Clinical Interventions in Aging

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REVIEW

A systematic review on the influence of fear of falling on quality of life in older people: is there a role for falls?

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Daniel Schoene[1,2]
Claudia Heller[1]
Yan N Aung[1]
Cornel C Sieber[1,3]
Wolfgang Kemmler[2]
Ellen Freiberger[1]

[1]Institute for Biomedicine of Aging, Friedrich-Alexander University Erlangen-Nürnberg, Nuremberg, Germany; [2]Institute of Medical Physics, Friedrich-Alexander University Erlangen-Nürnberg, Erlangen, Germany; [3]Department of General Internal and Geriatric Medicine, Hospital of the Order of St. John of God Regensburg, Regensburg, Germany

Abstract: Maintaining or improving quality of life (QoL) is a key outcome of clinical interventions in older people. Fear of falling (FoF) is associated with activity restriction as well as with poorer physical and cognitive functions and may be an important contributor to a diminished QoL. The objectives of this systematic review were to determine i) the effect of FoF on QoL in older people, ii) whether the association between these two constructs depends on the use of specific conceptualizations and measurement instruments, and iii) the role of fall events as mediating factor in this relationship. Four electronic databases (PubMed, EMBASE, CINAHL, and Cochrane Library) were searched from their inceptions to February 2018. Thirty mostly cross-sectional studies in nearly 30.000 people (weighted mean age 75.6 years (SD =6.1); 73% women) were included. FoF was associated with QoL in most studies, and this association appeared to be independent of the conceptualization of FoF. Moreover, this relationship was independent of falls people experienced which seemed to have a lower impact. FoF should be considered not only as by-product of falls and targeted interventions in parts different from those to reduce falls are likely required. Studies are needed showing that reducing FoF will lead to increased QoL.

Keywords: fear of falling, falls efficacy, quality of life, accidental falls, aged, function

Introduction

Falls in older adults are frequent events with severe consequences for the individual and high associated costs for the health care systems. Apart from physical injury, such as bone fractures and traumatic brain injuries, psychological consequences such as fear associated with falls might be just as detrimental for the individual in the long term. Together they may lead to disability, need for care, and loss of independence, greatly affecting one's quality of life (QoL). A great variability in the prevalence of fear of falling (FoF) has been reported, ranging from 3% to as high as 92% of the community-dwelling elderly fallers.[1,2] First reported as fear-related "post-fall syndrome" affecting about one-third of older people admitted to hospital after a fall,[3] today, this fear is no longer considered a "post-fall syndrome". It has been shown that in more than 50% of the people with no prior fall experience, FoF exists.[2,4–7] Conceptually, there are two different approaches to define and operationalize FoF. First, there is the definition focusing on the fear itself by measuring the fearful anticipation of future falls, for instance by using one-item questions ("At the present time, are you very fearful, somewhat fearful, or not fearful that you may fall?"). The second definition relates to Bandura's theory of self-efficacy[8] and measures the

Correspondence: Daniel Schoene
Institute for Biomedicine of Aging, Friedrich-Alexander University Erlangen-Nürnberg, Nuremberg, Kobergerstr. 60, Nuremberg 90408, Germany
Email daniel.schoene@fau.de

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construct of fall-related efficacy, which is the (loss of) confidence in one's abilities during certain tasks of daily life. Examples for instruments to assess fall-related efficacy are the Fall-Efficacy Scale (FES) by Tinetti[9] and the Activities-specific Balance Confidence Scale by Powell & Myers.[10] FoF is associated with poorer performance in physical, mobility, and cognitive tests.[11,12] One major consequence of this fear is the subsequent restriction of activities leading into a downward spiral of inactivity, deconditioning, loss of confidence, and further increased fall risk.[13,14] Hence, it is not surprising that FoF has been found to be associated with frailty in older adults.[15] The restriction of activities caused by fear-avoidance behavior also affects participation in social activities, a factor underlying reduced QoL.[16,17]

Quality of life is a broad, subjective, and complex construct that depends on cultural and social circumstances. Gerok and Brandstädter describe QoL and a long life without severe functional limitations as the key components of successful aging.[18] Changes in physical, mental, and functional dimensions during the aging process caused by illness, multimorbidity, and cognitive impairments affect QoL as do significant life transitions, such as retirement and the loss of important life partners.[19] Thus, the construct of QoL consists of physical, social, and emotional dimensions[19,20] and includes the satisfaction of basic needs as well as the sensation of happiness and fulfillment.[21] Strongly related to the construct of QoL and mostly used in research is the construct of health-related quality of life (HRQoL). As for QoL, there is no universal definition of HRQoL.[22] Similarly to QoL, it is a multidimensional concept that focuses on the impact health has on QoL, based on the individual's perception of well-being and functioning.[20,22–24] In this article, we will refer to both concepts as QoL.

According to the World Health Organization, in addition to an increased lifespan, the main goal of health care is to ensure "adding life to years"[25] in recognition of the significance of high QoL for people. Although underlying medical conditions and functional performance need to be targeted, patient-reported outcomes, such as QoL are more and more important in health care systems that move beyond survival.[26] Thus, in older people with multiple chronic conditions and functional limitations, main aim should be maintaining or improving QoL.[27,28] The demographics worldwide are changing rapidly toward aging societies. Therefore, the problem of FoF and falls and their impact on QoL is going to increase. However, to our knowledge, there has been no systematic analysis of the influence of FoF on QoL, including the clinically relevant issues addressed above (conceptualizations and measurement instruments for FoF/QoL and the mediating effect of actual fall events). We, therefore, conducted a systematic literature review to determine the impact of FoF on QoL. Specifically, we attempted to answer the following questions: 1) What is the effect of FoF on QoL? 2) Does the association depend on the operationalization of FoF or QoL? 3) Is there a mediating effect of falls on the effect of FoF on QoL?

Methods

Literature search strategy

Four electronic databases (PubMed, EMBASE, CINAHL, Cochrane Library) were searched for articles published from their inceptions to 12th of February 2018, with an initial search on 21 May 2015 and an update in February 2018. We applied a combined search of Medical Subject Headings (MeSH) and keywords related to fear ("fear of falling", anxiety, "self-efficacy", "self efficacy", "self confidence", "falls-efficacy", "falls efficacy", "balance confidence", "fall-related efficacy", "activity restriction"), older age (Aged, "older adults", "older persons", elderly, senior*), and QoL ("quality of life", QoL, HRQoL, "well-being"). If possible (PubMed, EMBASE, CINAHL), the search was limited to English language only. The Cochrane database was limited to "Trials". PubMed and CINAHL searches were further specified by excluding articles with diseases/medical conditions specified in the title (eg, Parkinson's Disease, stroke) and those that stated "review" or "randomized controlled" in the title field. Reference lists of included studies and review articles were also searched for relevant articles.

Eligibility criteria

Articles were included when they reported on studies fulfilling the following criteria: i) cohort, cross-sectional (including baseline data from intervention studies) or case–control study design; ii) minumum age of participants 60 years or mean age 65 years and older; iii) included measures of FoF and QoL which were put into relation to each other. Studies were excluded if they investigated disease-specific populations and were not published peer-reviewed articles (no abstracts or theses) in languages other than English.

Screening process, data extraction, and risk assessment

In a first step, the initial screening of titles and abstracts was performed. Subsequently, the assessment for eligibility of

retrieved full texts was conducted. A standardized, pre-piloted form was used to extract data from included studies. Extracted information included: study design; sample size; sample characteristics (age, gender, ethnicity, setting, health (conditions, co-morbidity, medications), falls, use of walking aids); instrument for assessing FoF; instrument for assessing QoL; prevalence/incidence of FoF; association between FoF and QoL. The 'Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies' was used to critically appraise the risk of bias of included studies.[29] Fourteen items were rated as 'yes', 'no', or 'other' (cannot be determined, not applicable, not reported) with no use of an overall score. All above-mentioned processes were done independently by two reviewers. Any disagreement was solved through discussion with a third reviewer.

Due to the large heterogeneity of instruments used for both constructs and differences in investigated populations we refrained from performing meta-analysis.

Results

Description of included studies

Thirty articles were included in this systematic review. Figure 1 describes the process of identification of included studies. A variety of study designs were applied, including cross-sectional studies, cohort studies, and pre-post group design studies. However, for the purpose of this review, all but one study[30] used a cross-sectional design. Overall, 29,029 individuals were included with sample sizes ranging widely between 32[31] and 11,802 participants.[32]

Table 1 displays the characteristics of included studies. Most participants resided in the community. Exceptions were few studies recruiting participants from nursing homes,[33–35] retirement villages/senior housing,[4,36] emergency department,[37] and day services.[38]

Apart from one study that included people from 58 to 96 years (mean age 78),[39] all studies had participants' minimum ages of 60 years. Thirteen publications included only participants of 65 years and older[15,30,31,37,40–48] and 6 studies only adults above 70 years.[32,33,35,49–51] Overall, the weighted mean age of 25 studies reporting on this outcome was 75.6 years (*SD* =6.1 (22 studies)).

The overall weighed proportion of women was 73%, ranging from 40% to 84%. Four studies exclusively recruited women.[30,32,35,50]

Study populations consisted of numerous cultures from all inhabited continents and 16 countries, ie, Nigeria,[40] Brasil,[48] Canada,[30,36] USA,[4,15,39,49,52] China/HK,[34,47] Iran,[53] Japan,[35,38] Taiwan,[41–44,46] Thailand,[54] Vietnam,[55] New Zealand/Australia,[51] Finland,[50] Germany,[33,43] Greece,[56] Turkey,[31,37] and UK.[32,45,57]

Health status of participants differed significantly across studies, from healthy to functionally impaired and frail covering a wide spectrum of fall risk. Generally, participants did not suffer from degenerative diseases and

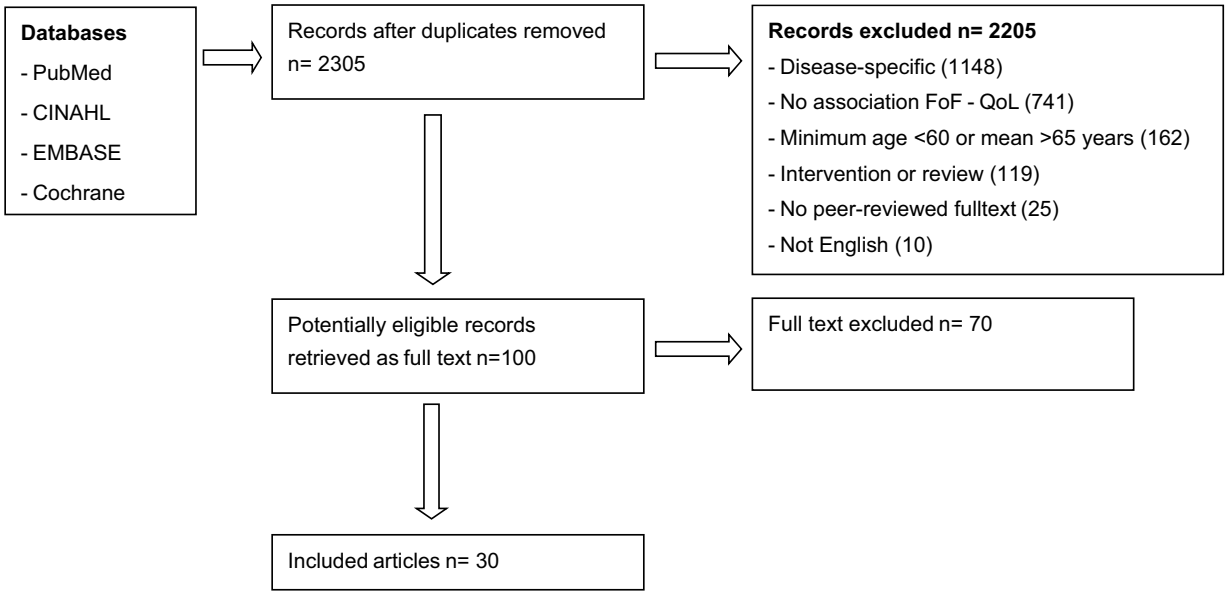

Figure 1 Flowchart of study selection process.
Abbreviations: FoF, fear of falling; QoL, quality of life.

Table 1 Sample sizes, age ranges, mean age (standard deviations), population characteristics, measurements, and main results of fear of falling and quality of life of the included studies

Reference	Population characteristics	Health and falls	FoF measure	FoF estimate/ prevalence	QoL measure	Univariate/unadjusted analyses	Multivariate/ adjusted analyses
Akosile et al 2014[40]	N=261; Age: 65+; 72.27 (7.72) Setting: CD % female: 50	Healthy; conditions affecting fall risk excluded	mFES (cut point 8)	23.4%	SF-36	FoF sig. correlated with all domains of QoL (r 0.199 to 0.430) except role limitation emotional; sig. mean differences between FoF and no FoF in all domains	3 domains of SF-36 (PF β=0.150, general health β=0.055, MH β=0.041, all $p<0.001$)
Arfken et al 1994[15]	N=890; Age: 65+ Setting: CD % female: 66	Relatively healthy; 12.4% faller	Single question (3 response options)	29% moderately fearful; 9% very fearful	SRH (2 response options)	Life less than very satisfied in 21/633 participants in no FoF, 34/190 in moderate FoF, 25/67 in very FoF ($P<0.001$)	FoF associated with fair or poor self-rated health OR =2.89 [1.32, 6.34]; Less than very satisfied: Moderate FoF vs no FoF OR 1.82 (1.26–2.63), very FoF vs no FoF OR 3.08 (1.81–5.25)
Baharlouei et al 2013[53]	N=191; Age: 60+; 69.2 (6.5) Setting: mostly CD % female: 39	Relatively healthy; mostly ambulant without walking aids (93.2%); 33.5% faller	Single question (4 response options); FES-I (no cut point applied)	21.5% somewhat fearful, 22% fairly fearful, 18.8% very fearful	SF-36	FoF sig. correlated with all domains of QoL (rs −0.22 to −0.58)	
Basalan and Atay 2014[31]	N=32; Age: 65–70 Setting: CD % female: 56	Healthy; no mobility restrictions; 9.4% walking aids; 21.9% faller	Question/s on concerns about falling (not specified)	43.8% concerned about falling	WHOQOL-BREF	Mean QoL: FoF 13.7 (2.9), no FoF 14.5 (2.0), $p=0.398$	
Billis et al 2011[56]	N=89; Age: 61–90; 72.9 (6.0) Setting: CD % female: 44	Healthy; without cognitive impairments; 8% walking stick; 43.8% faller	Single question (4 response options); FES-I (no cut point reported)	32.6% somewhat fearful, 19.1% quite a bit fearful, 3.4% very fearful	SF-36	FoF sig. correlated with all domains of QoL (r −0.310 to −0.655)	
Chang et al 2010[42]	N=1361; Age: 65–91; 72.2 (5.1) Setting: CD % female: 40	Relatively healthy; mobile; 16.3% faller	Single question (not specified)	60% of fallers are afraid of future falls	SF-36	Mean QoL: PCS - FoF 48.9 (10.4); no FoF 51.1 (9.3); MCS - FoF 47.1 (10.1); no FoF 50.6 (7.9); $p>0.05$	

(*Continued*)

Table 1 (Continued).

Reference	Population characteristics	Health and falls	FoF measure	FoF estimate/ prevalence	QoL measure	Univariate/unadjusted analyses	Multivariate/ adjusted analyses
Chang et al 2010[41]	N=4056; Age: 65–102; 73.6 (5.9) Setting: CD % female: 44	Relatively healthy; 13.8% faller	Single question (2 response options)	53.4%; 46.2% (♂), 62.6% (♀)	SF-36	Sig. mean differences between FoF and no FoF in all domains	FoF associated with PCS (β=−2.04, SE=0.24) and MCS (β=−2.46, SE=0.24), $p<0.001$
Chang et al 2016[46]	N=3824; Age: 65+ 73.9 (5.8) Setting: CD % female: 44	No dementia or severe cognitive impairment; 13.6% faller	Single question (2 response options)	53.4% afraid of falling	SF-36; SRH (5 response options)	Sig. mean differences between FoF and no FoF in all domains for men and women (SF-36 & SRH)	Only included SRH; SRH associated with FoF: reference excellent/very good vs good/fair all OR 1.35 (1.13–1.62), ♂ OR 1.40 (1.11–1.76), ♀ OR 1.32 (1.00–1.75); vs poor all OR 2.52 (1.75–3.64), ♂ OR 2.44 (1.54–3.86), ♀ OR 3.12 (1.69–5.76)
Cinarli et al 2017[37]	N=151; Age: 65+; 72.7 (6.3) Setting: ED % female: 48	No major cognitive impairment; 37% walking aid; 48.3% faller	FES (cut point 70); activity restriction (not specified)	63.6%; 46.9% limited activities because of FoF	Nottingham Health Profile	FoF sig. correlated with QoL (rs=0.64)	
Davis et al 2011[30]	N=135; Age: 65–75; 69.6 (3) Setting: CD % female: 100	Healthy; no major cognitive impairments; no neurodegenerative disease, stroke or depression; mean PPA 0.12 (1.28)	ABC Scale (no cut point applied)	ABC mean score - 87.9 (12.9) at baseline	EQ-5D	FoF sig. correlated with QoL (r=0.48)	FoF independent predictor QoL (β=0.0019, $p<0.001$)
Hoang et al 2017[55]	N=153; Age: 60–94; 72.0 (8.5) Setting: CD % female: 56	Healthy; no major cognitive impairment; no mobility limitation or balance problem due to medical conditions; 51% faller	FES-I (low 16–19, moderate 20–27, high 28+)	low FoF 8.5%, moderate FoF 27.5%, high FoF 64%	SRH (5 response options)	FoF sig. correlated with QoL (rs=−0.77)	

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Table 1 (Continued).

Reference	Population characteristics	Health and falls	FoF measure	FoF estimate/ prevalence	QoL measure	Univariate/unadjusted analyses	Multivariate/ adjusted analyses
Howland et al 1993[39]	N=150; Age: 58–96; 78 Setting: CD (housing complexes for the elderly) % female: 81	No major cognitive impairments; 65% walking aid; 28% faller	Single question (4 response options)	26% (♂:22%, ♀:27%) very or somewhat afraid of fall next year	SRH (4 response options)	QoL excellent/good less likely to have FoF OR 0.19 (0.10–0.35), p=0.01	QoL associated with FoF (ß=0.818, p=0.023)
Hsu et al 2013[43]	N=193/182; Age: 65+; 71.03 (5.69)/ 69.7 (5.42) Setting: CD % female: 60 (Taiwan), 45 (Germany)	Without or with minor mobility restrictions; without severe cognitive or physical impairments; 39.4%/31.9% faller last 6 months (Taiwan/Germany)	FES-I	Not reported	SF-12	FoF sig. correlated with QoL (Germany r= - 0.63, Taiwan r= −0.59)	partial mediation of physical activity and self-concept of health and physical independence in association between FoF and QoL
Iglesias et al 2009[32] (analyses of 3 studies)	N=4196/3314/ 4292; Age: 70+; 77.2 Setting: CD % female: 100	With increased risk for hip fractures; 43.2%/33.9%/29.3% faller; 67.7%/58.6%/43.6% previous fracture	Single question (6 response options)	5.8% afraid of falls all the time, 5.8% most of the time, 40.1% none of the time	EQ-5D		all levels of FoF sig. associated with QoL; hierarchical multilevel model: major role in affecting QoL by intensity of FoF, with sig. QoL decrements associated with increasing levels of FoF
Kato et al 2008[35]	N=342; Age: 70+; 85.6 (6.1) Setting: nursing home % female: 100	MMSE>15; increased fall and fracture risk; 45.1% faller; 29.3% previous hip fracture	FES (no cut point applied)	Mean 45 (22.3)	SF-8	FoF sig. correlated with all domains of QoL (rs −0.21 to −0.53) except for MCS	FoF associated with all domains of QoL (β −0.27 to −0.42) except for MCS (β = −0.12, p<0.05)

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Table 1 (Continued).

Reference	Population characteristics	Health and falls	FoF measure	FoF estimate/ prevalence	QoL measure	Univariate/unadjusted analyses	Multivariate/ adjusted analyses
Kloseck et al 2007[36]	N=199; Age: 60+; 78.9 (7.1) Setting: retirement village residents, partially with day services % female: 76	67% walking aids; 38% receive home services; 50% fallers; 37% recurrent fallers	General questions (not specified); FES	60% very, somewhat or slightly in following year	SHARP	FoF sig. less satisfied with life during past month (FoF 0.87 (0.34) vs no FoF 0.96 (0.19), p=0.02)	
Lachman et al 1998[4]	N=270; Age: 62–93; 76.2 (7.9) Setting: CD (public senior housing residents) % female: 78	Increased fall risk: multimorbidity, recurrent falls within the last 12 months; 37% walking aids; 17% fallers past 3 months	FES; SAFE (no cut points applied); afraid item (4 response options)	Not reported	SF-36; SRH (rate from 0–10)	More FoF (FES) is associated with lower QoL in all SF-36 domains; FoF (all 3 instrument of similar magnitude) sig. correlated with all domains of QoL	All FoF measures sig. associated with all domains of SF-36
Li et al 2003[49]	N=256; Age: 70–92; 77.5 (5.0) Setting: CD (primary care clinic outpatients) % female: 70	Ability to ambulate with minimal use of assistive device; without cognitive impairments or degenerative diseases; 20% walking aids	Single question (2 response options); SAFFE (latent class analyses)	38% very afraid; 18.4% high fear based on latent class analyses	SF-12		PCS: low vs high FoF 51.90±19.43 vs 42.68 ±17.58, F(1,254)=8.94; p=0.003, Cohen's d=2.11 MCS: low vs high FoF 60.38±20.52 vs 48.27 ±18.42, F(1,254)=13.84; p=0.001, Cohen's d=2.70
Lin et al 2015[44]	N=597; Age: 65+; 75.9 (7.0) Setting: CD % female: 55	Increased fall risk: recurrent falls or gait impairment and PPA>0; 36% faller	FES-I (scoring unclear)	Mean 2.7 (1.4)	EQ-5D		FoF associated with QoL (β= −0.122** (95%CI −0.017;−0.005))
Liu et al 2015[47]	N=597; Age: 65+; 75.9 (7.0) Setting: CD % female: 75	Robust (Rockwood scale); able to walk independently with or without assistance; no major cognitive impairment; 30.3% faller	Chinese FES-I (cut point 23)	65%	Chinese Personal Wellbeing Index	Mean QoL: FoF 69.9 (15.4), no FoF 77.5 (14.6), p<0.001; OR 0.97 (0.95–0.98);	low QoL associated with FoF (OR 0.97 (0.962–0.997), p=0.024)

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Table 1 (Continued).

Reference	Population characteristics	Health and falls	FoF measure	FoF estimate/ prevalence	QoL measure	Univariate/unadjusted analyses	Multivariate/ adjusted analyses
Malini et al 2016[48]	N=742; Age: 65+; 76.7 (7.0) Setting: CD % female: 70	No major cognitive or sensory impairment; 9% walking aid; 19% dependent in at least 1 ADL; 28.4% faller	FES-BR (cut point 23)	51.9%	SRH (3 response options)	% FoF according to SRH: very good/good 40.5%, fair 62.6% OR 2.45 (1.80–3.35), poor/very poor 88.4% OR 11.16 (3.82–32.57), $p<0.001$;	Lower QoL sig. associated with FoF: fair 2.36 (1.71–3.25), poor/very poor OR 11.22 (3.71–33.93)
Patil et al 2014[50]	N=409; Age: 70–81; 74.2 (3.0) Setting: CD % female: 100	increased fall risk: fall within the last 12 months; no major cognitive impairment (MMSE>20); no degenerative diseases; no ADL impairment; 100% faller	FES-I (low 16–19, moderate 20–27, high 28+)	21.9% high concern, 45.8% moderate concern, 32.3% low concern	LEIPAD; WHO-5		Poor but not moderate QoL associated with FoF: **moderate QoL**: moderate vs low FoF OR 1.2 (0.7–2.0); high vs low FoF OR 2.5 (0.9–7.1) **poor QoL**: moderate vs low FoF OR 3.5 (1.2–2.3); high vs low FoF OR 19.7 (4.9–78.8)
Stretton et al 2006[51]	N=243; Age: 74–84; 79 Setting: CD % female: 53	Frail (dependence in ADL or prolonged bed rest or impaired mobility or recent fall), low level of physical functioning; multimorbid; no major cognitive impairment (MMSE>20); 56% faller	MFES (no cut point applied)	Median 103.0 (95%CI 99–107)	SF-36	FoF sig. correlated with QoL (r 0.61 to −0.80) □ mFES single highest contributor to physical components of SF-36 (PCS 33%, PF 55%)	FoF associated with physical components of QoL (PCS β=0.13; SE=0.03, $p<0.001$, PF ß=−0.85; SE=0.233, $p<0.001$)
Stubbs et al 2016[57]	N=289; Age: 60+; 78 (8) Setting: CD % female: 67	No cognitive impairment; mobile over 10 m with or without a walking aid; no stroke or major surgery in past 6 months; 45.3% walking aid; 46% faller	ABC scale (tertiles: low 0–45%, moderate 45–71%, high 71–100%)	One third low confidence	EQ-5DVAS	Mean QoL: low confidence 56.7 (21.8), moderate confidence 68.1 (18.7), high confidence 80.6 (15.7), $p<0.001$	

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Table 1 (Continued).

Reference	Population characteristics	Health and falls	FoF measure	FoF estimate/ prevalence	QoL measure	Univariate/unadjusted analyses	Multivariate/ adjusted analyses
Suzuki et al 2002[38]	N=135; Age: 60+; ♀: 82.3 (6.8)/ ♂: 76.1 (7.4) Setting: day service % female: 68	Frail, functional impairments; sufficient cognition to answer questionnaire; 31.1% faller	Single question (3 response options)	16.3% very fearful; ♂: 46.5% moderately fearful, 9.3% very fearful; ♀: 47.4% moderately fearful, 19.6% very fearful	SF-36	♂ no FoF: RP (role limitations) and SF (social functioning) higher scores than moderate FoF ($P<0.05$); ♀ no FoF: PF (physical functioning), RP, SF, GH, VT higher scores than moderate or very FoF ($P<0.05$)	
Tiernan et al 2014[52]	N=449; Age: 60–97; 72.3 (7.7) Setting: CD % female: 88	No major cognitive impairments; 26.5% walking aids; 24.5% faller	Adapted FES (no cut point reported	Mean 94.9 (12.0)	SRH (5 response options); SPF-IL (Well-Being)	FoF sig. correlated with QoL (SRH r=0.512, SPF-IL r=0.336); FoF by SRH group: 'very good' and 'excellent' SRH with lower FoF scores ($p<0.001$), 'fair' higher FoF than 'good' ($p<0.001$), 'poor' higher FoF than 'good' ($p<0.001$) and 'fair' ($p<0.001$)	FoF sig. associated with QoL (SRH OR=1.133, $p<0.001$; SPF-IL OR=1.035**, $p=0.002$)
Valentine et al 2011[45]	N=153; Age: 67–95; 81 (6.2) Setting: hospital patients % female: 69	No recent deterioration in mobility; able to recall at least 3 of 5 items in a test of recent memory; 56% walking aids; mean 4.5 (8.4) falls past 3 years	CAFlik	Not reported	PGMS	FoF sig. correlated with QoL (r= −0.40)	Structural equation modelling found no direct or indirect effect of falls, balance confidence and falls efficacy on QoL
Warnke et al 2004[33]	N=68; Age: 70+; 86(6) Setting: nursing home % female: 84	Not bedridden; 79% walking aids; 63% faller; 28% past fracture	FoF subscale (7 items; min 7, max 21, higher scores indicate lower FoF)	Mean 14.8 (5.1)	NHP	FoF sig. correlated with all domains of QoL (r 0.32 to 0.64)	

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Table 1 (Continued).

Reference	Population characteristics	Health and falls	FoF measure	FoF estimate/ prevalence	QoL measure	Univariate/unadjusted analyses	Multivariate/ adjusted analyses
Yeung et al 2006[34]	N=100; Age: 60+; 79.0 (8.3) Setting: care and attention home % female: 58	Functionally independent; mean 0.4 (0.8) falls past 6 months	SAFFE	Not reported	SRH (5 response options)	FoF sig. correlated with QoL (r= −0.28)	QoL not associated with FoF (β=−0.06, *p*=0.507)
Yodmai et al 2015[54]	N=394; Age: 60–95; 70.5 (7.0) Setting: CD % female: 62	58% at least 1 chronic condition; 87% walking impairment; 34% fall in aging life	Single question (3 response options)	74.1% low fear, 23.6% moderate fear, 2.3% high fear	Mod WHOQOL-OLD (low 24–55, moderate 56–88, high 89–120)		No FoF not associated with QoL (OR 1.264 (0.695–2.299)); low vs moderate/high FoF during public transport use associated with higher QoL OR 6.5 (2.7–15.5), *p*<0.001

Abbreviations: FES, Falls Efficacy Scale; FES-I - Falls Efficacy Scale International; MFES, Modified Falls Efficacy Scale; ABC Scale, Activities Balance Confidence Scale; SAFE/SAFFE, Survey of Activities and Fear of Falling in the Elderly; CAFlik, Concern and Fear about Falling; SF-36, Medical Outcome Study 36-Item Short-Form Health Survey (subscales: PF, Physical Function; RP - Role Limitation Physical; BP, Bodily Pain; GH, General Health; V, Vitality; SF, Social Function; RE, Role Limitation Emotional; MH, Mental Health; PCS, Physical Component Scale; MCS, Mental Component Scale); SF-12, MOS 12-Item Short-Form Health Survey; SF-8, MOS 8-Item Short-Form Health Survey; EQ-5D, EuroQol-5D; WHOQOL-BREF, World Health Organization Quality of Life - Short Form WHOQOL-100; WHOQOL-OLD, World Health Organization Quality of Life – OIder Adults Module; SHARP, Short Happiness and Affect Research Protocol, WHO-5–5-item World Health Organization Well-Being Index; SPF-IL, Social Production Function Instrument for the Level of Well-Being; PGMS, Philadelphia Geriatric Morale Scale; NHP, Nottingham Health Profile; NPH, Nottingham Health Profile (Subscales: energy, sleep, physical mobility, pain, emotional reaction, social isolation; SRH, self-rated health; SWB, subjective well-being; PPA, Physiological Profile Assessment; VAS, visual analogue scale; CD, community-dwelling; R, Pearson product-moment correlation coefficient, Rs, Spearman's rank correlation coefficient; OR, odds ratio.

were cognitively functioning on a sufficient level. Need of walking aids was used as marker for function that was reported by a majority of studies and ranged from 0%[53] to 79%.[33] Falls during the past year, when reported, ranged from 12.4%[15] to 100%.[50] Several studies reported on previous fractures[32,33,35,48] ranging from 3.9% to 68%.

Measurement instruments for FoF and QoL

Most studies utilized standard FoF questionnaires related to self-efficacy including the FES and its variations (FES-I and MFES, translations)[3,4,37,40,43,44,47,48,50–53,55,56] and the ABC scale.[30,57] The SAFE, measuring the activity restrictions due to FoF was used in three studies.[4,34,49] Nine studies identified FoF with a single question;[15,31,32,38,39,41,42,46,54] however, response options partially differed (dichotomized, 3-, 4-, 6-level scale). One study applied three questionnaires for different aspects of FoF (consequences of falling: CONSq; falls-efficacy measures – concern and fear about falling: CAFlik, balance confidence: CONbal).[45] Another study developed an instrument that used ratings by nursing staff in combination with a newly developed QoL questionnaire in people with FoF consisting of three subscales, one of them being "fear of falling".[33]

The evaluation of the participants' QoL was also administered by a wide range of standard instruments, the SF-36,[4,38,40–42,46,51,53,56] SF-12,[43,49] SF-8,[35] EQ-5D,[30,32,44] WHOQOL–BREF,[31] modified WHO QOL-OLD,[54] Short Happiness and Affect Research Protocol (SHARP),[36] LEIPAD,[50] WHO (Five) Well-Being Index (WHO-5),[50] Social Production Function Instrument (SPF-IL),[52] Nottingham Health Profile (NHP),[33,37] Philadelphia Geriatric Morale Scale (PGMS),[45] and Chinese Personal Wellbeing Index (CPWI).[47] Eight studies used single questions related to self-rated health (SRH) status using a visual analog scale[57] or graded response options with dichotomized,[15] three,[48] four,[39] and five categories.[34,46,52,55]

Methodological quality assessment

The methodological quality of included studies was largely homogeneous (Table 2). With the exception of one study,[54] the population was clearly defined. However, in only half of the studies, the participation rate was clearly 50% or above, potentially affecting generalizability of results. For the questions of interest, all but one study were of cross-sectional design.[30] However, also in the study by Davis et al, no temporal relationship between falls-related self-efficacy and QoL was investigated and thus forbidding any cause–effect relationship.[30] Except for few studies for which scoring, or test–retest reliability were unclear, all studies used valid and reliable instruments for FoF and QoL. For the mediating effect of actual fall events on the relationship between FoF and QoL, none of the studies included exclusively these three measures and models were adjusted for different variables, mostly related to demographics and health. Small sample sizes likely impacted on the results in several studies. This was also due to most studies having had other primary objectives than the current review. None of the studies reported on blinding of outcome assessors for relevant outcomes.

Prevalence/incidence of fear of falling

From 30 articles, several did not provide data on prevalence, incidence, or point estimates with spread measures of FoF for their respective study samples.[4,34,43,45] Prevalence rates of remaining studies varied widely likely due to differences in sample characteristics and measurement properties (scoring, number of categories, wording). Participants without mobility restrictions or increased fall risk had the lowest FoF prevalence (<30%).[15,39,40,57] Higher prevalence rates of FoF were found in frail populations,[38] increased with the number of experienced falls,[36,50,57] was higher in people at increased risk of hip fractures[32] or in those with previous fall-related fractures,[48] in individuals with chronic musculoskeletal pain[57] and in people requiring walking aids for ambulation.[4,39,53,57] Several studies reported higher levels of FoF in women.[4,36,38,39,41,46–48,53,55]

What is the effect of FoF on QoL?

Better QoL was consistently associated with lower levels of FoF. Comparison of means/ranks showed that people with less FoF rated their QoL better.[31,36,41,42,46,47,49,52,57] When using multiple categories for FoF, this seems to be a linear relationship with higher levels of FoF being associated with poorer scores on QoL.[15,32,38,48,50,52,57] Several studies reported moderate to strong correlations between FoF and QoL (r=−0.47 to −0.80).[30,37,43,45,51,52,55] The relationship between FoF and QoL appears to be stronger for the physical than for the mental components of QoL. Comparing sub-scales of the SF-36 and its modified versions, highest correlations were observed for the physical function domain.[4,35,40,53,56] Beside the physical function domain, also other physical domains such as bodily

Table 2 Rating of methodological quality of included studies using the 'Quality assessment tool for observational cohort and cross-sectional studies'[29]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Akosile et al 2014[40]		Yes	NR	Yes		No	No	No	Yes	NA	Yes	NR	NA	No
Arfken et al 1994[15]		Yes	Yes	Yes		No	No	No	Yes	NA	Yes	NR	NA	Yes
Baharlouei et al 2013[53]		Yes	NR	Yes		No	No	No	Yes	NA	Yes	NR	NA	No
Basalan and Atay 2014[31]		Yes	No	Yes		No	No	No	CD	NA	Yes	NR	NA	No
Billis et al 2011[56]		Yes	NR	Yes		No	No	No	Yes	NA	Yes	NR	NA	No
Chang, Yang and Chou 2010[42]		Yes	Yes	Yes		No	No	No	CD	NA	Yes	NR	NA	No
Chang et al 2010[41]		Yes	Yes	Yes		No	No	No	Yes	NA	Yes	NR	NA	Yes
Chang et al 2016[46]		Yes	Yes	Yes		No	No	NA	Yes	NA	Yes	NR	NA	Yes
Cinarli et al 2017[37]		Yes	Yes	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	No
Davis et al 2011[30]		Yes	Yes	Yes		No	CD	Yes	Yes	No	Yes	NR	Yes	No
Hoang et al 2017[55]		Yes	NR	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	No
Howland et al 1993[39]		Yes	Yes	Yes		No	No	No	Yes	NA	Yes	NR	NA	Yes
Hsu et al 2013[43]		Yes	NR	No		No	No	Yes	Yes	NA	Yes	NR	NA	No
Iglesias et al 2009[32]		Yes	No	No		No	No	Yes	Yes	NA	Yes	NR	NA	Yes
Kato et al 2008[35]		Yes	Yes	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	Yes
Kloseck et al 2007[36]		Yes	No	Yes		No	No	Yes	CD	NA	Yes	NR	NA	Yes
Lachman et al 1998[4]		Yes	Yes	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	Yes
Li et al 2003[49]		Yes	CD	Yes		No	No	No	Yes	NA	Yes	NR	NA	No
Lin et al 2015[44]		Yes	NR	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	No
Liu et al 2015[47]		Yes	NR	Yes		No	No	No	Yes	NA	Yes	NR	NA	Yes
Malini et al 2016[48]		Yes	NR	Yes		No	No	No	Yes	NA	Yes	NR	NA	Yes
Patil et al 2014[50]		Yes	Yes	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	Yes
Stretton et al 2006[51]		Yes	No	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	No
Stubbs et al 2016[57]		Yes	Yes	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	No
Suzuki et al 2002[38]		Yes	NR	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	No
Tiernan et al 2014[52]		Yes	Yes	Yes		No	No	Yes	CD	NA	Yes	NR	NA	Yes
Valentine et al 2011[45]		Yes	Yes	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	Yes
Warnke et al 2004[33]		Yes	Yes	Yes		No	No	Yes	CD	NA	Yes	NR	NA	No
Yeung et al 2006[34]		Yes	Yes	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	Yes
Yodmai et al 2015[54]		No	NR	Yes		No	No	Yes	Yes	NA	Yes	NR	NA	Yes

Notes: 1. Was the research question or objective in this paper clearly stated?; 2. Was the study population clearly specified and defined?; 3. Was the participation rate of eligible persons at least 50%?; 4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?; 5. Was a sample size justification, power description, or variance and effect estimates provided?; 6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?; 7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?; 8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (eg, categories of exposure, or exposure measured as continuous variable)?; 9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?; 10. Was the exposure(s) assessed more than once over time?; 11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?; 12. Were the outcome assessors blinded to the exposure status of participants?; 13. Was loss to follow-up after baseline 20% or less?; 14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)? As in most studies had objectives differed to the question of this review, we decided Not to apply Items 1 and 5.

Abbreviations: CD, community dwelling; NR, not reported; NA, not applicable.

pain,[15,35,40,46,56] general health perceptions,[4,15,40,46,56] and physical role functioning[15,35,46,56] were associated with FoF. Exceptions were studies that found similar associations with the mental health domain.[46,56] One study demonstrated a moderate correlation between the social role functioning domain and FoF, measured with FES and SAFE in residents of public senior housing communities.[4]

Regression analyses showed that FoF is an independent predictor for QoL.[15,30,32,39,41,44,46–48,50–52] Again, this relationship was stronger for the physical components of QoL.[4,35,40,44,50] Stretton and colleagues[51] reported that the MFES was the single highest contributor to SF-36 physical component summary score and the physical function domain in frail older adults. Moreover, FoF and QoL

appeared to be more important for predicting each other than other basic variables such as age, gender, previous falls, and comorbidity.[4,40,46,48,51] In contrast, Valentine and colleagues[45] using structural equation modeling found no direct effect of balance confidence or self-efficacy on the relationship between postural instability and QoL in a geriatric rehabilitation setting; however, they found a relationship between QoL and general anxiety. Yodmai and colleagues[54] found no associations between FoF and QoL scales, but low-level FoF during use of public transport was linked to better QoL.

Hsu et al[43] demonstrated a mediating effect of physical activity (PA) participation and the self-concept of health and physical independence on the relationship between FOF and QoL with lower PA levels being associated with higher FoF and reduced QoL in two independent samples in Germany and Taiwan.

Does the association depend on the operationalization of FoF or QoL?

The relevance of FoF for QoL appeared to be independent of the FoF instruments used as evidenced by the consistent results of the association across studies that administered different instruments. Few studies administered more than one instrument related to the FoF construct. The SAFE explained a comparable amount of variance in QoL (SF-36, 1-item question SRH) as the FES and a single question measurement of FoF (four levels).[4] Contrary, Valentine et al applied the Caflik as a measure for fear of falling and the Confbal for balance confidence and both tools were parts of different paths in structural equation models.[45]

Most studies administered the SF-36, an abbreviated version of this instrument, SRH questions or the EQ-5D to assess QoL and nearly in all of these studies a significant association was demonstrated. The WHOQOL-BREF[31] and mod WHOQOL-OLD,[54] administered each in one study, did not show an overall association with FoF in Asian samples, although latter found a reduced level of QoL during public transport use and FoF. The use of the PGMS also demonstrated no association with FoF.[45] Two studies administered more than one instrument of QoL. Tiernan et al[52] found in multivariate logistic regression analyses that FoF (adapted FES) was a significant contributor to SRH and well-being (SPF-IL). However, the amount of variance explained was larger for SRH.[52] Another study found that older women with a falls history who were moderately or highly concerned about falls (FES-I) reported poorer QoL (LEIPAD) and well-being (WHO-5) than those with low levels of concern.[50] Due to the very wide confidence intervals, a direct comparison could not be done.

Is there a mediating effect of falls on the association between FoF and QoL?

To explore the potential mediating effect of actual fall events on the association of FoF and QoL, we looked at studies that used multivariate modeling and included all three variables. Several studies found FoF and falls to be independent predictors of QoL.[4,15,39] Findings in studies with community-dwelling older people, including those from large epidemiological studies, however, indicated that FoF was a significant risk factor for reduced QoL after controlling for falls or fall-related injuries with little or no mediation from actual falls.[32,41,44,52] Iglesias and colleagues found that the main burden of QoL loss was FoF which was consistently associated with this outcome in three large datasets, while falls and fractures had much smaller effect sizes, with fall events being non-significant in two of these three studies.[32] Similarly, Tiernan et al found that when including falls-efficacy and falls into the modeling process, latter added very little to the relationship with SRH beyond that explained by falls-efficacy.[52] Contrary, FoF and falls were maintained independent predictors for well-being.[52] Finally, Lin and colleagues demonstrated that among other factors, FoF was an independent predictor for overall QoL while fall events were not in community-dwelling elderly with functional limitations.[44] Regarding individual domains of QoL these authors found both, FoF and falls were associated with self-care but only FoF was linked to mobility.[44] In another study, fall history and FoF were associated with the physical function component of the SF-36 but only FoF was also associated with the mental function component.[41]

Two of the identified studies were conducted in institutionalized settings.[35,45] Kato found no mediating influence of falls on the relationship between falls-efficacy and the physical function component of the SF-8 in female nursing home residents.[35] The study by Valentine and colleagues using structural equation modeling found no direct or indirect effect of falls, balance confidence, and falls-efficacy on the relationship between instability and QoL.[45]

Discussion

This systematic review aimed at determining the impact of FoF on QoL in older adults and the effect of actual fall events on this relationship. We found that FoF was consistently and strongly associated with QoL and this association appeared to be independent of the conceptualizations of FoF and QoL. Moreover, this relationship is independent of falls people experienced which seem to have a lower impact.

What is the effect of FoF on QoL?

Our results demonstrate a robust association of lower levels of FoF and higher perceived QoL. In multivariate analyses of single studies, FoF remained an independent predictor of QoL. Furthermore, the relationship appears to be more important than other basic variables such as age and gender.[4,51]

Fear is an important emotional trait that evolved and triggers innate responses important for survival and one of these fears is the fear of heights or depth which may lead to a fall with serious if not fatal consequences.[58] How the concept of FoF in older adults fits in this context is less well established. But it seems that fearful individuals elicit postural responses in everyday activities that younger fearful people demonstrate when exposed to heights >3 m.[59] Thus, emotion and balance control are associated with each other and more fearful people seem to learn associations between specifically related tasks and an avoidance response.[60] While an activity avoidance may protect from dangerous situations and can already be observed in infants,[61] it may be maladaptive if it exceeds a certain level, and thereby, the fear becomes debilitating, initiating a vicious cycle of activity reduction and physical and mental decline.[62] In line with this, Hsu et al[43] found a mediating effect of PA on the relationship between FoF and QoL.

While fear itself is a psychological construct, highest correlations were found not for mental but for physical components of QoL.[4,33,35,46,49,52] Particularly strong associations with FoF were found for physical function, general health perceptions, bodily pain status, vitality, physical role functioning, and physical mobility,[4,15,33,35,40,56] indicating that physical components of health are key determinants for high QoL. This is confirmed by findings that QoL is lower in people with medical conditions that affect physical functioning, including multimorbid and frail individuals[63] while FoF is increased in physically frail older adults.[64]

It seems that the association between these physical limitations and FoF is in parts due to restricting activity participation and subsequent negative consequences. Similarly, one study in people with chronic musculoskeletal pain found that activity restriction due to FoF was associated with sedentary behavior.[65] Howland and colleagues found the influence of FOF on activity restriction to be independent after controlling for other factors such as age, sex, pain, self-rated health, previous falls, medications, and the use of walking aids.[39] This finding supports other results which stated that FOF is a significant predictor of activity restriction and that individuals being fearful were distinguished from those that additionally restricted their activities.[14,66]

Findings also indicate that activity restriction is related not only to physical functioning but also to psychological issues, such as depression.[67,68] Individual studies found associations between mental health, social functioning and QoL,[4,56] emphasizing that QoL is a complex multifactorial construct. This association may be linked to a maladaptive degree of activity restriction too. Fear only has positive effects as long as social and physical mobility is not decreased.[69] Also, less social interaction, participation and becoming homebound can cause not only physical but also mental problems, resulting in reduced levels of QoL.[70]

The limitation of physical functions and reduction of social activities can lead to mental problems such as depression and loss of self-confidence. Self-critical thinking, low functional performance, and limited personal and social activities are risk or exacerbating factors for depressive symptoms in older people.[71] Taking the physical and mental components together, activity restriction in older people can lead to deconditioning, depression, social isolation and thus reduced QoL.[72] Hence, activity restriction appears to be an important link between FoF and QoL. Today it remains unclear, when and how individuals decide to avoid certain activities. A small qualitative study in people with FoF found that some individuals' QoL were not affected by their FoF while in others it led to restrictions of activities.[73] It seems that this complex process involves physical and cognitive functions, rating one's own risk and subsequent risk-taking behavior and is influenced by personality traits (especially introversion/extroversion), depressive symptoms among other factors.[36,74–76] Anxious people may overestimate their actual risk of falling and subsequently avoid activities.[74]

Evidence suggests a direct link of FoF related measures on physical performance, such as balance and gait.[77] Thus, QoL likely is also diminished by reduced physical functioning not related to activity restriction. In addition, recent fall experience has been associated with post-traumatic stress disorder in older

people.[78] Also, anxiety has been associated with chronic stress and the perseverative cognitive representation leads to elevated stress levels.[79] As people are permanently concerned about falling, inflammation levels may be increased affecting one's physical and mental health.[80–82] To our knowledge, no study has been published on this topic with regard to FoF but it might be another path how QoL is reduced by FoF.

Does the association depend on the operationalization of FoF or QoL?

No obvious systematic difference on the relationship of FoF and QoL in dependence of measurement method of FoF was found. A lower degree of FoF was consistently associated with better perceived QoL, independent of the instrument used for FoF and QoL. The majority of studies administered measures for falls-efficacy, the SAFE or 1-item questions for FoF and versions of the MOS questionnaire or 1-item SRH questions for QoL. Administering more than one instrument led to results pointing into the same direction,[39,50,52,53] indicating that the underlying association was similar. Psychometric properties of multi-item generic measures of QoL and FoF measures have been questioned,[83,84] but most of the ones used in the analyses were judged to be valid, internally consistent and reliable. Some QoL instruments were not associated with FoF but were each only administered in one study (WHOQOL-BREF,[31] mod WHOQOL-OLD,[54] PGMS[45]). This may be caused by the different operationalization of QoL or sample characteristics and more studies are needed to draw firm conclusions.

While direct measurement of FoF and instruments of falls-efficacy were used, the latter construct has been criticized, as it is possible that people are confident of their abilities to engage in activities but may still be fearful of having a fall.[69] Similarly, Hadjistavropoulos, Delbaere, and Fitzgerald argue that these constructs are not be used interchangeably as often done.[77] Supporting this, the study by Valentine found no association between the constructs of self-efficacy, FoF and QoL using structural equation modeling.[45] However, these authors applied different (newly developed) instruments that require further external validation. The authors point out that FoF in older adults is a multifactorial construct that is related to postural stability and lesser to general anxiety.[45] Future studies of sufficient size are needed to determine the more complex relationships between concepts involved. There is limited evidence that suggests a difference in people that are concerned about falling and those that additionally restrict their activities.[14] These groups are likely affected differently in their QoL. This relationship requires further investigation.

There is a need for further validation of FoF instruments potentially conceptualizing different constructs. For instance, brain networks including sub-cortical (low road) and higher cortical centers (high road) have been described as pathways in the processing of fear.[85] However, sufficient data to show in how far FoF is associated to these are lacking.

Is there a mediating effect of falls on the association between FoF and QoL?

The majority of studies that included actual fall events as variable in the association between FoF or QoL found both, FoF and falls to be independent predictor of QoL or QoL and falls for FoF. All three concepts have been shown to be influenced not only by each other but also by multiple other factors. The fact that non-fallers may also be concerned about falls also indicates the independence of these measures.[2] Falls and FoF independently predict each other and individuals, who have one of them, also have an increased risk to develop the other outcome.[86] It has been shown that this fear declines linearly over time and becomes non-significant after two to three years without falling.[87] However, it appears that in about 60% of the individuals FoF is persistent, with previous falls and female gender being independent risk factors.[88] This may indicate different coping strategies that lead to the misperception of fall risk in some individuals[74] and may further confirm the detrimental effect of persistent cognitions. Apart from being independent predictors of QoL, samples without heightened fall risk (eg, use of mobility aids, falls in the recent past) had the lowest levels of FoF. Higher prevalence of FoF was found in study populations with poorer general condition, with higher proportions of frail people or with heightened fall risk. Mentioned attributes were already identified as risk factors for FoF in a literature review.[2] This demonstrates that FoF and falls also share some variance.

However, some studies demonstrated that fall events played no or a minor role in the association of FoF and QoL.[32,35,41,44,52] FoF is associated with psychological factors (eg, depression) and physical function which in turn are known risk factors for falls in the elderly.[89] Murphy, Dubin, & Gill demonstrated that falls were only associated with FoF when other predisposing factors were present.[90]

It may be that instead of a direct relationship of falls, other with falls associated factors mediate the relationship between FoF and QoL, such as functional performance measures (instability, mobility).[44,45] Recently, the simplistic vicious cycle in which fear leads to restriction of activities, deconditioning and increased risk of falls has been questioned.[77] An alternative model in which FoF affects falls-efficacy which in turn affects balance performance negatively leading to an increased fall risk has been proposed.[77] However, the multiple causes of falls are still not untangled and quite likely both paths play a role in the genesis of falls. In addition, it has been demonstrated that the level of PA mediates the relationship between FoF and outdoor falls.[13] Low PA levels could be a proxy for activity restriction. As most studies did not obtain this measure, current evidence might underestimate the direct impact of fall-related activity restriction on the association between FoF and QoL. Future studies are required to determine more complex and accurate cause–effect models.

Clinical implications

Findings of this review demonstrate the importance of FoF on QoL and thus on the subjectively perceived well-being of an individual. Hence, the identification of individuals at risk and the subsequent intervention to reduce FoF are important to increase QoL in older people. FoF and associated factors are modifiable risk factors and should be targeted in clinical interventions to improve QoL as important patient-centered outcome. The relationship between FoF and QoL appears to be partially mediated by physical and cognitive functioning and by higher levels of PA. Increased PA levels and in particular structured exercise have been linked to improve physical[91] and cognitive functioning,[92] reduced levels of FoF,[93] and increased QoL.[94]

Also, cognitive-behavioral interventions that can be administered at home and aim at cognitive re-structuring to instill adaptive and realistic views are effective in reducing FoF and related activity restriction in older adults,[95] partially mediated by psychosocial factors such as control beliefs, self-efficacy, and outcome expectations.[96]

Limitations of the review

We acknowledge several limitations of this review. First, only English language and full articles were included. Therefore, it is possible that relevant studies not fulfilling these criteria were excluded. Second, some articles were excluded due to populations with specific diseases. While included studies often did not exclude individuals with specific conditions or multimorbidity, the generalizability of results may be limited. Third, different scales and instruments were used to conceptualize the constructs of FoF and QoL. Although these might not measure exactly the same, our results were quite similar and did not appear to be influenced by the underlying differences. Finally, we did not investigate the effect of specific or non-specific interventions on the relationship between FoF and QoL. To our knowledge, there has been no systematic review published on this topic.

Conclusions

Findings of this systematic review demonstrate the importance of fear of falling on quality of life in older individuals which is independent of fall events and appears to be more important than actual falls. This association also seems to be independent of different conceptualizations of FoF. Clinically, this implies FoF should be considered not only as by-product of falls and requires targeted interventions, different from those aiming to reduce falls. More research is needed to prospectively investigate the cause–effect relationship of FoF, falls and QoL, determine the validity of different constructs involved, and to investigate whether specific activities are linked stronger to QoL than others.

Disclosure

The authors report no conflicts of interest in this work.

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