

**A Systematic Review of the Effectiveness of Housing Adaptations for Preventing Falls
Among Home Dwelling Older Disabled Adults**

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Abstract

Falls are a significant public health concern among older adults, with environmental hazards contributing to injury, functional decline and loss of independence. This systematic review evaluated the effectiveness of a specific intervention, namely housing adaptations, in reducing the rate and severity of falls among home-dwelling older disabled adults. A systematic review methodology was adopted in accordance with PRISMA 2020 guidance. Literature was searched across PubMed, Scopus, Web of Science, CINAHL, MEDLINE, Cochrane Library and Google Scholar, with English-language evidence published between 1999 and 2025 considered. Eligible evidence involved community-dwelling adults aged 65 years and above and examined housing or disability adaptations in relation to fall-related outcomes. Methodological quality was assessed using Critical Appraisal Skills Programme (CASP) checklists, while findings were synthesised narratively due to heterogeneity in study designs, interventions and outcomes. Twenty-one records were included in the synthesis. Overall, targeted housing adaptations were associated with reductions in falls, particularly among older adults with previous falls, functional limitations or identifiable home hazards. Evidence also indicated benefits for independence and reduced care requirements. Adaptations appeared more effective when combined with occupational therapy, nursing support or wider multifactorial interventions rather than implemented in isolation. Policy evidence highlighted delays and barriers to accessing adaptations as factors that may reduce their effectiveness. The review concludes that housing adaptations represent an important component of falls prevention and Environmental Health practice, particularly when interventions are person-centred, professionally assessed and delivered promptly. Further research is required to establish their long-term effectiveness and cost-effectiveness across different housing and healthcare systems.

CHAPTER ONE

Introduction

1.1 Background

Population ageing has become one of the most significant demographic changes worldwide. Advances in healthcare and living conditions have increased life expectancy, but also increased the number of older adults living with reduced mobility, chronic illness, and disability. These changes have made falls a major public health concern because older adults are more vulnerable to serious injuries, hospitalisation and loss of independence following a fall (World Health Organization [WHO], 2021; Chen et al., 2025).

Globally, falls are the second leading cause of unintentional injury related deaths, accounting for approximately 684,000 deaths each year (WHO, 2021). Adults aged 65 years and above are particularly affected, with around one in three experiencing at least one fall annually. Many of these falls occur within the home, where environmental hazards such as poor lighting, uneven flooring, slippery surfaces and unsafe staircases interact with age-related physical decline and disability to increase the risk of injury (Clemson et al., 2023). Consequently, the home environment has become an important focus for fall prevention strategies. In England, the government has developed the ambition to shift healthcare towards prevention, early intervention and care closer to home. This is aimed at enabling older and disabled people to remain safe and independent in their own homes. (NHS England, 2025).

Housing adaptations are increasingly recognised as preventative interventions that improve safety and support independent living. These adaptations include grab rails, level access showers, ramps, stair lifts, improved lighting and other environmental modifications that reduce hazards and improve accessibility (NHS, 2023). Beyond reducing falls, they enable older adults to remain in their own homes, maintain independence and improve their quality of life (Carnemolla and Bridge, 2019).

1.2 Why This Topic is Important

The importance of housing adaptations extends beyond individual health outcomes. For older adults, remaining safely at home promotes independence, dignity and social participation while reducing fear of falling. Many older people prefer to age in place rather than move into residential care, making safe and accessible housing increasingly important (Sheahan et al., 2026). From a government perspective, effective housing adaptations have the potential to reduce emergency hospital admissions, delay the need for long term residential care and ease pressure on health and social care services. Age UK (2024) estimates that falls cost the National Health Service more than £2.3 billion annually, highlighting the potential economic value of effective home adaptations. Appropriate housing adaptations can make routine tasks safer for informal carers by reducing the need for manual lifting, and other physically demanding assistance. By creating a more accessible home environment, adaptations can reduce the likelihood of musculoskeletal injury and physical strain while enabling carers to support daily activities more safely.

Housing adaptations are also highly relevant to environmental health practice. Environmental Health Practitioners have an important role in promoting safe housing, identifying

environmental hazards and supporting interventions that prevent injury and improve health outcomes. Robust evidence is therefore required to ensure that housing adaptation programmes are effective and represent appropriate use of public resources. In England every local housing authority receives a government funding allocation under the Care Act 2014 to deliver mandatory Disabled Facilities Grants. Many of the services across the country include environmental health practitioners.

1.3 Research Gap

Although research examining housing adaptations has increased considerably, the evidence remains fragmented. Existing studies investigate different adaptation types, intervention programmes and outcome measures across a range of healthcare and housing systems. While many studies report positive effects on fall prevention and independent living, others report more modest benefits depending on intervention design, participant characteristics and implementation approaches. Furthermore, evidence relating to cost effectiveness, policy implementation and environmental health practice is often considered separately rather than collectively. These differences make it difficult to determine which housing adaptations are most effective and under what circumstances they achieve the greatest individual and societal benefit. A systematic review is therefore needed to critically synthesise the available evidence and identify implications for policy, practice and future research.

1.4 Aim and Objectives

Aim

To systematically review and critically evaluate the effectiveness of housing adaptations in reducing the rate of falls among home dwelling older disabled adults.

Objectives

1. To systematically identify studies examining housing adaptations for preventing falls among home dwelling older disabled adults.
2. To evaluate the effectiveness of housing adaptations in reducing fall incidence and fall related injury severity.
3. To critically appraise the methodological quality and strength of the available evidence.
4. To identify implications for environmental health practice, UK policy development and future research.

1.5 Research Question

How effective are housing adaptations in reducing the rate and severity of falls among home dwelling older disabled adults?

CHAPTER TWO

Literature Review

2.1 Theoretical and Conceptual Foundations of Housing Adaptations

Understanding the relationship between housing adaptations and falls among older adults requires consideration of theories that explain how individuals interact with their physical environment. An influential framework is Lawton and Nahemow's Environmental Press Theory, which proposes that an individual's ability to function depends on the balance between personal competence and environmental demands (Lien, Steggell and Iwarsson, 2015). As people age, physical strength, mobility and balance often decline. Consequently, environmental features that were once manageable, such as stairs, uneven flooring or poorly designed bathrooms, may become significant hazards. Housing adaptations therefore aim to reduce environmental demands so that they better match an individual's functional abilities.

Closely related is the Person Environment Fit Theory, which argues that health and wellbeing are influenced by the degree of compatibility between an individual's capabilities and their living environment (Zhang et al., 2024; Iwarsson, 2005). Unlike Environmental Press Theory, which focuses on the interaction between competence and environmental demands, Person Environment Fit Theory places greater emphasis on achieving an optimal balance that promotes independence and participation. This perspective has informed many housing adaptation programmes by recognising that modifying the environment may be more effective than expecting older adults to adapt to unsuitable housing conditions.

At a broader level, the World Health Organization's Healthy Ageing Framework identifies supportive environments as essential for maintaining functional ability throughout later life (WHO, 2021) by recognising accessible housing as a key determinant of healthy ageing, social participation and quality of life. Similarly, principles of Universal Design advocate environments that are usable by people of all ages and abilities without requiring extensive future modification.

Although these frameworks collectively support the use of housing adaptations, they differ in emphasis. This suggests that housing adaptations should not be viewed solely as interventions for fall prevention but as components of healthier and more inclusive living environments. Integrating these perspectives provides a stronger foundation for evaluating the effectiveness of housing and disability adaptations within environmental health practice.

2.2 Housing Adaptations

Housing adaptations are recognised internationally as important interventions that enable older adults and people with disabilities to live safely and independently within their own homes. However, there is no universal definition. This lack of consistency has created variation across research, policy and professional practice, making comparison between studies more challenging.

In the United Kingdom, housing adaptations are generally defined as structural or physical modifications that improve accessibility, safety and functional independence within the home. Chandola and Rouxel (2022) describe adaptations as changes such as grab rails, level access showers, stair lifts, ramps and widened doorways that enable disabled people to carry out

everyday activities more safely. Similarly, Age UK (2024) argues that home adaptations are essential for supporting independent living, reducing falls and delaying admission into residential care, while also easing pressure on health and social care services.

Housing adaptations are increasingly viewed as investments rather than expenditures. While adaptations require substantial upfront funding, they may reduce long-term healthcare expenditure by preventing falls, delaying admission into residential care and reducing reliance on formal care services. Consequently, governments increasingly recognise housing adaptations as cost-effective preventative interventions rather than simply housing improvements (Carnemolla and Bridge, 2019).

International literature presents housing adaptations as broader interventions that can improve physical function and social participation, rather than focusing solely on injury prevention. Carnemolla and Bridge (2019) highlight these wider benefits, while Washington et al. (2023) found that combining home modifications with occupational therapy, nursing support and assistive devices produced greater functional improvements than environmental changes alone. Terminology also varies internationally, with “home modification” commonly used in Australia and the United States, while “home adaptation” is more frequent in the UK and Europe (Peace and Darton, 2020). Although meanings are similar, inconsistent terminology may affect database searches and evidence synthesis, potentially excluding relevant studies.

From an environmental health perspective, housing adaptations extend beyond accessibility. They represent preventative public health interventions that reduce environmental hazards, promote healthy ageing and support ageing in place. Rather than focusing solely on physical alterations, current evidence suggests that effective adaptation programmes integrate environmental modification with person-centred assessment and ongoing professional support. This broader understanding provides a stronger basis for evaluating how housing adaptations contribute to falls prevention and wider health outcomes among home dwelling older adults.

2.3 Falls Among Older Adults and the Role of the Home Environment

Falls among older adults are recognised as a major global public health concern because of their significant impact on health, independence and healthcare systems. Beyond physical injuries such as fractures and head trauma, falls often result in reduced confidence, fear of falling, social isolation and loss of functional independence with associated deconditioning.

The literature consistently identifies falls as multifactorial events resulting from the interaction between intrinsic and extrinsic risk factors. Intrinsic factors include advancing age, impaired balance, muscle weakness, visual impairment, cognitive decline and the use of multiple medications (Rubenstein & Josephson, 2002). While these factors increase individual susceptibility, they do not fully explain why many falls occur within the home environment. Extrinsic factors, including poor lighting, slippery floors, loose rugs, uneven surfaces and unsafe staircases, have been identified as preventable hazards that significantly increase fall risk (Lee, 2021; Lord et al., 2006).

Despite broad agreement that falls result from the interaction between personal and environmental factors, the emphasis within the literature differs considerably. Many intervention studies prioritise clinical approaches such as exercise programmes, medication reviews and balance training, arguing that improving physical function provides the greatest

reduction in fall risk (Dawson et al., 2024; Choudhary et al., 2026). In contrast, Clemson et al. (2008) and Nikolaus and Bach (2003) demonstrate that modifying the home environment can also produce meaningful reductions in falls, particularly among older adults with existing functional limitations. This suggests that environmental interventions should complement rather than replace clinical strategies.

From an environmental health perspective, these findings highlight an important evidence gap. Although environmental hazards are widely recognised as modifiable risk factors, housing adaptations remain less extensively investigated than medical or behavioural interventions. Consequently, further synthesis is required to determine which housing adaptations are most effective in reducing falls and supporting safe, independent living among home dwelling older adults.

2.4 Effectiveness of Housing Adaptations in Preventing Falls

The effectiveness of housing adaptations in reducing falls has been widely investigated, although the evidence is not entirely consistent. Overall, the literature suggests that environmental modifications contribute to reducing fall risk among older adults, particularly when interventions are tailored to individual needs. However, the magnitude of benefit appears to depend on the type of adaptation, characteristics of participants and the way interventions are delivered.

Several randomised controlled trials provide strong evidence supporting housing adaptations as effective fall prevention strategies. Clemson et al. (2008) reported that home hazard assessment followed by environmental modifications significantly reduced falls among older adults who had previously experienced falls. Similarly, Nikolaus and Bach (2003) found that a multidisciplinary home intervention programme incorporating environmental modifications reduced both the frequency of falls and recurrent falls among frail older adults. These findings suggest that adapting the physical environment can successfully address modifiable hazards that contribute to fall risk.

However, not all studies report equally positive outcomes. Tse (2005) argued that housing modifications alone produced smaller effects than multifactorial interventions combining exercise, vision correction and medication review. This view is supported by Choudhary et al. (2026), who concluded that exercise-based interventions remain among the most effective strategies for preventing falls. While these findings may appear to challenge the value of housing adaptations, they also highlight an important methodological issue. Many studies evaluating environmental interventions include participants with varying levels of functional ability, making direct comparison difficult. Consequently, differences in outcomes may reflect participant characteristics rather than limitations of housing adaptations themselves.

More recent evidence has shifted attention towards person-centred interventions that integrate environmental modification with professional support. Szanton et al. (2021) demonstrated that the CAPABLE programme, which combines home modifications with occupational therapy and nursing input, consistently improved functional independence and reduced disability across multiple trials. Likewise, Stark et al. (2021) reported that targeted home hazard removal significantly reduced falls among community dwelling older adults identified as being at high risk. These studies suggest that housing adaptations achieve greater benefits when delivered as part of comprehensive intervention programmes rather than isolated structural changes.

Housing adaptations should be evaluated not only by their effect on falls but also by their economic value and sustainability within publicly funded healthcare systems. Carnemolla and Bridge (2019) found that home modifications reduced reliance on formal and informal care, while Szanton et al. (2021) reported that the CAPABLE programme generated healthcare savings exceeding implementation costs through reduced healthcare utilisation. These findings suggest that initial investment in adaptations may generate long-term savings by reducing hospital admissions, care requirements and dependence. Consequently, adaptations can be viewed as preventative investments rather than short-term expenditure. However, evidence on the cost-effectiveness of specific adaptations remains limited.

From an environmental health perspective, the evidence indicates that housing adaptations represent more than physical improvements to the home. They are preventative interventions that reduce environmental hazards, promote independent living and potentially lower healthcare costs. Nevertheless, variation in intervention design, outcome measures and follow up periods limits direct comparison across studies. This reinforces the need for systematic synthesis to identify which housing adaptations are most effective, for whom they work best and under what circumstances they provide the greatest health and economic benefits in both the short and longer term.

2.5 Government Policy and Environmental Health Practice

Government policies increasingly recognise housing adaptations as an important component of healthy ageing and falls prevention. In England, the Disabled Facilities Grant (DFG) provides financial support for essential home adaptations to enable disabled people to live safely and independently (Department of Health and Social Care, 2022). These policies reflect a shift from reactive healthcare towards preventative approaches that reduce avoidable injuries and support ageing in place. However, evidence suggests that policy intentions are not always translated into effective practice.

Age UK (2024) argues that despite increased government investment, many older adults continue to experience lengthy delays in accessing housing adaptations because of fragmented assessment processes, workforce shortages and administrative barriers. As a result, individuals may remain exposed to preventable environmental hazards while waiting months or even years for relatively simple adaptations. This suggests that the effectiveness of housing adaptation programmes depends not only on the intervention itself but also on timely implementation and quality of service delivery.

From an environmental health perspective, these findings highlight the importance of proactive housing assessment and hazard prevention. Environmental Health Practitioners have a key role in identifying housing risks, promoting accessible living environments and supporting evidence-based interventions that reduce falls. Strengthening collaboration between housing, health and social care services is therefore essential to maximise the public health benefits of housing adaptations.

2.6 Literature Gap

The existing literature provides strong evidence that housing adaptations can improve safety, support independent living and reduce the risk of falls among older adults. Randomised control trials, systematic reviews and economic evaluations have consistently demonstrated positive

outcomes associated with interventions such as home hazard removal, grab rails, stair lifts and occupational therapy led home modification programmes (Nikolaus and Bach, 2003; Clemson et al., 2019). More recent studies have also shown that housing adaptations can reduce healthcare utilisation while generating long-term cost savings (Szanton et al., 2021).

Despite these advances, important gaps remain. Existing studies differ considerably in their intervention types, outcome measures, follow up periods and participant characteristics, making comparison across studies difficult. Much of the evidence also focuses on clinical effectiveness, while relatively limited attention has been given to implementation challenges, policy delivery, environmental health practice and the economic sustainability of housing adaptation programmes across different countries. Furthermore, the use of inconsistent terminology, including home modification, housing adaptation and disability adaptation, has fragmented the evidence base and complicated literature retrieval. A comprehensive systematic review is therefore required to critically synthesise the available evidence, identify areas of agreement and disagreement, and provide evidence-based recommendations for policy, environmental health practice and future

CHAPTER THREE

METHODOLOGY

3.1 Research Design

This study adopts a systematic review methodology to critically evaluate the effectiveness of housing adaptations in preventing falls among home dwelling older adults. A systematic review was selected because it provides a transparent, structured and reproducible approach to identifying, appraising and synthesising evidence from existing studies that address a clearly defined research question. Unlike a traditional narrative review, a systematic review follows predefined procedures that minimise selection bias and improve the reliability and validity of the findings (Page et al., 2021). This approach is appropriate because the present study seeks to synthesise evidence from multiple studies rather than generate primary data.

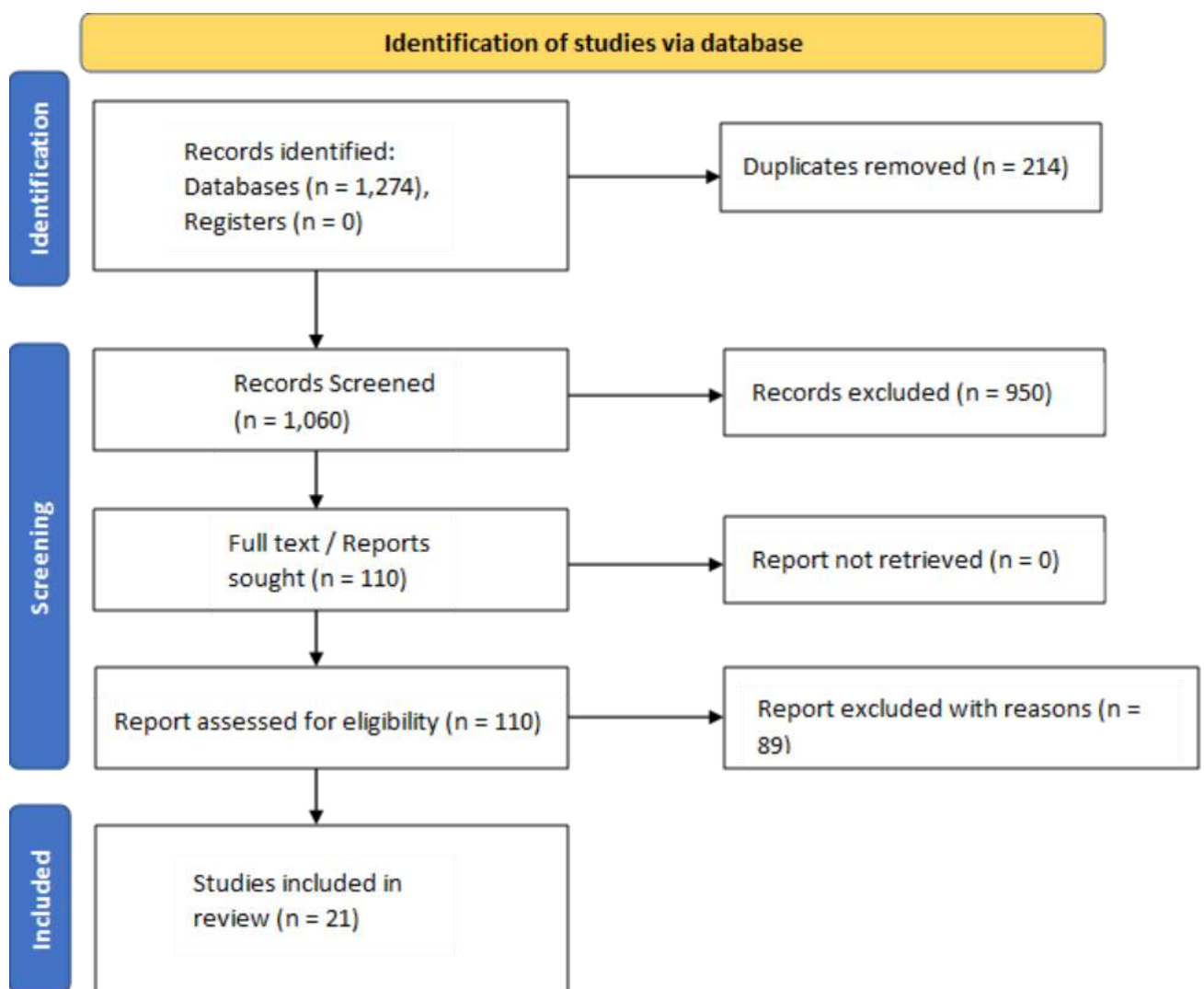


Figure 1: PRISMA 2020 flow diagram illustrating the study selection process for the systematic review (adapted from Page et al., 2021).

The review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines to ensure transparency throughout

the review process (Page et al., 2021). The review process involved developing a comprehensive search strategy, applying predefined inclusion and exclusion criteria, screening studies, critically appraising methodological quality and synthesising the findings narratively.

3.2 Search Strategy

A comprehensive literature search was undertaken across several electronic databases, including PubMed, Scopus, Web of Science, CINAHL, MEDLINE, Cochrane Library and Google Scholar, to identify relevant peer-reviewed studies.

The search strategy was developed using the PICO framework, where the population comprised home dwelling older adults aged 65 years and above, the intervention included housing adaptations, the comparison consisted of usual care or no adaptations where applicable, and the outcome focused on falls prevention and reduction in fall-related injuries. Boolean operators (AND, OR) and truncation were used to combine search terms effectively. Keywords included older adults, housing adaptations, home modifications, disability adaptations, fall prevention, community dwelling and ageing in place. Reference lists of relevant articles were also manually searched to identify additional studies.

3.3 Eligibility Criteria

Studies were included if they were published in English, involved community or home dwelling older adults aged 65 years or above, evaluated housing or disability adaptations designed to reduce falls and reported outcomes related to fall incidence or fall severity. Randomised controlled trials, cohort studies, quasi-experimental studies and systematic reviews published between 2000 and 2025 were considered.

Studies conducted in hospitals, nursing homes or long-term residential care facilities were excluded because the review focuses on independent older adults living within the community. Conference abstracts, editorials, opinion papers and studies without full-text availability were also excluded to ensure methodological quality.

3.4 Study Selection and Quality Appraisal

The study selection process followed the PRISMA 2020 framework (Page et al., 2021). Titles and abstracts retrieved from the database searches were screened against the eligibility criteria before full-text articles were assessed for inclusion. Duplicate records were removed prior to screening.

The methodological quality of the included studies was assessed using the Critical Appraisal Skills Programme (CASP) checklists, which provide structured criteria for evaluating the validity, reliability and applicability of research evidence (CASP, 2024). Quality appraisal enabled the strengths and limitations of each study to be considered during evidence synthesis, thereby improving the credibility of the review findings.

3.5 Data Extraction and Synthesis

A standardised data extraction form was used to record key information from each included study, including author, publication year, country, study design, participant characteristics, type of housing adaptation, outcome measures and principal findings. The extracted data were synthesised using narrative synthesis because of the anticipated variation in intervention types, study designs and outcome measures. Narrative synthesis allows findings from

heterogeneous studies to be systematically compared, interpreted and critically discussed while identifying common themes, differences and research gaps (Popay et al., 2006).

3.6 Ethical Considerations

Ethical approval was not required because this study utilised published secondary data and did not involve the collection of primary data from human participants. Nevertheless, ethical research principles were maintained throughout the review by accurately reporting findings, acknowledging all original sources and avoiding plagiarism.

CHAPTER FOUR

RESULTS

4.1 Overview of Included Studies

Following the screening process 21 studies met the inclusion criteria and were included in this systematic review. The evidence comprised randomised controlled trials, systematic reviews, meta-analyses, observational studies and government reports published between 2000 and 2025. The studies were conducted across several countries, including the United Kingdom, Australia, the United States, Germany, Canada, France, New Zealand and South Korea, reflecting the global relevance of the topic. Interventions investigated ranged from simple environmental modifications, such as grab rails, improved lighting and non-slip flooring, to more comprehensive programmes involving occupational therapy, home hazard assessment and multidisciplinary support (Cumming et al., 1999; Nikolaus & Bach, 2003; Stark et al., 2021). The characteristics of the included studies are summarised in Table 4.1, which provides an overview of the study designs, participant characteristics, interventions and key outcomes.

Table 1: Characteristics of Studies Included in the Systematic Review

Author (Year)	Country	Study Design	Participants	Housing/Disability Adaptation	Outcome Measures
Cumming et al. (1999)	Australia	Randomised Controlled Trial	Community dwelling older adults	Home hazard assessment and environmental modifications	Falls, fall incidence
Stevens et al. (2001)	Australia	Randomised Controlled Trial	Older adults	Multifactorial falls prevention	Falls
Hogan et al. (2001)	Canada	Randomised Controlled Trial	Community dwelling older adults	Community consultation and environmental advice	Falls
Day et al. (2002)	Australia	Randomised Controlled Trial	Older adults living independently	Multifactorial intervention including home modifications	Fall incidence
Pardessus et al. (2002)	France	Randomised Controlled Trial	Older adults	Home visits and environmental assessment	Falls, autonomy
Nikolaus & Bach (2003)	Germany	Randomised Controlled Trial	Frail community	Home Intervention Team (Falls-HIT)	Falls, recurrent falls

			dwelling older adults		
Shaw et al. (2003)	United Kingdom	Randomised Controlled Trial	Older adults with cognitive impairment	Multifactorial intervention including environmental assessment	Falls
Posner et al. (2004)	United States	Randomised Controlled Trial	Older adults at risk of falls	Home safety intervention	Falls, injuries
Campbell et al. (2005)	New Zealand	Randomised Controlled Trial	Older adults with severe visual impairment	Environmental modification and vision intervention	Falls
Gitlin et al. (2006)	United States	Randomised Controlled Trial	Community dwelling older adults	Multicomponent home intervention	Functional ability, falls
Lord, Menz & Sherrington (2006)	Australia	Review Article	Older adults	Home modifications	Environment al hazards, falls
Clemson et al. (2008)	Australia	Meta- analysis	Community dwelling older adults	Environmental interventions	Falls
Carnemolla & Bridge (2019)	Australia	Observation al Study	Older adults and people with disability	Home modifications	Care needs, independenc e
Clemson et al. (2023)	Internation al	Systematic Review	Community dwelling older adults	Environmental interventions	Falls
Stark et al. (2021)	United States	Randomised Clinical Trial	Community dwelling older adults	Home Hazard Removal Program	Falls
Szanton et al. (2021)	United States	Systematic Evaluation of CAPABLE Programme	Older adults with functional limitations	Home modifications, occupational therapy, nursing	Disability, ADLs, falls

World Health Organization (2021)	Global	Policy Framework	Older adults	Healthy ageing and supportive environments	Healthy ageing
Department of Health and Social Care (2022)	United Kingdom	Government Guidance	Disabled people	Disabled Facilities Grant adaptations	Accessibility
Cha (2025)	South Korea	Systematic Review	Older adults	Home modifications	Ageing in place
Age UK (2024)	United Kingdom	Policy Report	Older adults	Disabled Facilities Grant adaptations	Service delivery
York Health Economics Consortium (ROI Model)	United Kingdom	Economic Evaluation	Older adults	Home assessment and modification	Cost effectiveness

Quantitative findings varied considerably across the included evidence. Cumming et al. (1999) reported a relative reduction in falls, with the greatest benefit observed among participants with previous falls. Clemson et al. (2008) similarly identified a significant pooled effect, with a relative risk of 0.79 (95% CI 0.65–0.97), equivalent to an approximately 21% reduction in fall risk. However, Stevens et al. (2001) found no statistically significant reduction in falls, while Stark et al. (2021) reported a lower fall rate as a secondary outcome but did not demonstrate a significant effect on the primary fall hazard outcome. These differences indicate that the effectiveness of housing and environmental interventions was not consistent across populations or intervention approaches. Detailed quantitative findings are presented in Appendix B, Table B1.

CHAPTER FIVE

DISCUSSION, IMPLICATIONS AND CONCLUSIONS

5.1 Effectiveness of Housing Adaptations in Reducing Falls

The evidence synthesised in this review indicates that housing adaptations are effective in reducing falls among home dwelling older adults, although their effectiveness varies according to participant characteristics, intervention intensity and multidisciplinary involvement. Across the included studies, the strongest evidence was derived from randomised controlled trials and systematic reviews, increasing confidence in the reliability of the reported outcomes.

Cumming et al. (1999) and Nikolaus and Bach (2003) consistently demonstrated that home hazard assessment and targeted environmental modifications significantly reduced falls among older adults identified as being at high risk. These findings suggest that interventions tailored to individual needs are more effective than generic home safety advice. However, Day et al. (2002) reported that housing adaptations achieved greater reductions in falls when combined with exercise programmes, medication review and vision correction. Rather than contradicting earlier findings, this indicates that falls result from complex interactions between intrinsic and extrinsic risk factors, requiring multifactorial interventions for maximum effectiveness.

Similar conclusions were reached by Clemson et al. (2023), who found that home hazard removal was particularly beneficial for older adults with an established history of falls, while evidence for lower-risk populations was less consistent. This suggests that the effectiveness of housing adaptations is influenced by appropriate targeting, with greater benefits achieved when interventions are directed towards individuals with identifiable environmental risks and functional limitations.

These findings support Environmental Press Theory, which suggests that reducing environmental demands enables older adults to function more safely within their homes (Lawton & Nahemow, 1973). Similarly, the findings align with the Person Environment Fit Theory, which emphasises that improving compatibility between individuals and their living environments enhances independence and wellbeing (Iwarsson & Ståhl, 2003). The benefits of housing adaptations are influenced not only by their technical suitability but also by how they are perceived and accommodated within the home. Some older people may associate adaptations with ageing, vulnerability or a medicalised home which can discourage or delay their acceptance (Bailey et al., 2019).

The review also demonstrates that housing adaptations should not be viewed as stand-alone interventions. Studies reporting the greatest reductions in falls frequently combined environmental modifications with occupational therapy, nursing support or broader falls prevention programmes. This suggests that addressing environmental hazards alone may be insufficient where intrinsic risk factors, such as poor balance or chronic illness, remain unmanaged. Furthermore, the evidence indicates that the benefits of housing adaptations extend beyond falls prevention to include improved functional ability, greater independence and reduced healthcare utilisation.

While many studies measured fall incidence as the primary outcome, several authors argued that the wider benefits of home adaptations are equally significant. Gitlin et al. (2006) found that multicomponent home interventions improved older adults' ability to perform activities of daily living, enabling them to remain independent for longer. Similarly, Szanton et al. (2021) reported that the CAPABLE programme improved functional ability, confidence and overall wellbeing by combining home modifications with occupational therapy and nursing support.

Carnemolla and Bridge (2019) adopted a broader perspective by demonstrating that home modifications reduced dependence on both formal and informal care while supporting participation in everyday activities. This suggests that the value of housing adaptations extends beyond preventing injuries to promoting social inclusion and healthy ageing. In contrast, some studies primarily focused on clinical outcomes such as falls and fractures, giving less attention to patient-centred outcomes including confidence, dignity and quality of life. Consequently, relying solely on fall incidence may underestimate the overall impact of housing adaptations. Collectively, the evidence indicates that successful housing adaptation programmes should be evaluated not only by their ability to prevent falls but also by their contribution to maintaining independence and supporting older adults to age safely within their own homes.

These findings reinforce the view that housing adaptations represent preventative public health interventions that contribute to healthier ageing and support evidence based environmental health practice. From an environmental health perspective, these findings reinforce the importance of identifying and modifying domestic hazards before injuries occur. Nevertheless, differences in intervention design, follow-up periods and outcome measures across studies limit direct comparison and indicate that housing adaptations should be considered one component of a broader falls prevention strategy rather than a universal solution for all older adults.

5.2 Methodological Quality and Strength of the Available Evidence

The evidence base demonstrates varying levels of methodological strength, requiring the findings to be interpreted with appropriate caution. Several randomised controlled trials, including Cumming et al. (1999), Nikolaus and Bach (2003), Day et al. (2002) and Gitlin et al. (2006), provide relatively strong evidence that targeted home interventions can reduce falls and improve functional outcomes. This is reinforced by the higher-level synthesis provided by Clemson et al. (2008) and Clemson et al. (2023), which identified greater benefits among older adults at increased risk of falling. Nevertheless, Stark et al. (2021) reported no significant reduction in fall hazard, demonstrating that positive effects are not consistent across all interventions. Observational evidence, such as Carnemolla and Bridge (2019), contributes valuable information on independence and care needs, while policy and economic sources provide insight into implementation and cost effectiveness. Overall, the evidence supports targeted housing adaptations, but differences in study quality, populations, interventions and outcome measures limit the certainty of conclusions and indicate a need for further robust research.

There was limited evidence available which could possibly be because of the complexity of assessing housing adaptations. Unlike controlled clinical interventions, their effects are shaped by the person, the physical characteristics of the dwelling, the type of adaptation and the wider circumstances in which it is used. This complexity makes it difficult to isolate the specific contribution of an adaptation to outcomes such as falls and independence. Previous UK research has highlighted the limited evidence available on what adaptations are effective, for whom and in which circumstances (Russell et al., 2017). However, a limited evidence base should not necessarily be interpreted as evidence that adaptations are ineffective.

There is also however an important limitation concerning the pathway through which people obtain housing adaptations. In England, publicly supported adaptations commonly involve an assessment of individual needs, often undertaken by an occupational therapist, before adaptations are recommended or funded. The evidence also indicates that delays and variations in local-authority provision can lead some people with sufficient financial resources to arrange and pay for adaptations privately (Wu and Grundy, 2025). Consequently, the existing evidence provides limited understanding of whether outcomes differ between adaptations obtained through formal publicly funded pathways and those independently arranged and funded by individuals. This represents an important evidence gap (Russell et al., 2017).

5.3 Implications for UK Policy Development

The findings of this review have important implications for individuals, governments and environmental health practice. For older adults, timely housing and disability adaptations can reduce falls, maintain independence and support ageing in place, thereby improving quality of life and reducing dependence on formal and informal care. From a government perspective, investing in housing adaptations can reduce emergency hospital admissions, delay admission to residential care, and lower long-term healthcare and social care costs. In the UK, DFG funding has increased substantially over time, demonstrating the growing policy importance attached to housing adaptations in England. Funding has risen significantly since the introduction of the Better Care Fund in 2016/17, reaching £711 million in 2024/25 and 2025/26, compared with less than half this amount in 2015/16 (Foundations, 2026). This scale of public investment also highlights the need for stronger evaluation to establish whether adaptations deliver health, social and economic benefits proportionate to this expenditure.

In addition to these health and policy considerations, the findings suggest that housing adaptations provide important economic benefits. Although adaptations such as stair lifts, level access showers and structural modifications require initial investment, several studies indicate that these costs may be offset by long-term reductions in healthcare and social care expenditure. Carnemolla and Bridge (2019) found that home modifications reduced both formal and informal care requirements, while Szanton et al. (2021) reported that the CAPABLE programme generated healthcare savings that exceeded implementation costs through reduced hospital use and improved functional independence.

However, despite this evidence, the literature highlights continuing challenges in policy implementation. Age UK (2024) argues that delays in delivering housing adaptations remain common despite increased government funding, limiting the potential benefits of preventative interventions. Similarly, the Department of Health and Social Care (2022) recognises the Disabled Facilities Grant as an important mechanism for supporting independent living, but

effective outcomes depend on timely assessment and installation of adaptations. From a government perspective, early investment in housing adaptations may represent a more cost-effective strategy than managing the long-term consequences of preventable falls among older adults.

5.4 Implications for Environmental Health Practice

The findings highlight the important role of Environmental Health Practitioners in preventing falls through the identification and management of housing hazards. Housing adaptations should be viewed as preventative public health interventions that support safe, accessible and healthy living environments rather than simply structural modifications. The evidence suggests that effective implementation requires collaboration between environmental health professionals, occupational therapists, healthcare providers and housing authorities (Department of Health and Social Care, 2022). However, delays in assessment and adaptation delivery may reduce the effectiveness of these interventions. Strengthening multidisciplinary working and promoting timely access to housing adaptations is likely to improve health outcomes and support healthy ageing within the community.

In addition, local authorities have an important role in delivering housing adaptations, yet differences in service capacity and fragmented responsibilities can make consistent evaluation and outcome monitoring challenging. Research has identified fragmentation between housing, health and social care services as a barrier to efficient and effective adaptation delivery (Liu, 2018). Government guidance consequently recommends regular review of adaptation services to determine whether they are achieving intended outcomes and identifies integrated working between housing and social care as good practice (DLUHC, 2022). Strengthening evaluation capacity and standardising outcome measurement could therefore help local authorities demonstrate effectiveness and support more evidence-informed commissioning and service improvement. Unfortunately, local authorities conducting their own research into the effectiveness of their local housing adaptation service requires expertise they may not possess in-house. Alternatively, commissioning external quality research to be undertaken is likely to involve costs that cash-strapped councils would be unable to accommodate.

A potential policy implication is to place greater emphasis on accessibility and adaptability when designing new homes. In England, M4(1) remains the baseline requirement, while the higher Building Regulation M4(2) and M4(3) standards may be introduced through local planning policies where there is demonstrated need. Strengthening the use of these higher standards could help create homes that accommodate changing mobility needs and reduce future dependence on retrospective adaptations. However, the potential benefits should not be assumed, as further research is needed to determine whether more accessible housing design can reduce falls, improve independence and lower the financial burden associated with subsequent adaptations.

5.5 Strengths and Limitations

This review has several strengths. The use of a systematic review design, guided by the PRISMA 2020 framework, enhanced the transparency and reproducibility of the study. Searching multiple electronic databases and critically appraising the included studies using the CASP checklist strengthened the reliability of the findings. However, some limitations should be acknowledged. Only studies published in English were included, which may have

excluded relevant evidence from other languages. In addition, variations in study design, intervention types and outcome measures limited direct comparison between studies and prevented quantitative synthesis through meta-analysis. These limitations should be considered when interpreting the findings.

5.6 Recommendations

Future research should evaluate the long-term effectiveness and cost effectiveness of different housing and disability adaptations across diverse healthcare systems. Greater attention should also be given to implementation barriers, particularly in low- and middle-income countries where evidence remains limited. In practice, governments should improve the timely delivery of housing adaptation programmes through stronger collaboration between housing, health and environmental health services. Earlier assessment and intervention may maximise the health, social and economic benefits of housing adaptations for older adults.

5.7 Conclusion

This systematic review concludes that housing adaptations are effective interventions for reducing falls among home dwelling older adults while supporting independence and healthy ageing. Although implementation challenges remain, the evidence demonstrates important health, economic and environmental benefits. Strengthening policy implementation and multidisciplinary collaboration will help maximise the contribution of housing adaptations to safer and more sustainable communities.

References

Age UK (2024a) *A step change: improving delivery of the Disabled Facilities Grant*. London: Age UK.

Age UK (2024b) *Older people at risk of being forced into residential care due to massive delays in making adaptations to homes* [online]. Available from: [Age UK](#) [Accessed 2 August 2026].

Campbell, A.J., Robertson, M.C., La Grow, S.J., Kerse, N.M., Sanderson, G.F., Jacobs, R.J., Sharp, D.M. and Hale, L.A. (2005) Randomised controlled trial of prevention of falls in people aged 75 years and over with severe visual impairment: the VIP trial. *BMJ* [online]. 331 (7520), p.817. [Accessed 23 August 2026].

Carnemolla, P. and Bridge, C. (2019) Housing design and community care: how home modifications reduce care needs of older people and people with disability. *International Journal of Environmental Research and Public Health* [online]. 16 (11): 1951. [Accessed 23 August 2026].

Cha, S.-M. (2025) A systematic review of home modifications for aging in place in older adults. *Healthcare* [online]. 13 (7): 752. [Accessed 13 August 2026].

Chandola, T. and Rouxel, P. (2022) Home modifications and disability outcomes: a longitudinal study of older adults living in England. *The Lancet Regional Health – Europe* [online]. 18: 100397. [Accessed 23 August 2026].

Chen, Y., Dai, F., Huang, S., Qi, D., Peng, C., Zhang, A., Wang, Y., Gu, Y. and Guo, J. (2025) Global, regional, and national burden of falls among older adults: findings from the Global Burden of Disease Study 2021 and projections to 2040. *npj Aging* [online]. 11 (1). [Accessed 3 August 2026].

Choudhary, P.K., Choudhary, S., Saha, S., Katanić, B., Ilbak, I. and Tornóczy, G.J. (2026) Effectiveness of balance- and strength-based exercise interventions for fall prevention in community-dwelling older adults: a systematic review of randomised controlled trials. *Life* [online]. 16 (1): 41. [Accessed 10 August 2026].

Clemson, L., Mackenzie, L., Ballinger, C., Close, J.C.T. and Cumming, R.G. (2008) Environmental interventions to prevent falls in community-dwelling older people: a meta-analysis of randomised trials. *Journal of Aging and Health* [online]. 20 (8), pp.954–971. [Accessed 12 August 2026].

Clemson, L., Stark, S., Pighills, A.C., Torgerson, D.J., Sherrington, C. and Lamb, S.E. (2019) Environmental interventions for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews* [online]. 2019 (2): CD013258. [Accessed 23 August 2026].

Critical Appraisal Skills Programme (2024) *CASP checklists* [online]. Available from: [Critical Appraisal Skills Programme](#) [Accessed 3 August 2026].

Cumming, R.G., Thomas, M., Szonyi, G., Salkeld, G., O'Neill, E., Westbury, C. and Frampton, G. (1999) Home visits by an occupational therapist for assessment and modification of environmental hazards: a randomised trial of falls prevention. *Journal of the American Geriatrics Society* [online]. 47 (12), pp.1397–1402. [Accessed 2 August 2026].

Dawson, R., Suen, J., Sherrington, C., Kwok, W., Pinheiro, M.B., Haynes, A., McLennan, C., Sutcliffe, K., Kneale, D. and Dyer, S. (2024) Effective fall prevention exercise in residential aged care: an intervention component analysis from an updated systematic review. *British Journal of Sports Medicine* [online]. 58 (12). [Accessed 21 August 2026].

Day, L., Fildes, B., Gordon, I., Fitzharris, M., Flamer, H. and Lord, S. (2002) Randomised factorial trial of falls prevention among older people living in their own homes. *BMJ* [online]. 325 (7356): 128. [Accessed 23 August 2026].

Department of Health and Social Care (2022) *Disabled Facilities Grant (DFG) delivery: guidance for local authorities in England* [online]. London: Department of Health and Social Care. Available from: [GOV.UK DFG delivery guidance](https://www.gov.uk/government/guidance/disabled-facilities-grant-dfg-delivery-guidance) [Accessed 12 August 2026].

Department of Health and Social Care and Ministry of Housing, Communities and Local Government (2025) *Better Care Fund policy framework 2025 to 2026* [online]. London: Department of Health and Social Care. Available from: [GOV.UK Better Care Fund policy framework 2025 to 2026](https://www.gov.uk/government/publications/better-care-fund-policy-framework-2025-to-2026) [Accessed 23 August 2026].

Department of Health and Social Care and Ministry of Housing, Communities and Local Government (2026) *Better Care Fund framework 2026 to 2027* [online]. London: Department of Health and Social Care. Available from: [GOV.UK Better Care Fund framework 2026 to 2027](https://www.gov.uk/government/publications/better-care-fund-framework-2026-to-2027) [Accessed 12 August 2026].

Gitlin, L.N., Winter, L., Dennis, M.P., Corcoran, M., Schinfeld, S. and Hauck, W.W. (2006) A randomised trial of a multicomponent home intervention to reduce functional difficulties in older adults. *Journal of the American Geriatrics Society* [online]. 54 (5), pp.809–816. [Accessed 11 August 2026].

Hogan, D.B., MacDonald, F.A., Betts, J., Bricker, S., Ebly, E.M., Delarue, B., Fung, T.S., Harbidge, C., Hunter, M., Maxwell, C.J. and Metcalf, B. (2001) A randomised controlled trial of a community-based consultation service to prevent falls. *Canadian Medical Association Journal* [online]. 165 (5), pp.537–543. [Accessed 11 August 2026].

Hollinghurst, J., Daniels, H., Fry, R., Akbari, A., Rodgers, S., Watkins, A., Hillcoat-Nallétamby, S., Williams, N., Nikolova, S., Meads, D. and Clegg, A. (2022) Do home adaptation interventions help to reduce emergency fall admissions? A national longitudinal data-linkage study of 657,536 older adults living in Wales (UK) between 2010 and 2017. *Age and Ageing* [online]. 51 (1): afab201. [Accessed 5 August 2026].

House of Commons Library (2025) *UK disability statistics: prevalence and life experiences* [online]. London: House of Commons Library. Available from: [House of Commons Library disability statistics](https://www.parliament.uk/library/publications/publication/2025-07-16/uk-disability-statistics-prevalence-and-life-experiences) [Accessed 21 August 2026].

Iwarsson, S. (2005) A long-term perspective on person–environment fit and ADL dependence among older Swedish adults. *The Gerontologist* [online]. 45 (3), pp.327–336. [Accessed 11 August 2026].

Iwarsson, S. and Ståhl, A. (2003) Accessibility, usability and universal design: positioning and definition of concepts describing person–environment relationships. *Disability and Rehabilitation* [online]. 25 (2), pp.57–66. [Accessed 11 August 2026].

Lawton, M.P. and Nahemow, L. (1973) Ecology and the aging process. In: Eisdorfer, C. and Lawton, M.P., eds. *The psychology of adult development and aging*. Washington, DC: American Psychological Association, pp.619–674.

Lee, S. (2021) Falls associated with indoor and outdoor environmental hazards among community-dwelling older adults between men and women. *BMC Geriatrics* [online]. 21 (1). [Accessed 23 August 2026].

Lien, L.L., Steggell, C.D. and Iwarsson, S. (2015) Adaptive strategies and person–environment fit among functionally limited older adults aging in place: a mixed methods approach. *International Journal of Environmental Research and Public Health* [online]. 12 (9), pp.11954–11974. [Accessed 12 August 2026].

Lord, S.R., Menz, H.B. and Sherrington, C. (2006) Home environment risk factors for falls in older people and the efficacy of home modifications. *Age and Ageing* [online]. 35 (Suppl. 2), pp.ii55–ii59. [Accessed 23 August 2026].

NHS (2023) *Home adaptations* [online]. Available from: [NHS home adaptations guidance](#) [Accessed 23 August 2026].

Nikolaus, T. and Bach, M. (2003) Preventing falls in community-dwelling frail older people using a home intervention team (HIT): results from the randomised Falls-HIT trial. *Journal of the American Geriatrics Society* [online]. 51 (3), pp.300–305. [Accessed 23 August 2026].

Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R. *et al.* (2021) The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* [online]. 372: n71. [Accessed 23 August 2026].

Pardessus, V., Puisieux, F., Di Pompeo, C., Gaudefroy, C., Thevenon, A. and Dewailly, P. (2002) Benefits of home visits for falls and autonomy in the elderly: a randomised trial study. *American Journal of Physical Medicine and Rehabilitation* [online]. 81 (4), pp.247–252. [Accessed 21 August 2026].

Peace, S. and Darton, R. (2020) Cross-cultural comparison of the impact of housing modification/adaptation for supporting older people at home: an introduction. *Journal of Aging and Environment* [online]. 34 (2), pp.104–109. [Accessed 21 August 2026].

Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., Britten, N., Roen, K. and Duffy, S. (2006) *Guidance on the conduct of narrative synthesis in systematic reviews*. Lancaster: Lancaster University.

Posner, J.C., Hawkins, L.A., Garcia-Espana, J.F. and Durbin, D.R. (2004) A randomised clinical trial of a home safety intervention based in an emergency department setting. *Pediatrics* [online]. 113 (6), pp.1603–1608. [Accessed 3 August 2026].

Rubenstein, L.Z. and Josephson, K.R. (2002) The epidemiology of falls and syncope. *Clinics in Geriatric Medicine* [online]. 18 (2), pp.141–158. [Accessed 23 August 2026].

Shaw, F.E., Bond, J., Richardson, D.A., Dawson, P., Steen, I.N., McKeith, I.G. and Kenny, R.A. (2003) Multifactorial intervention after a fall in older people with cognitive impairment and dementia presenting to the accident and emergency department: randomised controlled trial. *BMJ* [online]. 326 (7380): 73. [Accessed 15 August 2026].

Sheahan, J., Berry, K., Vines, J., Lewis, S., Pschetz, L., Pearce, C., Wilson, C., Wright, F. and Wilkinson, H. (2026) Making ageing-in-place work. *Wellbeing, Space and Society* [online]. 10: 100411. [Accessed 23 August 2026].

Stark, S., Keglovits, M., Somerville, E., Hu, Y.-L., Barker, A., Sykora, D. and Yan, Y. (2021) Home hazard removal to reduce falls among community-dwelling older adults. *JAMA Network Open* [online]. 4 (8): e2122044. [Accessed 18 August 2026].

Stevens, M., Holman, C.D.J., Bennett, N. and de Klerk, N. (2001) Preventing falls in older people: outcome evaluation of a randomised controlled trial. *Journal of the American Geriatrics Society* [online]. 49 (11), pp.1448–1455. [Accessed 21 August 2026].

Szanton, S.L., Leff, B., Li, Q., Breysse, J., Spoelstra, S., Kell, J., Purvis, J., Xue, Q.L., Wilson, J. and Gitlin, L.N. (2021) CAPABLE program improves disability in multiple randomised trials. *Journal of the American Geriatrics Society* [online]. 69 (12), pp.3631–3640. [Accessed 23 August 2026].

Tse, T. (2005) The environment and falls prevention: do environmental modifications make a difference? *Australian Occupational Therapy Journal* [online]. 52 (4), pp.271–281. [Accessed 23 August 2026].

Washington, S.E., Edwards, E., Stiles, D.L. and West Bruce, S. (2023) Implementation of the CAPABLE program with older adults during the COVID-19 pandemic. *OTJR: Occupational Therapy Journal of Research* [online]. 43 (4), pp.683–690. [Accessed 20 August 2026].

Wilson, W. and Cromarty, H. (2023) *Disabled facilities grants for home adaptations* [online]. London: House of Commons Library. Available from: [House of Commons Library DFG briefing](#) [Accessed 10 August 2026].

World Health Organization (2021a) *Falls* [online]. Available from: [World Health Organization falls fact sheet](#) [Accessed 10 August 2026].

World Health Organization (2021b) *Step safely: strategies for preventing and managing falls across the life-course* [online]. Geneva: World Health Organization. Available from: [World Health Organization Step Safely report](#) [Accessed 11 August 2026].

York Health Economics Consortium (2018) *A return on investment tool for the assessment of falls prevention programmes for older people living in the community*. York: York Health Economics Consortium.

Zhang, Z., Zhang, W., Zhang, S., Chen, Y., Wang, X., Fujii, Y. and Furuya, N. (2024) Person–environment fit theory in built environment: a scoping review. *Journal of Asian Architecture and Building Engineering* [online]. 24 (4), pp.1–17. [Accessed 23 August 2026].

Appendix A: DFG Funding From 2011/12 to 2025/26.

YEAR	DFG ALLOCATION (£m)	ADDITIONAL IN-YEAR FUNDING (M. £)
2011/2012	200	
2012/2013	220	
2013/2014	200	
2014/2015	185	
2015/2016	220	
2016/2017	394	
2017/2018	431	
2018/2019	468	
2019/2020	505	
2020/2021	505	68
2021/2022	573	
2022/2023	573	
2023/2024	573	
2024/2025	635	86
2025/2026	711	
2026/2027	723	

Appendix B: Detailed Quantitative Evidence

Table B1: Quantitative Findings on the Effectiveness of Housing and Disability Adaptations

Study	Intervention / focus	Quantitative finding	Effect on falls	Critical interpretation
Cumming et al. (1999)	Occupational therapist home assessment and environmental modification	36% of participants in the intervention group fell compared with 45% in the control group. Among previous fallers, RR was 0.64 (95% CI 0.50–0.83).	20% relative reduction overall and approximately 36% among previous fallers.	Strong evidence that targeted home assessment and modification can reduce falls, particularly among older adults with a previous history of falling. The stronger effect among previous fallers suggests that risk targeting is important.
Stevens et al. (2001)	Home based falls prevention intervention	Adjusted rate ratio for all falls was 1.02 (95% CI 0.83–1.27).	No statistically significant reduction.	Contrasts with Cumming et al. (1999), showing that a home based intervention does not automatically produce fewer falls. Differences in intervention content and participant characteristics may explain the weaker effect.
Hogan et al. (2001)	Community based falls prevention consultation	No clear statistically significant reduction attributable specifically to environmental modification was demonstrated.	No clear independent effect established.	Environmental advice formed part of a broader falls prevention intervention. The design therefore limits the ability to isolate the contribution of housing adaptations.
Day et al. (2002)	Multifactorial programme including environmental modification, exercise and visual intervention	Estimated reduction in falls was 3.1% with environmental intervention alone, 9.9% with environmental intervention plus exercise and 14.0% when environmental, exercise and visual interventions were combined.	Greatest reduction occurred with the combined intervention.	Suggests that environmental modification may be more effective when integrated with exercise and vision interventions. The relatively small effect of environmental intervention alone challenges claims that adaptations independently prevent falls.

Pardessus et al. (2002)	Home visits and environmental assessment	No statistically significant difference in fall rate or hospitalisation was demonstrated between groups.	No significant reduction.	Indicates that home assessment alone may be insufficient to reduce falls. Intervention intensity, implementation and participant risk may influence effectiveness.
Nikolaus and Bach (2003)	Home intervention team with environmental modification for frail older adults	Approximately 31% reduction in falls, with greater benefit reported among frail and recurrent fallers.	Reduction in falls, particularly among higher risk participants.	Supports the argument that adaptations are most useful when directed towards people with substantial functional or environmental risk rather than applied universally.
Shaw et al. (2003)	Multifactorial intervention following a fall among older people with cognitive impairment	A reduction in subsequent falls was reported, but the independent contribution of housing modification could not be quantified.	Reduction reported but attribution uncertain.	The study supports a multifactorial approach but cannot establish that housing adaptation alone caused the reduction.
Campbell et al. (2005)	Falls prevention intervention for adults aged ≥ 75 with severe visual impairment	Approximately 41% fewer falls were reported following the intervention.	41% reduction in falls.	Provides strong evidence for targeted intervention among a particularly high risk population. However, the multifactorial nature of the intervention limits attribution of the effect specifically to housing adaptations.
Gitlin et al. (2006)	Multicomponent home intervention targeting functional difficulties	Improvements were reported in functional outcomes and fear of falling. No reliable overall percentage reduction in falls was established.	Fall reduction not quantified.	Demonstrates that adaptations may produce benefits beyond fall incidence. Functional improvement is important because it can support independence even where a direct fall reduction is not demonstrated.
Lord, Menz and Sherrington (2006)	Home environmental risk assessment and modification	Identified environmental hazards and their relationship with falls but did not provide a single reliable percentage	Evidence of environmental risk; effect size not isolated.	Supports the theoretical basis for environmental modification but highlights the methodological difficulty of separating

		reduction attributable to adaptation.		environmental effects from individual risk factors.
Clemson et al. (2008)	Environmental interventions for community dwelling older people	Meta analysis of 6 RCTs involving 3,298 participants produced a pooled RR 0.79 (95% CI 0.65–0.97). High risk participants had approximately 39% lower fall risk with RR 0.61.	Approximately 21% reduction in fall risk overall and 39% among high risk participants.	One of the strongest quantitative sources in the evidence base. The findings reinforce the importance of targeted interventions and provide stronger pooled evidence than individual trials.
Clemson et al. (2023)	Environmental interventions for community dwelling older people	Evidence indicated variation in effectiveness according to participant risk, intervention type and delivery.	Effect varied across studies.	The year should be checked against the final reference list. The later Cochrane review is Clemson et al. (2023). The dissertation should avoid presenting the 2019 date unless the specific source has been verified.
Carnemolla and Bridge (2019)	Home modifications and care needs among older people and people with disabilities	Reported associations between home modifications, reduced care requirements and greater independence. No single fall reduction percentage was established.	Falls not the primary quantitative outcome.	Important supporting evidence showing that adaptation benefits extend beyond falls. It should therefore be used for independence and care outcomes rather than presented as direct evidence of fall reduction.
Szanton et al. (2021)	CAPABLE programme combining home modification, occupational therapy and nursing	Significant improvements were reported in disability and functional outcomes. No single overall percentage fall reduction was established.	Direct fall reduction not established as the principal outcome.	Demonstrates the value of combining environmental modification with professional support. It is particularly relevant to the argument that adaptation effectiveness depends on assessment and wider intervention rather than physical changes alone.
Stark et al. (2021)	Occupational therapist led home hazard removal	The intervention group demonstrated approximately	Mixed evidence.	Particularly important contradictory evidence. The

		38% lower fall rate as a secondary outcome, although the primary analysis did not demonstrate a statistically significant reduction in fall hazard.		secondary fall result suggests potential benefit, but the absence of a significant primary fall outcome means that effectiveness should not be overstated.
Age UK (2024)	Housing adaptation and Disabled Facilities Grant provision	No direct quantitative fall reduction was reported. Evidence focused on access, availability and delivery of adaptations.	No direct fall effect measured.	Provides policy and service context rather than effectiveness evidence. It is useful for interpreting barriers to timely access to adaptations.
Department of Health and Social Care (2022)	Disabled Facilities Grant delivery and housing adaptation services	No direct quantitative fall reduction reported. Guidance emphasises assessment, timely delivery, person centred solutions and adaptation pathways.	No direct fall effect measured.	Important for understanding how adaptations are delivered in practice. It should not be treated as empirical evidence demonstrating effectiveness.
World Health Organization (2021)	Global falls prevention and healthy ageing	Provides global evidence on the scale of falls and recommends environmental approaches as part of comprehensive falls prevention.	No specific housing adaptation effect size.	Provides international public health justification for environmental falls prevention but does not establish the effectiveness of individual adaptations.
Cha (2025)	Systematic review of home modifications for ageing in place	Findings across studies were heterogeneous, with benefits reported for accessibility, independence and ageing in place. No single pooled percentage reduction in falls was established across all interventions.	Variable evidence.	Provides contemporary synthesis and reinforces the heterogeneity of home modification interventions. Its findings support a cautious interpretation rather than assuming that all modifications have equivalent effects.
York Health Economics Consortium	Economic evaluation of falls prevention and home assessment/modification	Economic modelling indicates potential financial benefits where effective falls prevention	No direct fall reduction estimate.	Provides economic context rather than direct clinical effectiveness evidence. It supports consideration of cost

		reduces healthcare and care costs.		effectiveness alongside fall outcomes.