to determine which populations are most appropriate for this scale (e.g., frail older adults vs. active adults). Research should also assess determinant frameworks from well-established risk-taking domains to adapt to the context of fall-related risk-taking behaviors in community-dwelling older adults. This includes evaluating mediating and moderating factors that influence the relationship between risk appraisal, risk attitudes, and risk propensity that leads to fall-related risk-taking behaviors.

Limitations

There are limitations to the findings of this study. First, we did not consider grey literature, limiting our findings to articles published in academic journals. Secondly, we did not consider studies that included participants < 65 years of age, which excluded 46 articles. These excluded articles may have had similar approaches to identifying risk-taking behaviors as the studies included in this review, and future research should explore if risk-taking behaviors differ in younger populations who may be at risk of falling.

CONCLUSION

This scoping review explored fall-related risk-taking behaviors. As falls are a complex multifactorial phenomenon, fall-related risk-taking behaviors can be challenging to identify. This review demonstrated a variety of factors could influence risk-taking behaviors, including an individual's physical abilities, the surrounding environment (social and physical), and how the activity was performed (e.g., rushing vs. going slowly). This review also identified the FaB and Everyday Risk-Taking scales to measure risk-taking propensity. However, it is important to recognize that responses in these scales may vary according to an individual's physical ability, not just their risk-taking

propensity. Risk is a highly individualized concept, and therefore researchers assessing risk-taking behaviors need to consider the interaction of complex factors and how to assess these relationships objectively.

Acknowledgments

We wish to acknowledge Ms. Neera Bhatnagar, Health Sciences Librarian at McMaster Health Science Library, for sharing her knowledge and expertise and for providing guidance in the development and refinement of the search strategies for the scoping review. The authors declare that Ms. Bhatnagar received no funding for her assistance and provided no assistance in the writing process.

REFERENCES

- [1] World Health Organization. *WHO Global Report on Falls Prevention in Older Age.*; 2007.
- [2] Feldman F, Chaudhury H. Falls and the physical environment: A review and a new multifactorial falls-risk conceptual framework. *Can J Occup Ther.* 2008;75(2):82-95.
- [3] Adams T. The social construction of risk by community psychiatric nurses and family carers for people with dementia. *Heal Risk Soc.* 2001;3(3):307-319. doi:10.1080/13698570120079903
- [4] Clarke CL. Risk and ageing populations: practice development research through an international research network. *Int J Older People Nurs.* 2006;1(3):169-176. doi:10.1111/j.1748-3743.2006.00027.x
- [5] Public Health Agency of Canada. *Seniors' Falls in Canada: Second Report.*; 2014.
- [6] Durocher E, Gibson BE, Rappolt S. Mediators of marginalisation in discharge planning with older adults. *Ageing Soc.* 2017;37(9):1747-1769. doi:10.1017/S0144686X16000593
- [7] Rush KL, Murphy MA, Kozak JF. A photovoice study of older adults' conceptualizations of risk. *J Aging Stud.* 2012;26(4):448-458. doi:10.1016/j.jaging.2012.06.004
- [8] Sitkin SB, Pablo AL. Reconceptualizing the Determinants of Risk Behavior. *Acad Manag.* 1992;17(1):9-38.
- [9] Haines TP, Lee DCA, O'Connell B, Mcdermott E, Hoffmann T. Why do hospitalized older adults take risks that may lead to falls? *Heal Expect.* 2015;18(2):233-249. doi:10.1111/hex.12026
- [10] Boyer TW. The development of risk-taking: A multi-perspective review. *Dev Rev.* 2006;26(3):291-345. doi:10.1016/j.dr.2006.05.002
- [11] Bran A, Vaidis DC. Assessing risk-taking: what to measure and how to measure it. *J Risk Res.* 2020;23(4):490-503. doi:10.1080/13669877.2019.1591489
- [12] Byrnes JP, Miller DC, Schafer WD. Gender differences in risk taking: A meta-analysis. *Psychol Bull.* 1999;125(3):367-383. doi:10.1037/0033-2909.125.3.367
- [13] Finucane ML, Holup JL. Risk as value: Combining affect and analysis in risk judgments. *J Risk Res.* 2006;9(2):141-164. doi:10.1080/13669870500166930

- [14] Arksey H, O'Malley L. Scoping studies: Towards a methodological framework. *Int J Soc Res Methodol Theory Pract.* 2005;8(1):19-32. doi:10.1080/1364557032000119616
- [15] Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci.* 2010;5(69):1-9. doi:10.1017/cbo9780511814563.003
- [16] Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol.* 2018;18(1):1-7. doi:10.1186/s12874-018-0611-x
- [17] Peters M, Godfrey C, McInerney P, Munn Z, Tricco A, Khalil H. Chapter 11: Scoping Reviews (2020 version). In: Aromataris E, Munn Z, eds. *JBIR Reviewer's Manual*. JBI; 2020. doi:https://doi.org/10.46658/JBIRM-20-01
- [18] Begin D, Morgan A, Macedo L, Richardson J, Wojkowski S. Risk-taking behaviours and falls in community-dwelling older adults: a scoping review protocol. *JBIR Evid Synth.* 2021:1-9. doi:10.11124/JBIES-20-00355
- [19] Tricco AC, Lillie E, Zarin W, O'Brien, KK., Colquhoun, H., Levac, D., et al. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Ann Intern Med.* 2018;169(7):467-473. doi:10.7326/M18-0850
- [20] Azzarello J, Hall B. Describing older adults' awareness of fall risk using situation awareness research techniques: A pilot study. *Res Gerontol Nurs.* 2016;9(4):161-166. doi:10.3928/19404921-20160504-01
- [21] Bailey C, Foran T, Scanail C, Dromey B. Older adults, falls and technologies for independent living: a life space approach. *Ageing Soc.* 2011;31(5):829-848.
- [22] Clemson L, Manor D, Fitzgerald MH. Behavioral Factors Contributing to Older Adults Falling in Public Places. *OTJR Occup Particip Heal.* 2003;23(3):107-117. doi:10.1177/153944920302300304
- [23] Clemson L, Cumming RG, Heard R. The development of an assessment to evaluate behavioral factors associated with falling. *Am J Occup Ther.* 2003;57(4):380-388. doi:10.5014/ajot.57.4.380
- [24] Crenshaw JR, Bernhardt KA, Achenbach SJ, Atkinson, EJ., Khosla, S., Kaufman, KR., et al. The circumstances, orientations, and impact locations of falls in community-dwelling older women. *Arch Gerontol Geriatr.* 2017;73(October 2016):240-247. doi:10.1016/j.archger.2017.07.011
- [25] Dollard J, Barton C, Newbury J, Turnbull D. Falls in old age: A threat to identity. *J Clin Nurs.* 2012;21(17-18):2617-2625. doi:10.1111/j.1365-2702.2011.03990.x
- [26] Horton K. Gender and the risk of falling: A sociological approach. *J Adv Nurs.* 2007;57(1):69-76. doi:10.1111/j.1365-2648.2006.04061.x
- [27] Kilian C, Salmoni A, Ward-Griffin C, Kloseck M. Perceiving Falls within a Family Context: A Focused Ethnographic Approach. *Can J Aging / La Rev Can du Vieil.* 2008;27(4):331-345. doi:10.3138/cja.27.4.331
- [28] Kim D, Ahrentzen S. Environmental and Behavioral Circumstances and Consequences of Falls in a Senior Living Development. *J Hous Elderly.* 2017;31(3):286-301. doi:10.1080/02763893.2017.1335667
- [29] Kluft N, van Dieën JH, Pijnappels M. The degree of misjudgment between perceived and actual gait ability in older adults. *Gait Posture.* 2017;51:275-280. doi:10.1016/j.gaitpost.2016.10.019
- [30] Lehtola S, Koistinen P, Luukinen H. Falls and injurious falls late in home-dwelling life. *Arch Gerontol Geriatr.* 2006;42(2):217-224. doi:10.1016/j.archger.2005.07.002
- [31] Mackenzie L, Byles J, Higginbotham N. A prospective community-based study of falls among older people in Australia: Frequency, circumstances, and consequences. *OTJR Occup Particip Heal.* 2002;22(4):143-152. doi:10.1177/153944920202200403
- [32] Berlin Hallrup L, Albertsson D, Bengtsson Tops A, Dahlberg K, Grahn B. Elderly women's experiences of living with fall risk in a fragile body: A reflective lifeworld approach. *Heal Soc Care Community.* 2009;17(4):379-387. doi:10.1111/j.1365-2524.2008.00836.x
- [33] Nachreiner NM, Findorff MJ, Wyman JF, McCarthy TC. Circumstances and consequences of falls in community-dwelling older women. *J Women's Heal.* 2007;16(10):1437-1446. doi:10.1089/jwh.2006.0245
- [34] Nyman SR, Ballinger C, Phillips JE, Newton R. Characteristics of outdoor falls among older people: a qualitative study. *BMC Geriatr.* 2013;13:125. http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed12&NEWS=N&AN=24245830.
- [35] Pohl P, Sandlund M, Ahlgren C, Bergvall-Kåreborn B, Lundin-Olsson L, Wikman AM. Fall risk awareness and safety precautions taken by older community-dwelling women and men-a qualitative study using focus group discussions. *PLoS One.* 2015;10(3):1-15. doi:10.1371/journal.pone.0119630
- [36] Robson K, Coyle J, Pope R. Exploration of older people's perceptions of behavioural factors associated with falls. *Age Ageing.* 2018;47:734-740. doi:10.1093/ageing/afy051
- [37] Roe B, Howell F, Riniotis K, Beech R, Crome P, Ong BN. Older people's experience of falls: Understanding, interpretation and autonomy. *J Adv Nurs.* 2008;63(6):586-596. doi:10.1111/j.1365-2648.2008.04735.x
- [38] Sattar S, Spoelstra SL, Alibhai SMH, Puts MTE. Circumstances of falls and fear of falling in community-dwelling older adults with cancer: Results from a mixed-methods study. *J Geriatr Oncol.* 2019;10(1):105-111. doi:10.1016/j.jgo.2018.08.005
- [39] Stevens JA, Mahoney JE, Ehrenreich H. Circumstances and outcomes of falls among high risk community-

- dwelling older adults. *Inj Epidemiol.* 2014;1(1):1-9. doi:10.1186/2197-1714-1-5
- [40] Tomczak U, Sattar S, Schoenbeck KL, Cordner T, Wildes TM. Circumstances around falls in older adults with Cancer. *J Geriatr Oncol.* 2021;12(1):91-95. doi:10.1016/j.jgo.2020.06.001
- [41] Weijer RHA, Hoozemans MJM, van Dieën JH, Pijnappels M. Consistency and test–retest reliability of stepping tests designed to measure self-perceived and actual physical stepping ability in older adults. *Aging Clin Exp Res.* 2019;31(12):1765-1773. doi:10.1007/s40520-018-01112-3
- [42] Zecevic AA, Salmoni AW, Lewko JH, Vandervoort AA, Speechley M. Utilization of the seniors falls investigation methodology to identify system-wide causes of falls in community-dwelling seniors. *Gerontologist.* 2009;49(5):685-696. doi:10.1093/geront/gnp059
- [43] Blalock SJ, Gildner PL, Jones JL, Bowling JM, Casteel CH. Relationship Between Perceived Risk of Falling and Adoption of Precautions to Reduce Fall Risk. *J Am Geriatr Soc.* 2016;64(6):1313-1317. doi:10.1111/jgs.14136
- [44] Bleijlevens MHC, Diederiks JPM, Hendriks MRC, Van Haastregt JCM, Crebolder HFJM, Van Eijk JT. Relationship between location and activity in injurious falls: An exploratory study. *BMC Geriatr.* 2010;10. doi:10.1186/1471-2318-10-40
- [45] Brundle C, Waterman HA, Ballinger C, Olleveant, N., Skelton, DA., Stanfor, P., et al. The causes of falls: Views of older people with visual impairment. *Heal Expect.* 2015;18(6):2021-2031. doi:10.1111/hex.12355
- [46] Butler AA, Lord SR, Taylor JL, Fitzpatrick RC. Ability Versus Hazard: Risk-Taking and Falls in Older People. *Journals Gerontol - Ser A Biol Sci Med Sci.* 2015;70(5):628-634. doi:10.1093/gerona/glu201
- [47] Butler AA, Lord SR, Fitzpatrick RC. Reach distance but not judgment error is associated with falls in older people. *Journals Gerontol - Ser A Biol Sci Med Sci.* 2011;66 A(8):896-903. doi:10.1093/gerona/glr071
- [48] Cayado V, Chahbi R. La perception du risque d'accident et de chute par des personnes âgées vivant à domicile: Un arbitrage complexe? *NPG Neurol - Psychiatr - Geriatr.* 2015;15(88):194-199. doi:10.1016/j.npg.2015.02.003
- [49] Chaumon MEB, Cuvillier B, Body S, Cros F. Detecting falls at home: User-centered design of a pervasive technology. *Hum Technol.* 2016;12(2):165-192. doi:10.17011/ht/urn.201611174654
- [50] Sandlund M, Pohl P, Ahlgren C, et al. Gender perspective on older people's exercise preferences and motivators in the context of falls prevention: A qualitative study. *Biomed Res Int.* 2018;2018. doi:10.1155/2018/6865156
- [51] Fox CR, Tannenbaum D. The elusive search for stable risk preferences. *Front Psychol.* 2011;2(NOV):1-4. doi:10.3389/fpsyg.2011.00298
- [52] Blais A, Weber EU. A Domain-Specific Risk-Taking (DOSPERT) scale for adult populations. *A Domain-Specific Risk-Taking scale adult Popul.* 2006;1(1):33-47.
- [53] Farnham A, Ziegler S, Blanke U, Stone E, Hatz C, Puhan MA. Does the DOSPERT scale predict risk-taking behaviour during travel? A study using smartphones. *J Travel Med.* 2018;25(1):1-7. doi:10.1093/jtm/tay064
- [54] Gullone E, Moore S. Adolescent risk-taking and the five-factor model of personality. *J Adolesc.* 2000;23(4):393-407. doi:10.1006/jado.2000.0327
- [55] Lejuez CW, Aklin WM, Zvolensky MJ, Pedulla CM. Evaluation of the Balloon Analogue Risk Task (BART) as a predictor of adolescent real-world risk-taking behaviours. *J Adolesc.* 2003;26(4):475-479. doi:10.1016/S0140-1971(03)00036-8
- [56] Jones G, Milligan J, Llewellyn D, Gledhill A, Johnson MI. Motivational orientation and risk taking in elite winter climbers: A qualitative study. *Int J Sport Exerc Psychol.* 2017;15(1):25-40. doi:10.1080/1612197X.2015.1069876
- [57] Coudin G, Alexopoulos T. "Help me! I'm old!" How negative aging stereotypes create dependency among older adults. *Aging Ment Heal.* 2010;14(5):516-523. doi:10.1080/13607861003713182
- [58] Hanson HM, Salmoni AW, Doyle PC. Broadening our understanding: Approaching falls as a stigmatizing topic for older adults. *Disabil Health J.* 2009;2(1):36-44. doi:10.1016/j.dhjo.2008.11.001
- [59] Kornadt AE, Kessler EM, Wurm S, Bowen CE, Gabriel M, Klusmann V. Views on ageing: a lifespan perspective. *Eur J Ageing.* 2020;17(4):387-401. doi:10.1007/s10433-019-00535-9
- [60] Egan MY, Laliberte Rudman D, Ceci C, Kessler, D, McGrath, C, Gardner, P, et al. Seniors, risk and rehabilitation: broadening our thinking. *Disabil Rehabil.* 2017;39(13):1348-1355. doi:10.1080/09638288.2016.1192227
- [61] Miller KE. Wired: Energy drinks, jock identity, masculine norms, and risk taking. *J Am Coll Heal.* 2008;56(5):481-490. doi:10.3200/JACH.56.5.481-490
- [62] Zinn JO. The meaning of risk-taking—key concepts and dimensions. *J Risk Res.* 2019;22(1):1-15. doi:10.1080/13669877.2017.1351465
- [63] Han K, Jung J, Mittal V, Zyung JD, Adam H. Political Identity and Financial Risk Taking: Insights from Social Dominance Orientation. *J Mark Res.* 2019;56(4):581-601. doi:10.1177/0022243718813331
- [64] World Health Organization. Ageing and health. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>. Published 2018. Accessed May 13, 2021.
- [65] Mckendry J, Breen L, Shad BJ, Greig CA. Muscle morphology and performance in master athletes: A systematic review and meta-analyses. *Ageing Res Rev.* 2018;45(January):62-82. doi:10.1016/j.arr.2018.04.007
- [66] Bauman A, Merom D, Bull FC, Buchner DM, Fiatarone Singh MA. Updating the Evidence for Physical Activity: Summative Reviews of the Epidemiological

Evidence, Prevalence, and Interventions to Promote “active Aging.” *Gerontologist*. 2016;56:S268-S280. doi:10.1093/geront/gnw031

[67] Dunlop DD, Semanik P, Song J, Manheim LM, Shih V, Chang RW. Risk factors for functional decline in older adults with arthritis. *Arthritis Rheum*. 2005;52(4):1274-1282. doi:10.1002/art.20968

[68] Merom D, Pye V, Macniven R, et al. Prevalence and correlates of participation in fall prevention exercise/physical activity by older adults. *Prev Med (Baltim)*. 2012;55(6):613-617. doi:10.1016/j.ypmed.2012.10.001

[69] Unger JB, Johnson CA, Marks G. Functional decline in the elderly: Evidence for direct and stress-buffering protective effects of social interactions and physical activity. *Ann Behav Med*. 1997;19(2):152-160. doi:10.1007/BF02883332

[70] Campbell AJ, Robertson MC. Otago exercise programme to prevent falls in older adults: a home-based, individually tailored strength and balance retraining programme. 2003:2-71.

[71] Edwards T, Pilutti LA. The effect of exercise training in adults with multiple sclerosis with severe mobility disability: A systematic review and future research directions. *Mult Scler Relat Disord*. 2017;16(June):31-39. doi:10.1016/j.msard.2017.06.003

[72] Lam FM, Huang MZ, Liao LR, Chung RC, Kwok TC, Pang MY. Physical exercise improves strength, balance, mobility, and endurance in people with cognitive impairment and dementia: a systematic review. *J Physiother*. 2018;64(1):4-15. doi:10.1016/j.jphys.2017.12.001

[73] Neri SGR, Cardoso JR, Cruz L, Lima, RM, de Oliveira, RJ, Iversen, MD, et al. Do virtual reality games improve mobility skills and balance measurements in community-dwelling older adults? Systematic review and meta-analysis. *Clin Rehabil*. 2017;31(10):1292-1304. doi:10.1177/0269215517694677

[74] Papa E V, Dong X, Hassan M. Resistance training for activity limitations in older adults with skeletal muscle function deficits: a systematic review. *Clin Interv Aging*. 2017;12:955-961. doi:10.2147/CIA.S104674

[75] Varahra A, Rodrigues IB, MacDermid JC, Bryant D, Birmingham T. Exercise to improve functional outcomes in persons with osteoporosis: a systematic review and meta-analysis. *Osteoporos Int*. 2018;29(2):265-286. doi:10.1007/s00198-017-4339-y

Supplementary Materials

Table 1. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	2-3
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	3
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	3
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	3
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	4
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	4, Supp Mat
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	4
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	4
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	2, 4
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	4
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	5
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	5
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	5
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	5-10
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	10-12
Limitations	20	Discuss the limitations of the scoping review process.	13
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	13
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	N/A

JB1 = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JB1 guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: 10.7326/M18-0850.

Table 2. Search Strategy

OVID MEDLINE (02/07/2020)		
#	Searches	Results
1	exp Aged/ or / or elder*.mp. or older adult*.mp. or senior*.mp.	3,230,053
2	exp Accidental Falls/ OR fall*.mp. OR slip*.mp. OR trip*.mp.	646,894
3	exp Choice Behavior/ or exp Risk-Taking/ or exp Health Risk Behaviours/ or exp Self Concept/ or exp Perception/ or (risk adj3 behavio*).mp. or risk taking.mp. or (hazard* adj2 behavio*).mp. or (danger* adj2 behavio*).mp. or risk appraisal.mp. or risk evaluation.mp. or self-perception.mp. or self-perceived risk.mp. or self-perceived.mp. or (risk* adj3 estimate*).mp. or (risk* adj2 judgment*).mp. or (risk* adj3 perception*).mp. or (perceived adj3 risk*).mp. or perceived ability.mp. or (risk adj3 awareness).mp. or circumstance*.mp. or impulsiv*.mp. or sensation seeking.mp.	784,927
4	1 and 2 and 3	3,400
5	limit 4 to (yr="2000 -Current") and (english or french))	2,691
OVID AMED (02/07/2020)		
#	Searches	Results
1	exp Aged/ or (older adult* or elder* or senior*).mp.	19,165
2	exp Accidental Falls/ OR fall*.mp. OR slip*.mp. OR trip*.mp.	4,863
3	exp Choice Behavior/ or exp Self Concept/ or Perception/ or (risk adj3 behavio*).mp. or risk taking.mp. or (hazard* adj2 behavio*).mp. or (danger* adj2 behavio*).mp. or risk appraisal.mp. or risk evaluation.mp. or self-perception.mp. or self-perceived risk.mp. or self-perceived.mp. or (risk* adj3 estimate*).mp. or (risk* adj2 judgment*).mp. or (risk* adj3 perception*).mp. or (perceived adj3 risk*).mp. or perceived ability.mp. or (risk adj3 awareness).mp. or circumstance*.mp. or impulsiv*.mp. or sensation seeking.mp.	9,070
4	1 and 2 and 3	134

5	limit 6 to (yr="2000 -Current") and (english or french))	112
OVIED EMBASE (02/07/2020)		
#	Searches	Results
1	exp Aged/ or (older adult* or elder* or senior*).mp.	3,134,382
2	exp Accidental Falls/ OR fall*.mp. OR slip*.mp. OR trip*.mp.	909,781
3	exp High Risk Behavior/ or Self Concept/ or Perception/ or (risk adj3 behavio*).mp. or risk taking.mp. or (hazard* adj2 behavio*).mp. or (danger* adj2 behavio*).mp. or risk appraisal.mp. or risk evaluation.mp. or self-perception.mp. or self-perceived risk.mp. or self-perceived.mp. or (risk* adj3 estimate*).mp. or (risk* adj2 judgment*).mp. or (risk* adj3 perception*).mp. or (perceived adj3 risk*).mp. or perceived ability.mp. or (risk adj3 awareness).mp. or circumstance*.mp. or impulsiv*.mp. or sensation seeking.mp.	468,336
4	1 and 2 and 3	2,642
5	limit 6 to (yr="2000 -Current") and (english or french))	2,304
OVIED APA PsychInfo (02/07/2020)		
#	Searches	Results
1	exp Geriatric Patients/ or exp Geriatrics/ or (older adult* or elder* or senior*).mp.	149,062
2	exp Falls/ or fall*.mp. or trip*.mp. or slip*.mp.	70,599
3	exp Risk Taking/ or Risk Perception/ or (risk adj3 behavio*).mp. or risk taking.mp. or (hazard* adj2 behavio*).mp. or (danger* adj2 behavio*).mp. or risk appraisal.mp. or risk evaluation.mp. or self-perception.mp. or self-perceived risk.mp. or self-perceived.mp. or (risk* adj3 estimate*).mp. or (risk* adj2 judgment*).mp. or (risk* adj3 perception*).mp. or (perceived adj3 risk*).mp. or perceived ability.mp. or (risk adj3 awareness).mp. or circumstance*.mp. or impulsiv*.mp. or sensation seeking.mp.	172,361
4	1 and 2 and 3	235
5	limit 6 to (yr="2000 -Current") and (english or french))	206
EBSCOhost CINAHL (02/07/2020)		
#	Searches	Results
1	OR (MH "Aged+") OR "elder*" OR "older adult*" OR "senior**"	936,745
2	(MH "Accidental Falls") OR "fall*" OR "trip*" OR "slip**"	100,228
3	(MH "Risk Taking Behavior+") OR (MH "Perception+") OR (MH "Self Concept+") OR "danger* behavio*" OR "hazard* behavio*" OR "risk* behavio*" OR "behavior* risk*" OR "health risk behavio*" OR "risk appraisal" OR "risk taking" OR "perceived risk" OR "self-perceived risk" OR "self-perception" OR "risk perception" OR "risk judgement*" OR "risk evaluation" OR "perceived ability" OR "circumstance*" OR "impulsiv*" OR "sensation seeking"	248,679
4	1 and 2 and 3	2,344
5	Limiters – publication date: 2000-2020; Language: english, french	2,154
EBSCOhost AgeLine (02/07/2020)		
#	Searches	Results
1	older adults or elderly or seniors or geriatrics or older people or aged or senior citizens	92,293
2	accidental falls or fall* or trip* or slip*	5,941
3	risk taking or risk* behavio* or risk-taking behavio* or danger* behavio* or hazard* behavio* or health risk behavio* or risk appraisal or perceived risk or self-perceived risk or self-perceived or self-perception or risk perception or risk judgement or risk evaluation or perceived ability or circumstance or impulsiv* or sensation seeking	3,215
4	1 and 2 and 3	270
5	Limiters – publication date: 2000-2020	182

Table 3. Data Extraction Sheets

Sheet 1. Characteristics of Studies

Author (Year)	Country	Methods	Study Aim	Population			Falls Collection	Risk-Taking			
				Sample Size	% Female	Age		Behavior	Propensity	Attitudes	Appraisal

Sheet 2. Risk-Taking Assessment Details

Author (Year)	Type/Theme	Assessment Description	Assessment Rationale/Reasoning	Study Results
---------------	------------	------------------------	--------------------------------	---------------

Sheet 3. Risk-Taking Behaviour Details

Author (Year)	Perspective of Risk/Risk-Taking Behaviour	Risk-Taking Behaviours	Notes/Comments
---------------	---	------------------------	----------------

Sheet 4. Factors Associated with Risk-Taking

Author (Year)	Risk-Taking Propensity	Risk Appraisal	Risk Attitudes	Other	Notes/Comments
---------------	------------------------	----------------	----------------	-------	----------------