“Fear of falling serves as protection and signifies potential danger”: a qualitative study to conceptualise the phrase “fear of falling” in women with osteoporosis

K. Hamed 1 · K.S. Roaldsen 2,3,4 · A. Halvarsson 1,2

Received: 25 November 2020 / Accepted: 21 June 2021 / Published online: 7 July 2021
© The Author(s) 2021

Abstract
Summary
Fear of falling (FoF) was described as a dichotomy, whereby FoF on one hand posed a threat to the sense of security but on the other hand provided protection against harm through increased awareness and cautious behaviour. These findings contribute to a deeper understanding of FoF for women with osteoporosis.

Introduction
Fear of falling is a major problem for many individuals in society and it increases with age; it is more common among women, especially women with a diagnosis of osteoporosis. It is important to gain a deeper understanding of the concept of fear of falling among women with osteoporosis to be able to devise fall prevention programmes to address fear of falling in the most appropriate way. Therefore, we aimed to explore and describe how older women with osteoporosis and self-reported balance deficits conceptualise their fear of falling

Methods
A qualitative study with individual interviews was carried out, using a semi-structured interview guide. The interviews were recorded, transcribed verbatim, and analysed with inductive qualitative content analysis. The study includes 25 informants, all women with osteoporosis aged 66–85 years.

Results
The analysis resulted in one overarching theme, “Fear of falling is a protection and danger”, and three main themes: “Fear of falling is a sense of unease”, “Fear of falling is to be vulnerable”, and “Fear of falling is a call for help”.

Conclusion
The concept of fear of falling was perceived in terms of emotional states as well as cognitive and active strategies and was described in the context of being able to protect oneself in order to stay safe and secure. The concept was described as a dichotomy, whereby fear of falling on the one hand posed a threat to the sense of security but on the other hand provided protection against harm through increased awareness and cautious behaviour. These findings contribute to a deeper understanding of the phenomenon of fear of falling and how it could be seen from both a positive and negative perspective.

Keywords Conceptualisation · Fear of falling · Osteoporosis · Qualitative content analysis

Introduction
Fear of falling is a major problem for many individuals in society, and it increases with age; it is more common among women, especially women with a diagnosis of osteoporosis. A previous fall is an important risk factor for developing fear of falling [1, 2]. Approximately two out of three older adults
living in the community, who are afraid of falling or have a history of a fall, experience at least one fall each year [3]. Fear of falling often leads to activity avoidance, which contributes to decreased physical function and quality of life and an increased risk of falling [4]. Moreover, it is known that fear of falling is associated with decreased walking speed and balance performance, loss of independence, reduction in social activity, and depression [5–7].

Fear of falling is a multifaceted phenomenon, usually expressed as fall-related psychological issues, including balance confidence, fall self-efficacy, consequences of falling, and fear of falling [8, 9]. Fear of falling is defined as a constant concern that makes the individual avoid activities that they are still able to perform, whereas fall self-efficacy is defined as confidence in one’s ability to perform activities of daily living without falling [8]. Balance confidence is defined as confidence in one’s ability to maintain balance and remain steady while performing different activities [10]. Consequences of falling, i.e. fear of the potential consequences of falling, is defined as the “loss of functional independence and damage to identity” [11]. Fall-related psychological issues can be a great challenge in everyday life and in the health of older adults, especially in women with osteoporosis, which has been addressed in a previous study by Sale et al. [12].

In their qualitative study, they found that persons with osteoporosis were aware of their risk of fractures, and it was accompanied with positive lifestyle changes such as being careful and engaging in exercise. However, no study to date has qualitatively explored the perception or conceptualisation of fear of falling among older women with osteoporosis.

Women with osteoporosis are an important population to study in this context because they are at high risk of fall-related fractures, resulting in considerable personal, financial, and other costs for both the individual and society. Therefore, it is important to gain a deeper understanding of the concept of fear of falling among older adults with osteoporosis to be able to devise fall prevention programmes to address fear of falling in the most appropriate way.

The aim was to explore and describe how older women with osteoporosis and self-reported balance deficits conceptualise their fear of falling.

**Methodology**

**Design**

To answer the research question “How do older women with osteoporosis conceptualise their fear of falling?”, we used a qualitative research design using individual, face to face indepth interviews based on a semi-structured interview guide.

The Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist guided the reporting of this study [13].

**Participants**

A purposive sample was recruited from an ongoing randomised controlled trial (RCT) at the Karolinska Institutet (NCT01417598, ClinicalTrials.gov). This was an intervention study involving older women with osteoporosis on a 12-week balance training programme [14]. Inclusion criteria were aged ≥65 years, osteoporosis objectively verified by dual-energy X-ray absorptiometry, independent ambulation indoors, self-reported balance, reported afraid of falling, and all reported they had changed their behaviour. A total of 96 participants were included in the RCT from 2009 to 2011. Participants to the present study were recruited from the RCT during two semesters. All participants that had completed the intervention during these two semesters (n=25) were asked to participate in the present study by one of the test leaders at the follow-up testing. Resulting in 25 participants included in the present study. None of them declined participation. The participants, aged 66 to 85 years, were all women, were afraid of falling, and had changed their behaviour due to fear of falling (see Table 1 for detailed background information).

**Data collection**

Individual interviews were conducted in Swedish, 1 to 2 months after completion of the intervention in the RCT, by an experienced physiotherapist using a semi-structured interview guide [21] with predefined topic areas and open-ended questions. The main topics in the interview guide were experience of living with osteoporosis and the meaning of the concept fear of falling and experience of fear of falling in everyday life.

The interviews lasted for 45 to 60 min and were recorded with a digital voice recorder (OlympusWS-550M) and transcribed verbatim in Swedish by one of the authors and a research assistant. Three pilot interviews were performed to test and adjust the interview guide and to practise the interview technique.

**Data analysis**

All 25 interviews were analysed, including the three pilot interviews since there were no major changes made in the interview guide. The transcripts were systematically analysed in several steps by using inductive qualitative content analysis following the methodology of Graneheim and Lundman [22]. The analysis sought both to identify manifest content, i.e. what is described by participants, and to identify latent meanings, i.e. an interpretation of the underlying meaning by the research team.

The first author read all 25 transcribed interviews thoroughly several times, with the aim of the study in mind and reduced them to meaning units, words, and statements that related to the central meaning. The two co-authors read half of the interviews and assigned meaning units to the text. Thereafter, triangulation was used by the co-authors to agree
on the final selection of meaning units. The meaning units were condensed and labelled with a code, and over the course of several meetings, the coded meaning units were grouped into subthemes and themes. Through abstraction and interpretation of the themes, the overarching theme was identified, i.e. the latent underlying meaning of how older women conceptualise their fear of falling.

The analysis process involved going back and forth between the different steps to capture the key aspects of the themes and the overarching theme in the data, and the findings were discussed repeatedly by all authors until consensus was reached regarding the subthemes and the development and refinement of the themes and overarching theme. During the analysis process, all authors took an active role, both in individual analysis and when together in meetings with the other authors, all to make it possible to discuss and capture different interpretations (see Table 2 for examples of the analysis process).

Both the interviews and the data analysis process were carried out in Swedish. The quotes were translated to English by a bilingual professional with experience of the patient group and qualitative research.

Table 1  Background information for the 25 female participants in the study

| Variable                                      | Values                  |
|-----------------------------------------------|-------------------------|
| Age (years), median (min–max)                 | 73 (66–84)              |
| Body mass index (kg/m²), median (min–max)     | 25 (17–35)              |
| Mini Mental State Examination (MMSE)a, median (min–max) | 28 (26–30) |
| University education, n                       | 18                      |
| Living alone, n                               | 12                      |
| Use walking aid outdoors, n                   | 12                      |
| Fear of fallingb (not at all/a little/quite a bit/very much) | 0/6/10/9           |
| Falls Efficacy Scale Internationalc, median (min–max) | 25 (20–39) |
| Preferred gait speedd, m/s, median (min–max)  | 1.17 (0.70–1.47)        |
| Physical activity level (1/2/3/4/5)e, n       | 0/2/10/13/0             |

a Mini Mental State Examination [15]
b Single-item question [16]
c Falls Efficacy Scale International [17]
d GaitRite electronic gateway [18, 19]
e Frändin Grimby [20]

In order to promote critical appraisal throughout the analysis, the properties of trustworthiness were determined according to criteria of dependability, credibility, transferability, and confirmability described by Lincoln and Guba [23].

To meet the criterion for dependability, each transcription was independently read, checked, and coded by all authors. No data were excluded due to the lack of an appropriate theme. Final interpretations were reached via agreement between all authors who discussed the findings and interpretations several times until consensus was reached and themes were identified, i.e. gathering codes into potential themes, reviewing themes, and defining and naming themes.

Credibility asks the researcher to clearly link the study’s findings with reality in order to demonstrate the truth of the findings. The criterion of credibility concerns the selection of participants, data collection, how data analysis is performed, and how well the subthemes and themes cover the data. The criterion was met through individual interviews using open-ended questioning, prolonged engagement with the data, and by providing a detailed description of the methods.

The criterion for transferability was fulfilled through presenting detailed description of the demographic data about the

Table 2  Examples of the inductive qualitative content analysis from meaning units to subthemes

| Meaning unit | Condensed meaning unit | Subtheme                        |
|--------------|------------------------|---------------------------------|
| The worst thing that can happen is that you break a leg or an arm, like I did many years ago | The worst thing that can happen is that you break a leg or an arm | Physical injury |
| If you are tired and feeling down maybe, then the risk of falling is much greater than when you are alert and feel strong and rested in general; full and satisfied | The risk of falling is much greater when tired and feeling down | Psychosocial limitations |
| I use anti-slip shoe covers when it’s icy, I put them on because I know that I fell last winter when I didn’t have them on | Use anti-slip shoe covers when it’s icy | Fall prevention strategies |
participants, detailed description of the data collection, and in-depth descriptive data from the participants’ quotes.

The criterion of confirmability was fulfilled by providing rich quotes from the participants depicting each emerging theme.

Pre-understanding involves the researcher’s existing knowledge about the context. The researchers of the present study maintained a constant sense of awareness about how their preconceptions might affect the study findings during both the interviews and the data analysis. The authors are all physiotherapists and have experience of working with older people with fear of falling. Moreover, two of the authors (KSR, AH) have previous experience and knowledge in conducting qualitative research and using inductive qualitative content analysis.

Results

The analysis resulted in one overarching theme “Fear of falling serves as protection and signifies potential danger”—and three themes—“Fear of falling is a sense of unease”, “Fear of falling is to be vulnerable”, and “Fear of falling is a call for help”. The overarching theme and the themes reflected the essential meaning of participants’ experience of the concept of fear of falling (Table 3). The results are illustrated with quotes from the different participants (with the participant research identification number in bracket).

Overarching theme

Fear of falling serves as protection and signifies potential danger

The concept of fear of falling was perceived in terms of emotional states as well as cognitive and active strategies and was described in the context of being able to protect oneself in order to stay safe and sound. The concept was described as a dichotomy, whereby fear of falling in one way posed a threat to the sense of security but also provided protection against harm through increased awareness and cautious behaviour.

Moreover, the participants were constantly directing focus to fear of falling in order to be alert and stay one step ahead of threatening situations. Not being able to do so was synonymous with falling and adverse consequences such as fractures, impaired health, and avoidance behaviour.

Themes

Fear of falling is a sense of unease

The participants experienced a sense of unease and concern, primarily focusing on the consequences of a fall. This could include short-term consequences such as occasional physical injuries or long-lasting consequences such as becoming dependent or having anxiety about being stigmatised if unable to remain steady on one’s feet in everyday situations.

The participants emphasised the feeling of not having control of environmental factors, which could contribute to the burden of concern and fear, i.e. the fear was reinforced in relation to environmental factors that they could not control, such as the weather conditions. Slippery surfaces, snow, or rain were associated with increased risk of falling and led to increased concern and fear of consequences.

I have felt manic when it comes to snow and icy conditions, I hate it! I just want to sit inside and look out at it. (621)

The participants expressed that it was not just the fear or concern about the loss of balance control, breaking any body part, or not being able to get to their feet by themselves after a fall; the greatest concern was being left on the ground without being able to get up and no possibility of getting help.

I’m afraid of falling and not being able to get up. (611)

All the participants feared a fall and increased need for help and shared a fear of becoming dependent. They had concerns about becoming functionally impaired and being dependent on others, which led to unpleasant feelings. Moreover, they had a constant fear of becoming wheelchair dependent, because it would lead to a changed lifestyle. They would become more physically inactive and not be able to meet friends and loved ones in the same way as before.

I have seen people who have fallen and broken their hip who have never bounced back or never really walked properly again. It’s better in that case to be careful. (622)

The participants perceived falling as being embarrassing and expressed a concern that someone they knew could have witnessed the fall as well as the embarrassment of not being able to get up again after a fall. All of this was described as a stigmatising feeling.

When you do fall, you feel embarrassed that you have fallen and it’s humiliating in public when people have to come and help you. (640)

Fear of falling is to be vulnerable

The feeling of getting older and having osteoporosis was perceived as difficult and closely connected to the perception of fear of falling and being reminded of one’s vulnerability. This affected the quality of life both mentally and physically. Fear of falling appeared when there was a lack of trust in the
physical body. In the long term, this led to limitations in everyday life, decreased self-efficacy, and avoidance behaviour. Fear of falling was directly connected to the process of ageing and thereby being unsteady with reduced balance control, vision and hearing, as well as dizziness. Moreover, reduced gait speed, i.e. walking more slowly, was expressed as a safety precaution for managing balance deficits.

Changes in behaviour due to bodily limitations and lack of trust in the physical body were considered as a limitation or restriction of freedom in living a full and unimpeded life. The participants described that if you are weak, alone, and old, the fear of falling is further strengthened. They also expressed that the ability to react, as well as the ability to protect oneself, becomes impaired in relation to increased fear of falling and ageing.

With my condition, with my poor bones because of the osteoporosis, my bones won’t be able to tolerate the kind of impact that happens when you fall. (525)

It was a common perception that feelings of weakness and vulnerability were associated with lack of trust in the physical body. This was expressed as “the head wants it one way while the body wants it another”, leading to a discrepancy between the body and mind and resulting in fear and concern. All participants expressed that their body was on alert all the time because of the lack of trust in the physical body and the knowledge that a fall could occur.

When I notice it (fear of falling), then I tense up and then I get so terribly scared and stiff which makes it easy to fall! (608)

The participants perceived low confidence due to the ever-present feeling of uncertainty. In situations where fear had taken over, the participants expressed less self-efficacy in performing everyday activities. This led to avoidance behaviour and physical inactivity.

Yes, you feel like you, that you can’t manage to do things anymore. That’s how it feels. Because I have had that feeling before. Now I am much more afraid when I take the escalator and I think that it’s gotten worse when I’m going downwards. I feel like I need to hold the handrail, it feels that way – will I manage to make it to the bottom and get off or will I collapse? (822)

It is clear that the participants experienced great psychosocial limitations and feelings of vulnerability, i.e. fear of falling implies difficulty in spending time with friends and relatives because of the constant concern of falling. The fear of falling was heightened on days when they felt their health was failing and they felt tired, alone, and/or depressed.

Being afraid of falling affects how I socialise with other people. Last year my relatives visited. I wasn’t up for travelling to any of them, my cousins and my close relatives. They came up to me and we were supposed to take a daytrip out to the archipelago, but I couldn’t manage to go. (611)

**Fear of falling is a call for help**

It emerged that the participants experienced a need to constantly plan ahead before performing activities and sometimes even before basic movements. Cognitive resources were utilised to direct focus and attention and in the preparation of different strategies to handle fear of falling and prevent falls and fall-related injuries. In the case of threats and dangers, there was a need to be careful, vigilant, have a positive attitude, and use preventive actions.

Table 3  Overview of the results: overarching theme, themes, and subthemes of what fear of falling means to older women with osteoporosis, self-reported balance deficits, and fear of falling

| Subthemes                      | Theme                                      | Overarching theme                         |
|-------------------------------|--------------------------------------------|-------------------------------------------|
| Environmental factors         | Fear of falling is a sense of unease        | Fear of falling serves as protection and signifies potential danger |
| Physical injuries             |                                            |                                           |
| Increased dependency          |                                            |                                           |
| Stigma                        |                                            |                                           |
| Bodily limitations            | Fear of falling is to be vulnerable        |                                           |
| Lack of bodily trust          |                                            |                                           |
| Decreased self-efficacy       |                                            |                                           |
| Psychosocial limitations      |                                            |                                           |
| Positive attitudes            | Fear of falling is a call for help          |                                           |
| Vigilance                     |                                            |                                           |
| Fall prevention strategies    |                                            |                                           |
Fear was constantly present, whether they wanted it or not, because the brain continually worked to design strategies to deal with fear in any possible situation. The participants had to be careful, attentive, and vigilant at all times. To be aware of potential risks and have alternative strategies in different situations enabled the performance of everyday activities.

I must, at all costs, protect myself from falling. What I’m afraid of is that I have to have a routine about how to act, but it’s so quick when it happens, and I have to be ready for it. (813)

The participants described that preventive actions were required to be able to protect themselves, to feel safe, and to handle fear of falling, for example, the use of shoes with spikes or other aids to manage slippery surfaces. Not being in a hurry and not running for the bus or telephone when it rang could be considered as fall prevention actions.

First of all, I have proper anti-slip shoe covers. I can say that I avoid things. When it is really bad, then I avoid going outside. (620)

One factor that was frequent in all interviews was that a positive attitude and a resilient approach to life were needed to be able to live a safe and active life even when the fear was permanent. Through strong will and motivation, the driving force was to think positively and not to let the worry take over so that life will not be negatively affected.

I don’t really want to admit it to myself, the fear that I have of falling, because I try to live a life where I don’t fall, but where I can stay on my feet. (641)

Discussion

In the present study, we sought to understand how older women with osteoporosis, self-reported balance deficits, and fear of falling conceptualise the phrase “fear of falling”. The analysis resulted in one overarching theme “Fear of falling serves as protection and signifies potential danger” comprising three themes representing the challenges and possibilities of fear of falling to include both positive and negative perspectives. The concept of fear of falling was perceived in terms of emotional conditions as well as cognitive and taking active preventive strategies. Fear of falling was described in the context of being able to protect oneself in order to stay safe and sound. Furthermore, the concept was described as a dichotomy, whereby fear of falling on one hand posed a threat to a sense of security but on the other hand provided protection against harm through increased awareness and cautious behaviour.

Other researchers have studied different aspects of the meaning of fear of falling among older people in general [24–26]. In this study, we have focused on the conceptualisation of the phrase “fear of falling” among women with osteoporosis.

The participants in the present study expressed that concerns about falling were strongly connected to environmental factors and being physically injured as a result of a fall. Similar findings have been demonstrated in other qualitative studies [16, 24]. Furthermore, as in the present study, they found that falling and lying on the ground and not being able to get up evoked strong embarrassing feelings and a dreadful fear of becoming dependent. For women with osteoporosis, fear of falling could be an obstacle to daily activities. In accordance with the present study, previous studies found that fear of falling could become an obstacle to daily activities, leading to avoidance behaviour and physical inactivity [27, 28].

In the present study, fear of falling was also connected to lack of bodily trust and reduced confidence and self-efficacy in the performance of physical activities. Previous research by Tinetti et al. [8] has found a similar pattern, i.e. individuals who avoid activities due to fear of falling have a lower self-confidence. Moreover, the participants expressed that reduced confidence and self-efficacy could lead to reduced social life and avoidance of social activities and isolation and depression in the long term; similar findings have been found in a general older population [16, 29].

The participants expressed that they needed different strategies for handling fear of falling, such as positive thinking, being careful, and using different preventive measures as a prerequisite for dealing with fear of falling and possible injuries. Similar to our findings, other researchers have described that the environment creates a sense of concern, leading to creation of strategies to handle everyday life and fear of falling [25, 26]. Based on previous research and the findings from the present study, how a person perceives fear of falling influences the different strategies they require in order to live an active and safe life.

The International Classification of Functioning, Disability and Health (ICF) can be used as a framework to gain a deeper understanding of health and disease [30]. By understanding how the participants conceptualise fear of falling, it may be possible for women with osteoporosis to become more involved in their own health. According to the findings in the present study, older women with osteoporosis conceptualise fear of falling in a way that affects their health in all ICF components. The participants described the concept of fear of falling as a limitation to daily activity, which also leads to restricted participation, dependence on environmental factors, and being influenced by personal factors. Moreover, physical inactivity and activity avoidance lead to health-related consequences on body function and structure.
In summary, for women with osteoporosis, fear of falling was described as a dichotomy, a split, whereby fear of falling on one hand posed a threat to the sense of security but on the other hand provided protection against harm through increased awareness and cautious behaviour. Several factors acted as pros and cons as reflected in the themes, “Fear of falling is a sense of unease”, “Fear of falling is to be vulnerable”, and “Fear of falling is a call for help”. These findings contribute to a deeper understanding of the phenomenon fear of falling and how it could represent both positive and negative perspectives for older women with osteoporosis.

Acknowledgements The authors would like to thank all the participants in the study. A special thank you goes to Carolina Halén at the Karolinska University Hospital for conducting all the interviews.

Availability of data and material Data can be available upon request.

Code availability Not applicable.

Funding Open access funding provided by Karolinska Institute. The study was supported by grants from the Regional Agreement on Medical Training and Clinical Research between the Stockholm County Council and Karolinska Institutet (ALF) and from local financing from the Research and Development Department at Allied Health Professionals Function, Karolinska University Hospital.

Declarations

Ethics approval The study was approved by the Regional Board of Ethics in Stockholm, and all participants gave their written informed consent to participate (2009/819-32, 2012/1829-32).

Consent to participate Informed consent was obtained from all individual participants included in each study.

Consent for publication All involved authors gave consent to publish the manuscript.

Conflict of interest None.

Open Access This article is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License, which permits any non-commercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc/4.0/.

References

1. Zijlstra GA, van Haastregt JC, van Eijk JT, van Rossum EM, Stalenhoef PA, Kempen GI (2007) Prevalence and correlates of fear of falling, and associated avoidance of activity in the general population of community-living older people. Age Ageing 36(3): 304–309. https://doi.org/10.1093/ageing/afm021
2. Sinaki M, Brey RH, Hughes CA, Larson DR, Kaufman KR (2005) Balance disorder and increased risk of falls in osteoporosis and kyphosis: significance of kyphotic posture and muscle strength. Osteoporos Int 16(8):1004–1010. https://doi.org/10.1007/s00198-004-1791-2
3. Andresen EM, Wolinsky FD, Miller JP, Wilson MM, Malmstrom TK, Miller DK (2006) Cross-sectional and longitudinal risk factors for falls, fear of falling, and falls efficacy in a cohort of middle-aged African Americans. Gerontologist 46(2):249–257. https://doi.org/10.1093/geront/46.2.249
4. Delbaere K, Crombez G, Vanderstraeten G, Willems T, Cambier D (2004) Fear-related avoidance of activities, falls and physical frailty. A prospective community-based cohort study. Age Ageing 33(4):368–373. https://doi.org/10.1093/ageing/ahl06
5. Reelick MF, van Iersel MB, Kessels RP, Rikkert MG (2009) The influence of fear of falling on gait and balance in older people. Age Ageing 38(4):435–440. https://doi.org/10.1093/ageing/afp666
6. Delbaere K, Close JC, Brodaty H, Sachdev P, Lord SR (2010) Determinants of disparities between perceived and physiological risk of falling among elderly people: cohort study. BMJ 341: c4165. https://doi.org/10.1136/bmj
7. Legters K (2002) Fear of falling. Phys Ther 82(3):264–272
8. Tinetti ME, Richman D, Powell L (1990) Falls efficacy as a measure of fear of falling. J Gerontol 45(6):P239–P243
9. Bandura A (1977) Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev 84(2):191–215. https://doi.org/10.1037/0033-295x.84.2.191
10. Powell LE, Myers AM (1995) The Activities-specific Balance Confidence (ABC) Scale. J Gerontol A Biol Sci Med Sci 50A(1): M28–M34
11. Howland J, Lachman ME, Peterson EW, Cote J, Kasten L, Jette A (1998) Covariates of fear of falling and associated activity curtailment. Gerontologist 38(5):549–555. https://doi.org/10.1093/geront/38.5.549
12. Sale JE, Gignac MA, Hawker G, Beaton D, Bogoch E, Webster F, Frankel L, Elliot-Gibson V (2014) Non-pharmacological strategies used by patients at high risk for future fracture to manage fracture risk—a qualitative study. Osteoporos Int 25(1):281–288. https://doi.org/10.1007/s00198-013-2405-7
13. Tong A, Sainsbury P, Craig J (2007) Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care 19(6):349–357. https://doi.org/10.1093/intqhc/mzm042
14. Halvarsson A, Franzen E, Stahle A (2015) Balance training with multi-task exercises improves fall-related self-efficacy, gait, balance performance and physical function in older adults with osteoporosis: a randomized controlled trial. Clin Rehabil 29(4):365–375. https://doi.org/10.1177/0269215514544983
15. Folstein MF, Folstein SE, McHugh PR (1975) “Mini-mental state”: A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 12(3):189–198
16. Yardley L, Smith H (2002) A prospective study of the relationship between feared consequences of falling and avoidance of activity in community-living older people. Gerontologist 42(1):17–23
17. Yardley L, Beyer N, Hauer K, Kempen G, Piot-Ziegler C, Todd C (2005) Development and initial validation of the Falls Efficacy Scale-International (FES-I). Age Ageing 34(6):614–619. https://doi.org/10.1093/ageing/afi196

18. Menz HB, Latt MD, Tiedemann A, Mun San Kwan M, Lord SR (2004) Reliability of the GAITRite walkway system for the quantification of temporo-spatial parameters of gait in young and older people. Gait Posture 20(1):20–25. https://doi.org/10.1016/S0966-6362(03)00068-7

19. Webster KE, Wittwer JE, Feller JA (2005) Validity of the GAITRite walkway system for the measurement of averaged and individual step parameters of gait. Gait Posture 22(4):317–321. https://doi.org/10.1016/j.gaitpost.2004.10.005

20. Frändin KGG (1994) Assessment of physical activity, fitness and performance in 76-year-olds. Scand J Med Sci Sports 4:41–46

21. Creswell JW, Poth CN (2017) Qualitative inquiry and research design: choosing among five approaches. Sage publications

22. Graneheim UH, Lundman B (2004) Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse Educ Today 24(2):105–112. https://doi.org/10.1016/j.nedt.2003.10.001

23. Lincoln Y, Guba EG (1985) Naturalistic inquiry. SAGE, Beverly Hills

24. Tischler L, Hobson S (2005) Fear of falling: a qualitative study among community-dwelling older adults. Physical and Occupational Therapy in Geriatrics 4(23):37–53

25. Lee F, Mackenzie L, James C (2008) Perceptions of older people living in the community about their fear of falling. Disabil Rehabil 30(23):1803–1811. https://doi.org/10.1080/09638280701669508

26. Mahler M, Sarvimaki A (2012) Fear of falling from a daily life perspective; narratives from later life. Scand J Caring Sci 26(1):38–44. https://doi.org/10.1111/j.1471-6712.2011.00901.x

27. Filiatrault J, Belly AM, Laforest S, Gauvin L, Richard L, Desrosiers J (2013) Fear of falling among seniors: a target to consider in occupational and physical therapy practice. Physical and Occupational Therapy in Geriatrics 31(3):197–213

28. Stubbs B, Patchay S, Soundy A, Schofield P (2014) The avoidance of activities due to fear of falling contributes to sedentary behavior among community-dwelling older adults with chronic musculoskeletal pain: a multisite observational study. Pain Med 15(11):1861–1871. https://doi.org/10.1111/pme.12570

29. Gagnon N, Flint AJ, Naglie G, Devins GM (2005) Affective correlates of fear of falling in elderly persons. Am J Geriatr Psychiatry 13(1):7–14. https://doi.org/10.1176/appi.ajgp.13.1.7

30. World Health Organization. International classifications of functioning, disability and health. Accessed 2017-01-11

Publisher’s note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.