Safety of Older People at Home: An Integrative Literature Review

Aim: The aim of this review is to examine the relevant health literature, to describe safety in the homes of older and older people's perceptions and understanding of their safety at home based on current literature.

Background: Safety is a multifaceted, basic need of older people living at home. Many studies are hospital focused and few focus on safety at home. Research on the safety of older people at home appears to be under-researched.

Methods: MEDLINE, CINAHL, Scopus and Web of Science databases from the earliest to August 2017 were investigated. The integrative literature review was conducted in December 2017. The full text of the remaining n=93 papers was then screened for relevance by inclusion and exclusion criteria which reduced the number by 59 to n=34.

Results: Four dimensions of safety at home were discovered, namely physical, social, emotional and mental, and cognitive safety. Safety dimensions had both positive and negative components. Older people's main wish was to be able to live in their own home for as long as possible. Their perceptions of safety at home was categorized as active living, coping at home, managed living and the knowledge of the existence of disease.

Conclusions: The safety of older people at home is a worldwide concern. Identification of safety issues can assist in developing measures to help people stay at home for longer as they age. The management of this would need to take account of all four dimensions of safety, in ways that promote ageing at home.

Implications for practice: Learning, understanding and developing new strategies about safety affects everyone who visits the home of older people, and stakeholders have an important role to identify safety risks.

Keywords: Content analysis, home, integrative review, older people, safety

What does this research add to existing knowledge in gerontology?

- Safety of older people at home is a combination of physical, emotional and mental, social, and cognitive dimensions.
- Older people accept suggested renovations at home for safety reasons if they can be part of decision-making. Additionally, taking care for older people's emotional and mental needs by homecare workers improves safety at home.

What are the implications of this new knowledge for nursing care with older people?

- When the knowledge of safety at home is linked to the general trend to move care closer to home, the importance of a strategic approach for safety at home becomes evident.
- Adopting a holistic framework of safety is essential. Evaluation of home safety, finding factors, which are promoting or hindering safety, secures ageing in place.

How could the findings be used to influence policy or practice or research or education?

- The holistic framework provides opportunities to explore, assess and enhance the safety of older people. Moreover, it is possible to assess safety from other family members, and older people without homecare services.
- In health and safety culture, holistic framework innovates collaboration between organizations, promoting safety and enhance understanding safety aspects at home.

Introduction

The political climate is slowly changing as stakeholders begin to understand the importance of preventive safety measures in the homes of older people (Berland, Holm, Gundersen & Bentsen, 2012). When this is linked to the general trend to move nursing and care closer to home, the importance of a strategic approach to home safety, which includes perspectives of older people themselves, becomes evident. Older people have the right to remain at home if they wish (Ahn & Hedge, 2011; Petersson, Lilja & Borell, 2012) and to do this, the safety aspects of the care at home is often managed with the help of service providers. This right parallels changes in health services throughout Europe, which are increasingly being delivered to people in their own homes where possible (Melander-Wikman, Fältholm & Gard, 2008; World Health Organization, 2015, 136).

The World Health Organization's strategic objectives for patient safety are "…to provide global leadership for patient safety and to harness knowledge, expertise and innovation to improve patient safety in health care settings" and it aims to incorporate the patient, family and community voice into all levels of health care through engagement and empowerment (WHO, 2017, 3). This has led to Patients for Patient Safety (PFPS) programme, which aims: "to raise awareness of the need for a more active role of patients and families in managing their own care" (WHO 2017, 14).

Broadly based safety awareness influences behaviour helping older people to live at home for longer. When older people manage and have a meaningful life, it promotes independence and personal privacy (Petersson et al., 2012; Pietilä & Tervo, 1998). However, safety has mainly been studied in hospitals (Berland, Gundersen & Bentsen, 2012) and in nursing homes (Wiig et al., 2018). Only a limited number of studies focus on safety at home and these are mainly written from the perspectives of professional health care workers (Barstow, Bennett & Vogtle, 2011). Earlier research on safety at home has been concerned with isolated issues such as medication problems (Bao, Shao, Bishop, Schackman & Bruce, 2012), falls and home modification (Ahn &Hedge, 2011; Lord, Menz & Sherrington, 2006). Examples include potentially inappropriate medication (PIM) use in homecare (Bao et al., 2012) and medication mismanagement. In terms of falls, previous research has considered vulnerability, frailty and loss of vision related to falls risk (Yonge et al., 2017) and home modification has been researched in terms of low income, ethnic background and living arrangements that preclude home modifications (Ahn & Hedge, 2011). Inside the home wet floors, going barefoot and ill-fitting footwear have also been considered falls risks (Kelsey et al., 2010). Home hazard reduction appears effective if targeted at older people with a history of falls and mobility limitations (Lord et al., 2006).

A scoping review has reported the safety markers of older people at home with pulmonary disease and congestive heart failure (Macdonald et al., 2013). The review concluded that older people's safety was reduced when: (a) older people were left alone; (b) individual information about illnesses was not available, (c) homecare workers were outside visitors, (d) the caregivers' had multiple roles; (e) medication was a challenge for sick people; (f) the costs of services were expensive; and (g) caregivers took care of older people at expense of their own health (Macdonald et al., 2013). These negative markers demonstrate a lack of positive markers described by the older people themselves that might promote safety.

According to Cambridge Dictionary (2018) safety means “a state or a place where you are safe and not in danger or at risk” and includes physical, social and individual dimensions (Cloutier-Fisher & Harvey, 2009). In this integrative literature review, safety of older people at home means living in a familiar place, having few manageable fears, obtaining services when needed and being able to learn and adapt knowledge about home safety for their own use.

Much of the current research on its own does not lend itself to strategy development. This awareness identifies a gap in the literature about a strategic and multidimensional approach to safety at home, which requires exploration. The aim of this integrative literature review was to describe safety in the homes of older people and older people’s perceptions and understanding of their safety at home. The research questions that guided the study were: what the dimensions of safety at home perceived by older people are, and what are the categories of safety perceived by older people at home.

Methods

An integrative review method was chosen because it facilitates the mapping of studies from different branches of science (Whittemore & Knafl, 2005). This wider mapping was augmented by searching sources without time limits. The quality of the research papers selected for review were assessed using appropriately, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting system (Moher, Liberati, Tetzlaff & Altman, 2009), the Critical Appraisal Skills Program (CASP) (www.casp-uk.net/criticalappraisal) or the AXIS (Downes, Brennan, Williams & Dean, 2016).

Data sources

The literature search was conducted, using the most widely used healthcare electronic databases MEDLINE, CINAHL, Scopus and Web of Science from the earliest to August 2017, by one researcher in December 2017. The search was limited to empirical studies and systematic reviews written in English with the following search terms in the title, abstract or text: safety OR security AND senior OR geriatric OR elderly OR old people OR old age assistance AND residential facilities OR home OR place OR residence OR apartment OR accommodation OR dwelling OR house OR building OR habitation OR homes for the aged.

Study selection and exclusion criteria

This review included articles that: (a) focussed on safety inside the home; (b) considered older people living at home with or without homecare services; (c) investigated safety from the older person's point of view; (d) considered participants aged 65 years or older; and (e) reported the results of an empirical study or systematic review. Studies were excluded if the research included private homecare services exclusively or if the participants were homecare workers.

Data evaluation

The full text of all the articles (n=34) was evaluated independently by two researchers. The quality of the qualitative studies (n=14), randomised controlled trials (n= 9) and the systematic review (n=1) was assessed using the Critical Appraisal Skills Program (CASP) (www.casp-uk.net/criticalappraisal). The CASP is a checklist of questions that helps researchers assess the reliability and credibility of the studies (www.casp-uk.net/criticalappraisal). There are 10 questions for qualitative (Table 1) and randomised controlled trials (Table 2) and 11 questions for systematic review (Table 3). The questions are answered yes, cannot tell or no. The evaluation of the cross-sectional studies (n=10) was managed using the Appraisal Tool for Cross-sectional Studies (AXIS). The AXIS questions (20) are presented in the order that information generally appears in a paper, in the format: yes; no; do not know; and comment (Downes et al., 2016) (Table 4). After the critical appraisals and author discussions of quality and relevance, all 34 research papers were accepted into the review.

Data extraction and analysis

The data were analysed using qualitative inductive content analysis and consisted of open coding, creating sub-categories and categories, and abstraction (Elo & Kyngäs 2007). The process was twofold. Each paper was searched for words, phrases and sentences (codes) that expressed descriptions of safety. The list of codes from the papers were grouped into sub-categories and in turn into categories, which substantially reduced the number of headings. These categories were named using content-characteristic words. The codes were then classified into different safety dimensions, which included the positive or negative components of each safety dimension. Secondly, and separately, descriptions identified as older people's perceptions of issues that helped or hindered safety, were noted and managed as the descriptions of safety, codes subcategories categories and dimensions.

Results

The electronic search initially identified (n=2623) citations for the review. The retrieval process was three-phased. First the topic of the studies was assessed removing duplicates (n=15). Next, the citations (n=2608) were screened by title and abstract for relevance to the current study and most of these (n=2515) were excluded. Full-texts (n= 93) were then screened for eligibility based on the inclusion and exclusion criteria. Two researchers assessed the full texts independently and 34 were included for final analysis by consensus (Figure 1).

The 34 research papers to be reviewed were published between 1999 and 2016 (Table 4). Of the 34 empirical studies and systematic review, the study designs were randomized controlled trials (n=9), cross-sectional studies (n=10), qualitative studies (n=14) and the one systematic review. The studies used different data collection methods; interviews (n=10), observations (n=1), surveys using questionnaires (n=1), focus group discussions (n=1), register based records (n=6) and a combination of these (n=14). The number of participants varied in each study from five older people in an interpretative phenomenological study (Mahler & Sarvimäki, 2012) to 3 million participants in a cross-sectional, cohort study (Madigan, 2007).

The data extracted included: author, title, country of origin, year, aims, type and age of participants, design and methods and results. Data were extracted first by one researcher independently and later endorsed by the research group (Table 5).

Four dimensions of safety at home were identified namely, physical, social, emotional and mental, and cognitive safety (Figure 2). Within these dimensions, most studies contained positive and negative components that influenced safety at home.

Dimensions of Safety at Home

Physical Safety

The physical safety in the home environment, is defined by the boundaries of the living areas specially the main living area (Kim, 2010). Although factors outside the home, for example, the presence of neighbours may affect feelings of physical safety, they were not the focus of this review. There were three areas of physical safety discussed in the review papers; medication, home improvement, falls related to failing health and use of technology. Some people studied had to manage polypharmacy and were described as often being unable to take care of their own medication (Eloranta, Hannukainen, Routasalo, Viitanen & Arve, 2011; Lang et al., 2015; LeBlanc

& Choi, 2015). This problem is exacerbated, when medications look alike or their names sound alike (Doran et al., 2009; Sears, Baker, Barnsley & Shortt, 2013). Some older people were described as potentially vulnerable to taking inappropriate medication or over-the-counter medication (Golden, Qiu & Roos, 2011; Leikola, Dimitrow, Lyles, Pitkälä & Airaksinen, 2011; Metlay et al., 2005) which affected safety negatively.

Improvement of the home environment, to make it more suitable for an older person, was considered a positive component of physical safety, for example kitchen modification (Ibrahim & Davies, 2012; Kamei et al., 2015) home lighting (Bakker, Iofel & Lachs, 2004) and small-scale modifications such as the installation of bath grab rails (Edwards et al., 2006; Gill, Williams, Robison & Tinetti, 1999). Older houses, those built around the end of the Second World War, were reported as risk factors and a negative component of safety when they had old electrical installations, which had no fire safety devices (Coty, McCammon, Lehna, Twyman & Fahey, 2015). However, some older people were in homes not able to be improved and remained a difficult living environment not suitable for their needs in this phase of life (Bigonnesse, Beaulieu & Garon, 2014; Coty et al., 2015).

Less hazards like burglary were reported if older people owned their houses (Lee, Lee, Clinton, Zhang & Fraser, 2008). The technological equipment that older people usually accepted was considered a positive component of physical safety. This technology included safety devices designed to be worn as fall detectors or biometric monitors, connected as a sensor in the bed (Grant, Rockwood & Stennes, 2015; Horton, 2008) or elsewhere in the home, measuring activity (Lexis et al., 2013). Sometimes an alarm system was connected to a mobile phone and, when necessary, a message could be sent automatically to people who could help (Favela et al., 2013). Some devices, such as a night light, were offered free to older people in need of them (Stevens, Holman & Bennett, 2001; Wyman et al., 2007).

Researchers also reported negative components of physical safety such as failing health and the increased likelihood of minor or major accidents. Older people living at home were often reported as being frail, vulnerable and had multiple pathologies (Madigan, 2007; Mahler & Sarvimäki, 2012) which led to concern about falling (Bamgade & Dearmon, 2016; Beauvais & Beauvais, 2014; Chase, Mann, Wasek & Arbesman, 2012; Kamei et al., 2015), for example, having a poor understanding of the risk of falling when bending or lifting (Erkal, 2010) and falls leading to burns in the kitchen (Ibrahim & Davies, 2012).

Social safety

Social safety can be defined as the opportunities occurring when older people meet and maintain relationships with other people on their own terms (Bigonnesse et al., 2014). In the review, this was discussed as the provision of an age friendly environment and the presence of homecare and social interaction with people the same age and other people (Bigonnesse et al., 2014). This included those who lived alone, who accepted the help and support from homecare and other people (Coty et al., 2015). The negative components of social safety were the opposite of this situation: being isolated and additionally, having financial problems, such as not being able to purchase adequate lighting for bathrooms (Bakker et al., 2004). There were some whose financial difficulties were based on deeply rooted beliefs about thriftiness, which stopped the older people spending on themselves and had a negative impact on social safety.

Emotional and mental safety

In this review emotional and mental safety can be defined as older people having trustful relationship with homecare workers at home (Soodeen, Gregory & Bond, 2007) and having a secure feeling at home (Horton, 2008). Emotional and mental safety are achieved when basic needs as physiological needs, after Maslow's Hierarchy (Kendra, 2017), are met in older people's lives and the home environment is supportive and comfortable (Coty et al., 2015; Dahlin-Ivanoff, Haak, Fänge & Iwarsson, 2007). In this environment, the inmost feelings of older people vary from feelings of wellbeing (Soodeen et al., 2007) to anxiety (Porter & Lasiter, 2008). The positive components of emotional and mental safety were feelings of safety and living in a familiar environment (Dahlin-Ivanoff et al., 2007). Living alone was not always an emotional problem when the older person (Bigonnesse et al., 2014) considered everything else adequate. The fear of night and experiences of, for example a burglary, influenced older people's emotions about the intrusion risk (Lee et al., 2008; Porter & Lasiter, 2008).

Cognitive safety

Cognitive safety is concerned with issues arising when the older person's cognitive functioning is declined because of, for example, dementia (Marquardt et al., 2011). About half of the older people with dementia considered in this review had Mini Mental State Examination (MMSE) scores 0 to 30 (mean score was 19) and fifty percent of these 50% lived alone (Marquardt et al., 2011). A lower cognitive function affects an older person's ability to understand their illness and available resources learn and remember, for example, instruction and advice (Metlay et al., 2005). Some older people were frustrated about their memory loss and did not recognize situations of increased

risk (Gilmour, 2004). Accepting a reduction in cognitive functioning and the influences this has on health and living at home, was a positive component of safety (Marquardt et al., 2011). The negative components of safety were related to memory loss (Gilmour, 2004) and behaviour problems like medication management (Doran et al., 2009).

Older People's Perceptions of Safety

The reviewed articles revealed that older people perceived safety at home in many ways. Their main wish was to be able to live in their own homes for as long as possible even though this meant changes to their home and their lives (Dahlin-Ivanoff et al., 2007; Porter & Lasiter, 2008). Many older people were willing to accept the need for extra safety precautions in their home, but others did not which hindered the development of safety at home (Bamgade & Dearmon, 2016). The perceived safety of older people was categorized as: (a) active living; (b) coping at home; (c) managed living; and (d) the existence of disease (Figure 3).

Active living is concerned with direct and indirect efforts to actively improve and maintain health and safety. Many older people in the review thought that they had good health (Edwards et al, 2006). Even so, they accepted supervision of medication because this was connected to shared care with older people, caregivers and professionals across the health care system (Eloranta et al., 2011; Lang et al., 2015). To maintain good health, many of the older people took part in fall prevention programs, often continuing this in their own homes (Kamei et al., 2015) which decreased falls at home (Chase et al., 2012; Kamei et al., 2015; Stevens et al., 2001). Also, those with memory loss affected both active living and safety at home (Gilmour, 2004). Lables and signs on doors helped older people with dementia to maintain functioning and find their way around home (Marquardt et al., 2011). Poor physical health and emotional anxiety reduced older people's capacity for active living and hindered their safety, for example, the fear of falling. (Beauvais & Beauvais, 2014; Mahler & Sarvimäki, 2011). These fears led to older people accepting safety devices even when they thought they would not benefit from them, (Horton, 2008).

The review suggested that older people wished to live and cope at home even when they could not meet the standard of active living, having quite profound disabilities like visual impairment (Bakker et al., 2004) or communication difficulties due to cognitive causes (Sears et a.l, 2013). When help from others was agreed with the older person, this improved their safety (Eloranta et al., 2011; Gilmour, 2004). When older people needed services, they organized it usually from public homecare or other persons (Favela et al., 2013). This increased the social interaction between

reliable workers and older people (Soodeen et al., 2007). To help older people, homecare workers recommended free safety devices which were generally accepted, and older people were satisfied with them (Grant et al., 2015; Horton, 2008). For unknown reasons some older people doubted offers of help (Soodeen et al., 2007) and were suspicious of financial resources provided by other people (Bigonnesse et al., 2014). These fears hindered safety and the ability to cope at home, and sometimes led to falls in the home and the older person not being found for many hours (Mahler & Sarvimäki, 2011). These types of falls led care workers to question the safety of the older person at home (Gotzmeister, Zecevic, Klinger & Salmoni, 2015).

Some older people, living in an impractical home environment refused home modification offers such as the provision of a new fire or lighting system based on cost, requiring financial support. (Bakker et al., 2004; Coty et al., 2015). Other older people made appropriate home modifications and were more often able to stay at home for longer (Wyman et al., 2007).

Feelings of happiness and enjoying life at home seem to be associated with greater safety at home. Most of older people felt themselves safe and secure in the home with their memories and reminiscences (Dahlin-Ivanoff et al., 2007). At home, some older people took part in decision-making, were independent and made personalized privacy arrangements (Coty et al., 2015; Soodeen et al., 2007). Other older people in the review were unhappy to be confined at home (Coty et al, 2015), which hindered their safety and their ability to cope. To counter feelings of depression and fear, some older women watched out for strangers around the home. They also daydreamed to avoid feelings of fear (Mahler & Sarvimäki, 2011). According to older people, these strangers, and sometimes the presence of homecare workers, increased risk of unwanted intrusion (Horton, 2008; Lee et al., 2008; Porter & Lasiter, 2008). In addition, uncertainty of medication caused stress for older people (Eloranta et al., 2011). To this end, medication management was understood as an intrusion for the good (LeBlanc & Choi, 2015).

The older people at home had varying degrees of illness, which, in some cases, reduced their capability to live at home (Gilmour, 2004; Marquardt et al., 2011). The help given also varied person-to-person with some having had a plenty of homecare services for many years, whilst others had more recent help from social services (Eloranta et al., 2011; Soodeen et al., 2007). Where older people acknowledged the existence of illnesses and reduced capability, these enhanced feelings of safety. The ability to co-operate with other people and accept help from community services, for example homecare, also enhanced safety at home (Gilmour, 2004). Some older people were

interested in changing their medication to try to improve their feelings (Bamgade & Dearmon, 2016). However, other older people with dementia thought wrongly that they could, for example, look after themselves and take care of their apartments, meals and medication. These older people did not understand their own physical or cognitive functioning impairment (Gilmour, 2004) and this hindered safety at home. For example, medication might be stored with food or small children could reach dangerous drugs from unlocked cupboards (Lang et al., 2015). If the older person experienced depressive symptoms or became anxious about safety, this seemed to be associated with the manifestation of adverse events (Madigan, 2007) and hindered, for example, medication safety at home.

Discussion

This integrated review has identified four dimensions of safety at home: physical; social; emotional and mental; and cognitive safety, which had positive and negative components. Older people's perceptions of safety within these dimensions were reported as active living; coping at home; managed living; and the existence of disease. Sometimes the perceptions of older people hindered, but usually they promoted safety at home. This study provides a synthesis about safety at home that further analyses home safety. The home environment, the living area which older people occupy most of the time, defines the boundaries of the home and therefore physical safety at home. The elements of home environment and the risks known and understood by the older person, has a notable influence over their lives (Kim, 2010). These lives and its provisions impact the opportunities for the older person to remain at home independently (WHO, 2015, 15; WHO, 2017).

This integrated review of the literature has demonstrated that older people generally believe they can stay in their own homes as they deteriorate physically, socially and cognitively (Bakker et al., 2004; Bigonnesse et al., 2014; Dahlin-Ivanoff et al., 2007;). They want to live an active life and be safe at home (Marquardt et al., 2011). The activity theory (Havighurst, Neugarten & Tobin, 1963; McGarry, Clisset, Porock & Walker, 2013) states that older people are more likely to maintain good health and wellbeing if they continue an active and meaningful life when aging as in active living. The wish to do this could be the reason why many older people are ready to try for example, preventive programs to avoid falls (Kamei et al., 2015). In earlier studies older people thought that it was not necessary to have safety devices, when they suffered minor and temporary setbacks in their health (Horton, 2008). More recently, when older people are frail and have multiple illnesses, they are encouraged to purchase safety equipment to prolong their active and safe life at home. This

is in-line with international strategies (WHO, 2015), devised to help older people continue ageing in place with both formal and informal help.

The continuity theory is concerned about physical, social and economic impact on the personal attributes of older people and their satisfaction with life (Havighurst et al., 1963; McGarry et al., 2013, 52). Demonstrating the use of continuity theory, when older people accept help from others, including the practical use of necessary home services, they seem to cope better at home, than those who refuse to do so. Additionally, those older people who want to cope at home are usually satisfied in their lives further demonstrating that personal factors when ageing promote or hinder safety (McGarry et al., 2013). However, there are older people who are coping and feeling satisfied with their lives, that want to live alone (Gilmour, 2004) and do not seem to want help. It is important for practitioners assessing safety in the home, to be able to distinguish those who are coping, barely coping and not coping at home.

Feelings of happiness and enjoying life seems to promote safety at home (Dahlin-Ivanoff et al., 2007). According to the continuity theory (McGarry et al., 2013), people build their individual lives before retirement. If older people can tolerate stress during their working lives, they are more likely to age successfully (McGarry et al., 2013, 52). Reminiscing with other people can increase the safety of older people but sometimes, these memories can cause fear among older people. Illnesses may affect how older people use homecare services. The way these illnesses are managed varies amongst older people who may find it difficult to accept them and their consequences, particularly if they have reduced cognitive capacity. At this stage cooperation with homecare workers is essential (Gilmour, 2004).

Strengths and Limitations

The purpose of this review was to map the dimensions of safety of older people at home as broadly as possible. Care was taken to find relevant literature from a wide variety of sources to strengthen the base of the review. First, there were no time limits set in the search engines. Using an integrative literature review approach, it was possible to take account of all the studies concerned with safety at home from the older person's point of view. Secondly, the two comprehensive and widely used health science databases were included in the search for potential studies. Thirdly, the assessment of the quality of the papers to be reviewed was guided by appropriate assessment tools: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009); the Critical Appraisal Skills Program (CASP) (www.casp-uk.net/criticalappraisal) or by

the Appraisal tool for Cross-sectional Studies (AXIS) (Downes et al., 2016). This helped to standardize the quality assessment. Lastly, there was agreement between, first author and the other authors about the review procedures and the review outcomes.

Another strength, trustworthiness, was demonstrated through the accurate reporting of the review procedures: data extraction; data interpretation; describing the process of data selection (Figure 1); the description of the analysis; and reporting results (Elo & Kyngäs, 2007).

The limitations of the study are concerned with language restrictions and the selection of keywords. All the studies were in English and although the search terms were formulated alongside information specialists and thought to be comprehensive, it is still likely that some studies left out unintentionally.

Conclusions

The safety of older people at home is a worldwide concern and this concern will increase as the care of older people continues to move from hospital to home. As this transition occurs, there is a corresponding obligation to maintain the safety of older people in a wider context than their physical safety. However, the home environment safety protocols on which strategies are based are under development currently and the assessment of risks to the safety of older people at home is heavily biased towards aspects of physical safety. The extended dimensions of safety described in this integrative review of the health care literature: physical safety; social safety; emotional and mental; and cognitive safety, could be used as a broader and so less biased framework to understand the safety risks of individual older people at home. The broader assessment would provide greater opportunities to find ways of helping older people to stay in their own homes as they age and a platform for further research. Older people's perceptions of safety are living satisfied life at home and having help when needed.

Implications for practice

Learning, understanding and developing new strategies about safety affects everyone who visits the home of older people. Also, stakeholders have an important role to identify safety risks. Therefore, reporting and analysing safety incidents at home secure ageing in place. In addition, rising costs of planned services in homecare cause worry for policy makers in future.

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Conflicts of interest
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Table 5. Summary of Studies Included in the Integrative Review

Author(s) Country	Aims	Participants	Design and methods	Results
Qualitative studies				
Ibrahim & Davis (2012), United Kingdom	Investigate the cooking difficulties encounter by older people and the safety concerning cooking tasks	n= 18; a) 6 older people (4 women and 2 men, range 70 -91, mean 78.83) in basic observation and interview about cooking tasks, b) 8 participants in two set of questionnaires, c) 4 participants in role plays	Observation, video and interviews, questionnaires and role play methods	Difficulties in cooking: problems due to the awkward body position: had to bend down to take things from lower shelves
Dahlin-Ivanoff et al. (2007), Sweden	Explore aspects of the meaning of home as experienced by very old single-living people	n= 40 (range 80-89, mean 85), The Swedish ENABLE-AGE Survey Study database, the Swedish survey study sample	Grounded theory, analysis by Charmaz, interviews at home visits	Home is a central place in the lives of very old people: home means security; feeling of being in own field, familiar neighborhood; everything functions at home (independence); freedom to come and go as you like
Coty et al. (2015), USA	Examine factors influencing urban older adults and develop thematic analysis of how these factors affect seniors´ home fire safety (HFS) beliefs and practices	n= 8 (55-64 years= 2, 65-74 years= 3, over 75= 3), 75 % women, 50 % Meals -on- wheels participants	Ethnography with observation and semi-structured interviews; descriptive measures: age, gender, income, co-morbidity index, fall safety score and ADL, medications visualized and recorded, clock-drawing test, Mini-Cog, square footage of homes and lot size, county property value assessment (PVA)	Environmental risk factors: major lived in houses built before 1949 and had higher risk of fire due to electrical safety issues. Lack of resources of change; major talked about limited financial resources to purchase safety devices; many could not identify preventive safety or articulate a fire escape plan. General health and cognitive status influenced to maintain a less risky HFS environment
Mahler & Sarvimäki (2011), Denmark	Illuminate the experiences and meaning of fear of falling in a daily-life context for older adults	n= 5 community-dwelling women over 80 years old (range 81-94), from fall-registration sheets and a senior course on fall prevention, more than two falling accidents in the last year	Interpretive phenomenology, narrative interviews	Live with fear of falling in daily life; learn to live with the challenge of a vulnerable bodily condition and of losing control at different levels from falling and being alone for hours. Maintaining autonomy was hard. Perception of independence was created while were dependent on help of

				community care and on news from the outside
Horton (2008), United Kingdom	Explore older people's experiences with and expectations of the use of telemonitoring devices such as fall detectors and bed occupancy sensors	Intervention group (n= 17) used the extended alarm service, control group (n= 18) used a standard pendant alarm, 65 years or older (mean 78.2), women 62.3%, 80 % of all lived alone, two or more falls in the past 6 months.	Observational (identify themes and concepts), individual in-depth interviews, two visits: at baseline and after 6 months	Many participants were afraid of falling and after 6 months over half of them were afraid; total number of falls decreased during the follow-up period. Feeling of security, some people were positive about the devices because they thought some would help them.
Bakker et al. (2004), USA	Measure the light levels in the dwellings of homebound older adults and to compare them with the minimum light levels recommended by IESNA, to ascertain participants' perceptions of their lighting levels	Community dwelling homebound adults 65 years or older from either Cornell's academic Housecall program (n= 6) or from two social services agencies (n= 34), 87 % women, 53 % fallen at home in last 12 months	Home visits with questionnaire, follow-up phone calls (social service agencies), and visits took place over an 11-month periodi, Mini Mental State Examination, 15-item Geriatric Depression Scale, corrected near visual acuity by the Rosenbaum Vision Screener card held in the subject's hand at 14 inches and contrast sensitivity with the LEA Symbols Low Contrast Symbol Testvisits. The day room= the room subject spent most time during the day, footcandle readings under a half footcandle was recorded as zero	Nearly all had inadequate light levels, but lighting conditions rated as adequate, no significant difference in the ambient light levels of participants with low vision compared to participants with normal vision. Only five percent had light levels with the minimum standard of 75 footcandles. The darkest area was bathtub floor; the median light level was 3 footcandles. 57 % of participants said cost was not a factor for light that they use
Bigonnesse et al. (2014), Canada	Explore, through the concept of meaning of home in later life, older adults' housing needs from their own perspective, to inform service providers how they can support aging in place, facilitate relocation into community-based housing for older adults, and develop housing models that properly	n = 392 (65–74, 75 years or older), The Age-Friendly Cities Project in Quebec (Canada) and a master of social work thesis at University of Sherbrooke (Sherbrooke, Canada), social diagnostic stage of the seven pilot projects (2008–2009) and consist of	First data collected during social diagnostics stage of 7 pilot projects, measured age and income level. Additional perspective from focus group with service providers was done. Second data was collected from case study of 7 pilot projects from social work thesis,	Older people need privacy, social connection by home support services. Safe environment: night lighting, safety guard and security systems. Cognitive aspects: feeling safe is physical integrity when someone comes to help and help is in time of emergency. Also feeling safe and protected from external dangers

	address older adults' specific needs.	49 focus groups of older adults, caregivers, and service providers	stakeholders from various sectors gave 11 in-depth interviews. Heuristic Framework on Domains of Meaning of Home in Old Age; a thematic analysis of these two sources; qualitative data was conducted with the software Atlas.ti.	
Eloranta et al. (2011), Finland	Describe the knowledge and attitudes of older home-dwelling people's about their perceptions of pharmaceutical care and use of medication	n= 16 older people, part of the Turku Aging Study, a prospective, populationbased, 15-year follow-up study of the age cohort of 70-year olds (born 1920)	Theme interviews, the participants were approached by personnel with a covering letter (3 themes according to the study objectives: knowledge of pharmaceutical care, attitudes concerning pharmaceutical care, and pharmaceutical care at home), inductive content analysis	Average number of drugs used was about 7; some had precise knowledge whereas others had none. For 1/3, guidance in pharmaceutical care was not readily available. Positive attitude toward their pharmaceutical care and favored a minimum use of medication. Being able to cope independently with their pharmaceutical care strengthened the older people's sense of control over their lives.
Lexis et al. (2013), Netherlands	Examine potential effects of the activity monitoring system 'QuietCare' on three levels: the client, the formal caregiver and the informal caregiver	n= 19 older people (mean 83.7), frail or having psychogeriatric problems, living alone, 15 women	QuietCare registers activities of daily living, Visual Analogue Scale, Groninger Activity Restriction Scale (GARS), health status, quality of life, feelings of loneliness, the level of safety of clients, interviews, questionnaire, statistical program SPSS 18.0	No significant changes were found on the client questionnaires
Gilmour (2004), Northern Ireland	Explore the concepts of risk in the context of the social circumstances, lifestyle, health status, and range and intensity of services utilised by a small group of people with dementia who lived alone in a rural area and who had been identified from an earlier study	n= 10 (range 74-93, mean 83.3), dementia, 8 women, living alone in their own homes	Interviews, open questions	The main areas of risk to emerge were heating and cooking, falling, getting lost and managing money. None of the people with dementia showed concern about the practicalities of risk, although two people indicated that services were unwanted and unnecessary. An important finding was that no one reported any major incidents of harm, although potential risks were evident

Gotzmeister et al. (2015), Canada	Identify system-wide factors contributing to falls in community-dwelling octogenarians	n= 7 (range 83–90), a fall in the past 30 days	Across-case analysis, collective case study research design, systemic falls investigative method, Mini-Mental State Examination	Over 240 factors were identified; safety in community care ought to be individualized, allowing for personal choices, especially when related to PSW (personal support worker) care
Lang et al. (2015), Canada	Medication management issues faced by seniors with chronic illness, their family members, caregivers, and paid providers identify within publicly funded home care programs in Alberta (AB), Ontario (ON), Quebec (QC) and Nova Scotia (NS), Canada.	n= 32 (range 67–92, mean 79), four Canadian provinces (AB, ON, QC, and NS) from 2009–2012	Socio-ecological perspective, Interpretive Description (ID) methodology and participatory photographic methods, interviews, NVivo 9 software	Six patterns were identified of medication management safety in home care: vulnerabilities that impact the safe management and storage of medication, sustaining adequate supports, degrees of shared accountability for care, systems of variable effectiveness, poly-literacy required to navigate the system, and systemic challenges to maintaining medication safety in the home
Porter & Lasiter (2008), USA	Describe the intentions of old homebound women relative to reducing the risk of intrusion.	n= 32 women (range 85-98, M = 89.6), living alone	Descriptive phenomenological method, over 18 months interviews ((a) Interview 2, 1 month after Interview 1; (b) Interview 3, 6 months after Interview 2; and (c) Interview 4, 8 months after Interview 3); semistructured, philosophy of Husserl	Feeling safe in-place was contextual to recognizing intrusion risk and intentions to reduce the risk. Most women denied a recent change in feeling safe but reported intentions to reduce intrusion risk. The nine women who reported feeling less safe referred to various personal social situations as explanatory. The five components of the phenomenon were keeping watch here, keeping out of harm's way here, preventing theft and vandalism here, discouraging people who might want to get in here, and keeping intruders out of here. With these tools, older people sought specific intentions to reduce intrusion risk

Soodeen et al. (2007), Canada	Explore the home care experience as described by older care receivers and their spouse caregivers, to illustrate how the individual themes identified from both participant groups relate to the concept of security, which emerged as a key underlying theme	n= 9 couples (client range 70 -94, spouse range 67 - 90)	Separate face-to-face semistructured interviews, person-centered interviewing, open-ended questions, Wolcott's (1994) method of organizing and reporting data	For care receivers the themes were independence and developing a trusting relationship with HCW (home care worker). Participants clearly expressed their intention to continue in this living arrangement for as long as possible; interviews expand current understanding of the meaning of independence to older people. Although they recognized their need for formal care and appreciated the help, they sought to limit its intrusion by doing as much self-care as they could; trusting long-term relationships with HCWs might promote home care clients' emotional security; bonds did not form when many different workers were encountered over the course of their "association" with home care
RCT Wyman et al. (2007), USA	Test the effectiveness of an education and counseling intervention on reducing environmental hazards in the homes of older women	n= 272 (age groups 70-74 and over 75 years old), community-dwelling women of Medicare beneficiares, living independently, in risk for falls	Secondary analysis, fall prevention program and health education program (control), MMSE, SPSS software (Version 13.0), Statistical Analysis, P-value 0.05 was considered statistically significant, total number of environmental hazards, 12- week intervention in both groups	Environmental hazards were found in all homes. Analysis of within-group changes indicated that the fall prevention group had significantly fewer bathroom, lighting, and total hazards after the intervention, whereas the health education group had significantly fewer bathroom hazards but more floor hazards. At follow-up, the fall prevention group had significantly fewer lighting hazards and total hazards than the health education group

LeBlanc & Choi (2015), USA.	Improve medication safety through focused assessment in the home environment, enhance provider collaboration, and assess medication self-management among ommunity-dwelling older adults	n= 25 (65 years or older), self-managed medication, more than 19 points from Mini-Mental Test	One-group pretest-posttest design, 3-month periodi, home visits, The S-TOFHLA (Short Test of Functional Health Literacy in Adults), Drug Regimen Unassisted Grading Scale (DRUGS), The HomeMeds© assessment	The mean number of medications for the entire sample was 12 medications per person (range 2-25). Majority was able to identify the need to take a medication on time and what it was for but were not able to name the side effects or potential medicationrelated problems. The most common intervention was the teaching on the importance of avoiding medications (over-the-counter and prescription) with duplicate ingredients. Many of older people reported falls history. Half of older people had a medication list to which they could refer
Marquardt et al. (2011), USA	Provide a description of home environmental features, safety issues and health related modifications observed among a sample of elders with dementia being cared for in home in the community.	n= 82 (70 years or older, mean 84.5), 62 % women cohort of community-dwelling elders with cognitive disorders	Cross-sectional data derived from an ongoing randomized controlled trial, MIND at Home Phase 2, telephone Interview for Cognitive Status, Informant Questionnaire for Cognitive Disorders in the Elderly, a comprehensive in-home clinical assessment to determine the presence of dementia or Cognitive DO NOS, along with an assessment of 15 dementia-related needs across multiple domains. Home environments were assessed by an architect, data were analyzed using SPSS version 17.0 software	The majority of the caregivers had made home modifications that pertained mainly to physical limitations and increased safety. Home modifications to support cognitive deficits were made to a lesser extent. The main barrier to the implementation of home modifications to accommodate the care recipient's memory loss was skepticism about their usefulness. Regarding the removal of physical barriers, financial constraints were most frequently mentioned.
Bamgade & Dearmon (2016), USA	Describe a quality improvement project to reduce falls in older patients receiving home healthcare services (HHS) by employing	n= 30 (65 or older (and 67 nurses from Home Health Services))	Severity of Harm Scale, 6- month periodi, MAHC-10 fall risk assessment tool, number of falls and injuries (major, minor, noninjuries)	The fall prevention program incorporated best practices for fall reduction, including fall risk assessment, medication review/ management, home

	a comprehensive fall risk assessment tool to guide patientspecific evidence-based fall prevention interventions.			hazard and safety assessment for all older adults, staff and patient fall prevention education, and an individualized home-based exercise program (only 5 performed it)
Beauvais & Beauvais (2014), USA	Assess the effects of an evidence-based fall prevention program on the fear of falling and health-related quality of life among community-dwelling elders	n=56 (range 65–91, mean 77), 47 women	Repeated-measures design, the Falls Efficacy Scale-International, the 15D Health-Related Quality of Life instrument, and the Mini-Cog, demographic data	The more fearful group of older people in preintervention had a significant decrease in fear of falling after participating in the fall prevention program; those participants who were not fearful of falling, did not have a significant change in their perceptions postintervention. There was not a significant difference in overall health-related quality of life after participating in the fall prevention program, the more fearful group of participants had a significant decrease in the “discomfort and symptoms". Those at higher fall risk and with a greater fear of falling should be afforded the opportunity to attend a fall prevention program
Favela et al. (2013), Mexico	Assess whether an intervention based on nurse home visits including alert buttons (NV(nurse visits)+AB (alert button)) is effective in reducing frailty compared to nurse home visits alone (NV-only) and usual care (control group) for older adults	n= 133, age groups 70-74, 75-79, 80-84 and 85-90 years (mean 76.3), women 55 %,	Unblinded, randomized, controlled trial, telephone interviews, interviews, comorbidity was evaluated using the Charlson Index, MMSE, (CES-D), HRQoL, STATA software	There were no statistically significant differences in the baseline characteristics of the groups. At the baseline, many of older people were classified as frail. At end of follow-up, the adjusted prevalence of frailty in NV+AB group was 23.3% versus 58.3% in the control group
Grant and Stennes (2015), USA	Deploy telehealth services to monitor safety and health status remotely	N= 1582: n= 820 experimental subjects (with telehealth services), n= 762 control subjects received usual care (mean age 81), 67 % women of total, The	Randomized trial, experimental versus control conditions, longitudinal, face-to-face interviews, data collected at baseline and 6, 12 months	No statistically significant differences were found between experimental and control subjects at baseline. Statistically significant differences emerged at follow-up: experimental subjects in home healthcare agencies

		LivingWell@Home (LW@H) program		reported higher levels of satisfaction relative to controls, whereas experimental subjects in assisted living facilities reported lower levels of satisfaction
Kamei et al. (2014), Japan	Evaluate the potential improvement of fall prevention awareness and home modification behaviors and to decrease indoor falls by applying a home hazard modification program (HHMP) in community dwelling older adults, to evaluate the effects of a HHMP with residential mock-up and home equipment.	n= 130, 65 years and over (intervention group (n = 67, mean 75.7) or the control group (n = 63, mean 75.8)), per protocol n= 56 in HHMP group and n= 54 in control group	Randomized controlled trial for one year, fall prevention multifactorial programs, participants recruited by posters, flyers, and websites, a pretest and two post-tests (12 and 52 weeks), interviews, questionnaire, Kaplan–Meier survival analysis with the log–rank (Mantel–Cox) test undertaken on an intention-to-treat basis, statistical analysis was carried out using the Japanese version of IBM SPSS statistics version 19	The HHMP group showed some reduction in overall falls, and falls indoors showed some reduction at 52 weeks. Those aged 75 years and over showed a significant education in both overall falls and indoor falls at 12 weeks. Fall prevention awareness and home modifications were significantly improved in the HHMP group.
Stevens et al. (2001), Australia	Evaluate the impact of an intervention to reduce fall hazards in the homes of older people	n= 570 (age 70 or older), control group n= 1091 (age 70 or older)	Randomised controlled trial, the intervention; home hazard assessment of 11 hazards in the list, advice and education on hazard reduction, safety devices for all. Evaluation after 11-month of follow-up. Postal questionnaire after 11 months to 527 participants remained, 56 participants of intervention group had home hazard reassessment	All homes had at least one fall hazard (floor rugs and matts, stepovers, steps, trailing cords). Safety devices were installed in many of homes. Advice was better than general education to reduce hazards
Systematic review				
Chase et al. (2012), USA	Explored the impact of fall prevention programs and home modifications on falls and the performance of community-dwelling older adults	33 articles	systematic review	Multifactorial programs included home evaluations and home modifications, physical activity or exercise, education, vision and medication checks, or assistive echnology to prevent falls. Positive

				outcomes included a decreased rate of functional decline, a decrease in fear of falling, and an increase in physical factors such as balance and strength. The strength of the evidence for physical activity and home modification programs provided individually was moderate
Cross-sectional studies				
Sears et al. (2013), Canada	Identify the prevalence of AEs, the risk factors for home care patients associated with AEs, the types of events that occurred and the extent to which these events might be reduced by greater attention to patient safety in home care settings	430 charts/ 286 positive	Stratified, randomized sample, multivariate analysis on the RAI-HC data, two phase retrospective chart review, narratives describing all face-to-face, telephone, and paperbased and electronic correspondence	At least one screening criterion was positively identified in 286 (66.5%) of 430 cases. The most common AEs were falls and adverse drug events
Golden et al. (2011), USA	Determine the prevalence of the use by homebound older adults of OTC drugs, dietary supplements (vitamins, minerals and herbal products). Part D-excluded medications (benzodiazepines and barbiturates) and potentially inappropriate medications (according to Beers criteria).	n= 3911 (older than 65 years, mean 83.6), entire cohort of AmericanEldercare clients on November20, 2009 as well as 170 older adults who were recently accepted on a provincial basis while awaiting certification of Florida Medicaid benefits	Descriptive statistics, the prevalence of OTC medications, dietary supplements, and Medicare Part D-excluded medications (benzodiazepines and barbiturates)	Many of older people were using an OTC medication, some were using a dietary supplement, and some were using a benzodiazepine or barbiturate. Some were using at least 1 potentially inappropriate medication
Erkal (2010), Turkey	Analyzing home safety and safe behaviors of elderly people living at home, to determine the risks of fall accidents and the relationship between certain elderly demographic characteristics, home safety, and safe behaviors	Age group of 65 and above living in the house (n= 125 questionnaires, 121 accepted)	Descriptive, systematic sampling method by utilizing a health center household evaluation form, face-to-face interview with study participants and via observation techniques, Home-Screen Scale, data was analyzed using the SPSS 10.0 statistical package	Many of older people perceive that they have safe house conditions and perceive that they adopt safe behaviors against fall accidents; sufficient illumination and safe access to the toilet at night; some are at risk of falling at home and particularly in the bathroom. Older people may be at significant risk of falling at home due to these behaviors: the 65–69 age group pay greater attention to home

				security and behaviors that reduce the risk of falls compared to the other age groups and people with health insurance, a retirement fund, and a Social Security Institution had more positive attitude than others did
Gill et al. (1999), USA	Estimate the population -based prevalence of environmental hazards and to determine wether the prevalence of these hazards differs by housing type or by level of ADL disability	n= 1103 (72 years and older), n=1000 participants available for the primary analyses on prevalence, Project Safety cohort	Cross-sectional study, prevalence, per cents, P-values. Trained research nurse using a standard checklist derived from preexisting environmental assessment instruments. Since the sample was stratified by housing type, with age-restricted housing determined by census and community housing sampled, weights were assigned to participants to adjust for differences in ampling, response, coverage rates, and gender	Nearly all homes had at least two potential hazards. The greatest difference between the two housing types was found for grab bars in the tub/shower
Lee et al. (2008), Australia	Protecting older people from burglary: prevalence of security devices in the homes of older adults in Perth, Western Australia	n= 5,582 (65 years old or older), 15,000 household, pilot test involving 498 community-dwelling older adults. Response rate 37.2%.	Cross-sectional postal survey self-administered structured questionnaire. Prevalence rates of risk factors and security devices were estimated. Descriptive and other summary statistics were obtained. Both univariate and multivariate statistical analyses were performed to investigate relationships between variables. After adjusting for potential confounding variables, the risks of burglary were assessed using logistic regression analysis	Many of older people had security screens and key-operated deadlocks and 2.7% had no securily features. Older people living alone had the lowest prevalence of home security devices. Female living alone protected their home in other ways than others by installing different security devices. Logistic regression analysis indicated that older adults living in detached houses fetl particularly vulnerable to burglary ($p < .001$)

Edwards et al. (2006), Canada	Access to bathtub grab bars in privately and publicly owned apartment buildings and explores the profile of seniors who have access to bathtub grab bars	n= 510 (65 years or older), 483 bathrooms were inspected	Cross-sectional data obtained during the initial baseline interviews, face to face interviews; Socio-demographic measures were dichotomously coded to facilitate interpretation of the primary analysis. Tinetti's 9-item scale (for fear)	Bathtub grab bars were significantly more prevalent in apartments that were publicly owned (91.3%) as compared to privately own (37, 8%) ($p < 0,05$). Older people were more likely to have grab bars in their bathtubs if they were in poor health, had had a fall in the previous year, or used a mobility aid. Among those who did not have bathtub grab bars, 33 per cent reported fear of falling while bathing, 20 per cent reported difficulty bathing, and 23 per cent were found to have impaired balance
Doran et al. (2009), Canada	Identify the nature of patient safety problems among Canadian homecare (HC) clients, using data collected through the RAI-HC assessment instrument	n= 238 958 cases (< 65 years old, 65-74 years, 75- 84 years and 85 >), HC clients who qualified to receive a RAI-HC assessment from Ontario, Nova Scotia and Winnipeg Regional Health Authority for the 2003–2007 reporting periodi	Secondary analysis of Canadian home care reporting system, descriptive statistics	New fall (11%), unintended weight loss (9%), new emergency room (ER) visits (7%) and new hospital visits (8%) were the most prevalent potential adverse events identified. A small proportion of the HC clients experienced a new urinary tract infection (2%)
Leikola et al. (2011), Finland	Determine the prevalence of PIM use according to the Beers 2003 criteria, independent of diagnoses, among Finnish non-institutionalized people aged ‡65 years, and the reimbursement costs for these medications	n= 841 509 (from 868 717 aged ‡65 years in 2007, non-institutionalized were 96.9%), a register-based data from Finland's Social Insurance Institution (SII)	Cross-sectional national study, national prescription register by SII, ATC codes or Nordic article codes, 2003 version of the Beers criteria, total reimbursement costs (€) for each PIM were summed and compared with the total reimbursement costs (direct drug costs) for all drugs reimbursed for persons aged ‡65 years	Of the non-institutionalized older people 14.7% (n = 123 545) had received PIMs according to the Beers 2003 criteria. Temazepam > 15 mg/day was clearly the most commonly reimbursed PIM (4.4% of the population aged ‡65 years), followed by amitriptyline (2.0%) and diazepam (1.8%). The SII paid drug reimbursements of €2.9 million for PIMs, which was 0.7% of the total drug reimbursements (€421 million) for people aged ‡65 years in Finland in 2007

Madigan (2007), USA	Describe the most frequent adverse events defined by the Centers for Medicare & Medicaid Services among the national population of patients receiving home healthcare in 2003, and to compare characteristics between patients who experience adverse events and those who do not	n= 3,013,287 (aged 75.4 ± 13.1 years)	The Outcomes and Assessment Information Set (OASIS) is used quality purposes, internally and externally, the start-of-care episodes; adverse events were created following the algorithm from CMS; scores for ADL and IADL were obtained following the corrected Likert approach; relative risk was calculated for the categorical variables	Some of all home healthcare patients had an adverse event, with 80% experiencing only 1 adverse event. Older people experienced adverse events and had more depressive symptoms and behavioral problems than others. They were more functionally impaired. Women had a slightly lower relative risk of an adverse event (.98), whereas older people of minority ethnicity had a slightly higher relative risk (1.06)
Metlay et al. (2005), USA	Identify the current state of medication taking practices of community-dwelling older adults on high-risk medications and to describe self-reported sources of information on medication usage and adverse effects and homebased systems for medication reminders and medication dispensing	n= 4995 (aged 65 and older who are not on Medicaid and meet income eligibility requirements), The Pennsylvania Pharmacy Assistance Contract for the Elderly (PACE) Program, a state-run program; prescriptions for warfarin, digoxin, or phenytoin; PACE members	Prospective cohort study, 1 year, telephone survey, self-reported sources on current medications as well as home-based practices for organizing medication regimens, Medical Outcomes Study 8-Item Short Form (SF- 8), the 6-Item Cognitive Impairment Scale (6CIT), which is an abbreviated version of the Blessed Information Memory Concentration Scale and the Geriatric Depression ScaleFShort Form (GDS-SF), focused interviews, statistical analysis (all reported P-values are two-sided, and associations with $P < 0.05$ were determined to be statistically significant)	Some reported that they had not received any specific instructions about their medications and that they received instructions from their primary care provider. About half indicated they received them from a pharmacist. Many indicated that they used a pillbox for organizing their medications. Older adults prescribed warfarin were more likely to report receiving instructions than those prescribed digoxin or phenytoin

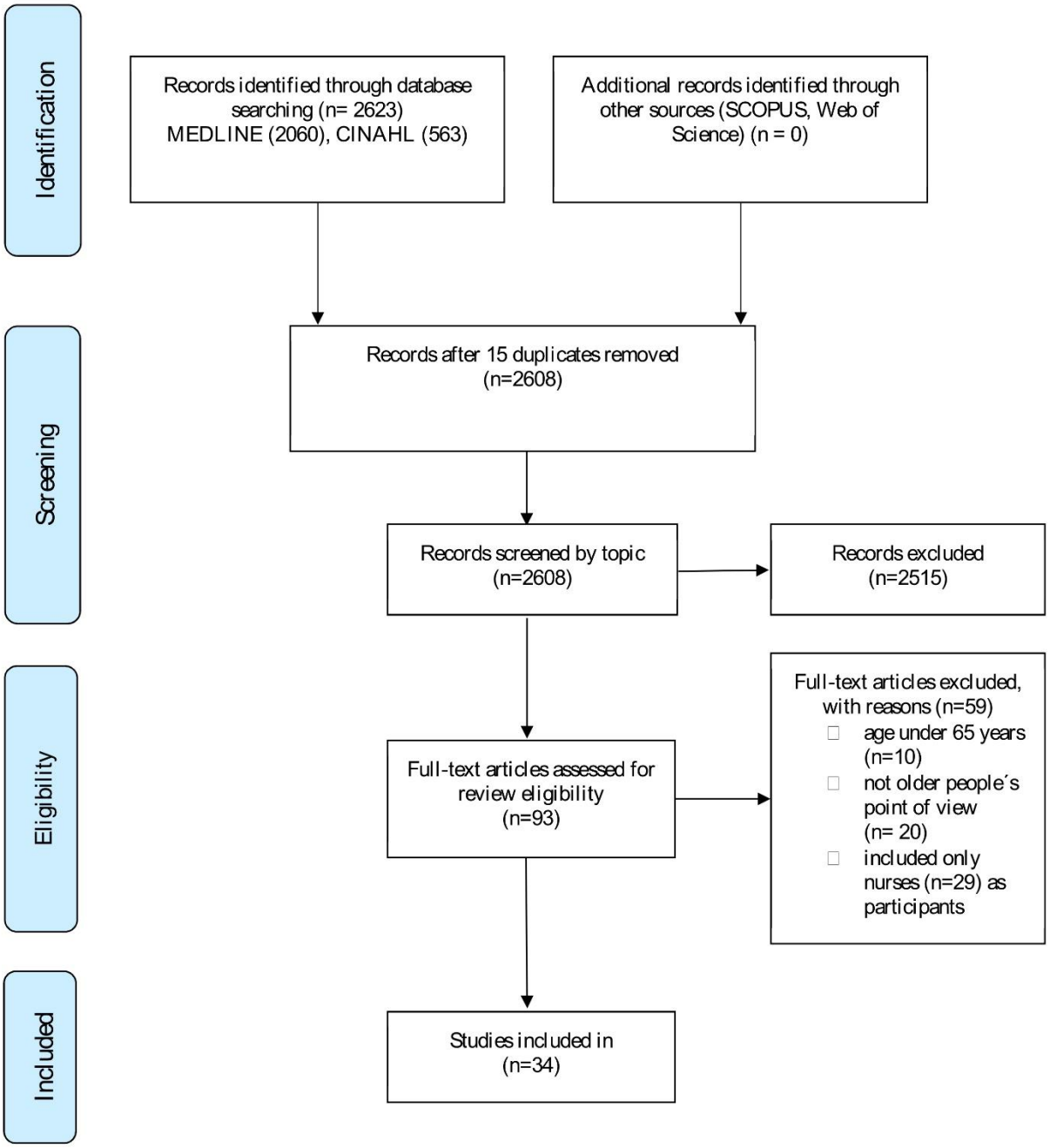

Figure 1 PRISMA 2009 Flow chart of the study inclusion

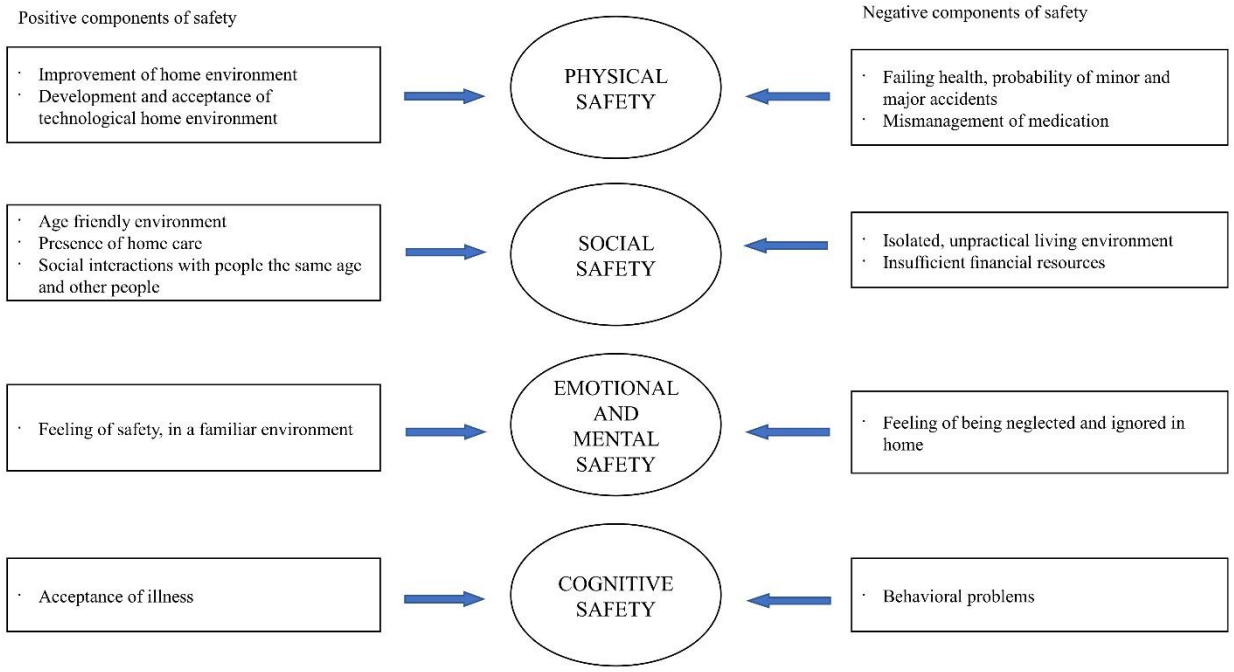

Figure 2 Four dimensions of safety at home

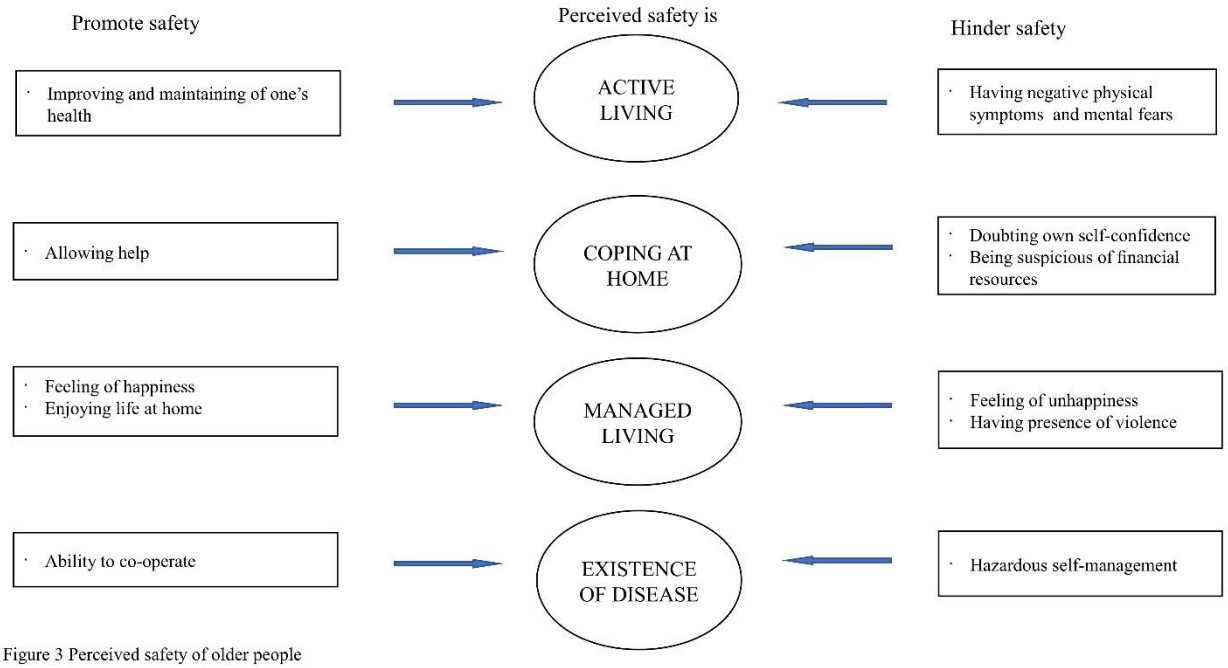

Figure 3 Perceived safety of older people