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Determinants influencing the implementation of multifactorial falls risk assessment and multidomain interventions in community-dwelling older people: a systematic review

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Abstract

Background: Multifactorial falls risk assessment and multidomain interventions are recommended by the World guidelines for falls prevention and management. To successfully implement these interventions, it is important to understand determinants influencing the implementation.

Methods: A literature search was conducted for this systematic review on the 3rd of December, 2021 and updated on the 3rd of April, 2023 in five databases: PubMed (including MEDLINE), EMBASE (via Embase.com), Cochrane Central Register of Controlled Trials (via Cochrane Library), Web of Science Core Collection and CINAHL (via EBSCO). Studies were included if they reported on determinants influencing the implementation of a multifactorial falls risk assessment and/or multidomain interventions in community-dwelling older people. Editorials, opinion papers, systematic reviews and studies focusing on one population (e.g. Parkinson) were excluded. Two researchers independently screened the articles on title, abstract and full text. The quality was evaluated based on a sensitivity analysis. 'The Comprehensive Integrated Checklist of Determinants of practice' (TICD) was used to categorize the determinants.

Results: 29 studies were included. Determinants were classified as barriers (n=40) and facilitators (n=35). The availability of necessary resources is the most reported determinant. Other commonly reported determinants are knowledge, intention/beliefs and motivation at the levels of older people and healthcare professionals, fitting of the intervention into current practice, communication, team and referral processes and financial (dis)incentives.

Conclusions: Mapping of the barriers and facilitators is essential to choose implementation strategies tailored to the context, and to enhance the uptake and effectiveness of a multifactorial falls risk assessment and/or multidomain interventions.

Keywords: 'Community setting', 'Implementation', 'Falls prevention', 'Aged', 'Influencing factors'

Introduction

Worldwide, falling is a major health issue, especially for people over the age of 65. Falling is one of the main reasons for admission to the emergency department or a nursing home; causing significant morbidity and mortality.[1] In 2017, the Global Burden of Disease Study stated that falls resulted in almost 17 million years of life lost, 19 million years lived with disability and 36 million disability-adjusted life years.[2]

Different factors influence the risk of falling (e.g. balance, muscle strength, medication).[1] The World guidelines for falls prevention and management recommend a multifactorial falls risk assessment and multidomain interventions in high-risk community-dwelling older adults.[1] A multifactorial falls risk assessment is: *'A set of assessments performed across multiple domains to judge an individual's overall level of risk of falling, to identify the individual risk factors potentially modifiable and non-modifiable to inform the choice of an intervention'*.[1] The multidomain interventions are *'A combination of two or more intervention components across two or more domains (e.g. an exercise program and environmental modification) based on a multifactorial falls risk assessment and intended to prevent or minimise falls and related injuries'*.[1] Despite their efficacy, healthcare professionals in the community struggle to implement those interventions.[3] Determinants are for example: lack of knowledge, time constraints, and financial issues.[4, 5] Determinants are *'factors that might prevent or enable improvements. Such factors are sometimes referred to as barriers and enablers, barriers and facilitators, problems and incentives, or as moderators and mediators.'*[6] Information about determinants helps us to understand and explain implementation outcomes, and can be useful for designing implementation strategies that aim to address these determinants. A review of Vandervelde et al. shows gaps in transparent reporting of determinants influencing the implementation of falls prevention interventions, strategies used to implement falls prevention interventions, and how implementation strategies influence determinants.[7] Poor implementation impacts the effectiveness of an intervention, resulting in research waste.[8-10] Therefore, the aim of this systematic review is to obtain a comprehensive view on the determinants influencing the implementation of a multifactorial falls risk assessment and/or multidomain interventions in community-dwelling older people, using the 'The Comprehensive Integrated Checklist of Determinants of practice' (TICD checklist).[11]

Methods

This review is registered in PROSPERO (CRD42022295988) and reported according to the PRISMA 2020 statement.[12-14]

Searches and selection process

The search strategy was developed with biomedical information specialists and is built upon the search strategy of Vandervelde et al. (2023).[7] The search was conducted on the 3rd of December 2021 and updated (from 3rd of December 2021 until 3rd of April 2023) in five

databases: PubMed (via NCBI, including MEDLINE), EMBASE (via Embase.com), Cochrane Central Register of Controlled Trials (CENTRAL, via Cochrane Library), Web of Science Core Collection (WoS) and CINAHL (via EBSCOhost). An additional search was performed in clinical trial registries (i.e. classic.clinicaltrials.gov and International Clinical Trials Registry Platform (ICTRP)). The search strategy can be found in appendix 1. Duplicates were removed in EndNote™ following the de-duplication method of Bramer et al.[15]

The titles, abstracts and full text were reviewed by two researchers independently. Differences were resolved and in case of discrepancy, an additional reviewer was consulted. Rayyan™ was used to manage this process.[16] Cited and citing references were manually searched of the included studies (snowballing forward and backwards) as well as the references of the reviews of Child et al. and McConville et al.[4, 5] The PRISMA 2020 Flow Diagram illustrates the process (figure 1).[12]

Study in- and exclusion criteria

Table 1 gives an overview of the in- and exclusion criteria. Quantitative, qualitative and mixed methods studies were included if they reported on determinants influencing the implementation of a multifactorial falls risk assessment and/or multidomain interventions in older people living in the community.

Table 1: In- and exclusion criteria.

Inclusion criteria	Exclusion criteria
• Determinants on the implementation of a multifactorial falls risk assessment and/or multidomain interventions in the community setting • Determinants: barriers and facilitators (on all levels of the context: older person 65+, family, healthcare professionals, organization, policy makers) • English, Dutch and German language of the reports • Multiple settings (e.g. hospitals, nursing homes) only included if specific determinants on the community were available • Experiences, perceptions and needs of target group • If recruitment was done in hospitals, the intervention needed to be coordinated in the community	• Editorials, opinion papers, studies only reported as conference abstract, systematic reviews, meta-analysis • Other settings (e.g. hospitals, nursing homes) • Studies that focus on one particular population were excluded (e.g. Parkinson, dementia, Cerebral vascular accident)
Community: 'Home or places of residence that do not provide residential health-related care'. [3]	
Determinants: 'Factors that might prevent or enable improvements. Such factors are sometimes referred to as barriers and enablers, barriers and facilitators, problems and incentives, or as moderators and mediators.'[6]	
Multifactorial falls risk assessment: 'A set of assessments performed across multiple domains to judge an individual's overall level of risk of falling to identify the individual risk factors potentially modifiable and non-modifiable to- inform the choice of an intervention'.[1]	
Multidomain interventions: 'A combination of two or more intervention components across two or more domains (e.g.: an exercise program and environmental modification) based on a multifactorial falls risk assessment and intended to prevent or minimise falls and related injuries'.[1]	

Study quality assessment

Included studies were appraised by a sensitivity analysis. This process was performed by two researchers independently, if needed a third researcher was involved. The overall rating was

determined by the results of the evaluation of the relevance to the research question and the methodological quality (low, moderate, high) (table 2, appendix 2). No studies were excluded based on the score.

The relevance to the research question was assessed on six questions developed by the research group (low, moderate or high) . The Mixed Methods Appraisal Tool (MMAT) was used to evaluate the methodological quality (low, moderate or high). MMAT is designed for systematic mixed studies reviews and it consists of five designs.[17] The detailed assessment can be found in appendix 2.

Data extraction strategy

Two researchers independently collected information about the study (i.e. title, author, publication year, country, aim, design, setting, population), the intervention and the determinants (i.e. barrier or facilitator, description)in Microsoft Office Excel™ (table 3, appendix 2). The researchers discussed the data extraction and if needed a third researcher was consulted.

Data synthesis

The data synthesis was performed by two researchers independently, a third researcher was involved when needed. To enhance conceptual clarity and comprehensiveness, the researchers mapped the determinants found in the included studies to the definitions accompanying the determinants of the TICD checklist of Flottorp et al.[11] The TICD checklist consists of 57 determinants categorized in 7 domains: (1) guideline factors, (2) individual healthcare professional factors, (3) patient factors, (4) professional interactions, (5) incentives and resources, (6) organizational change and (7) social, political and legal factors. The TICD Checklist is developed by a systematic review of 12 determinant frameworks (including the Consolidated Framework for Implementation Research (CFIR) and Promoting Action on Research Implementation in Health Services framework (PARIHS)) and a consensus process among implementation researchers.[11, 18, 19] The checklist contains for each determinant a definition, exploratory question and examples, which guided the researchers in mapping the determinants.[11] A table was created where the barriers were structured at the left side and the facilitators at the right side of the zero-line. This table reflects how often a determinant was reported as a barrier and/or a facilitator (table 4, appendix 2).

Results

In total, 20,408 records were identified in five databases and 114 records were found in two registers. After deduplication, 10,020 records were screened and 258 reports were sought for retrieval. Eight reports were identified by snowballing and hand searching. As a result, 29 studies were included in this review (figure 1).[20-48]

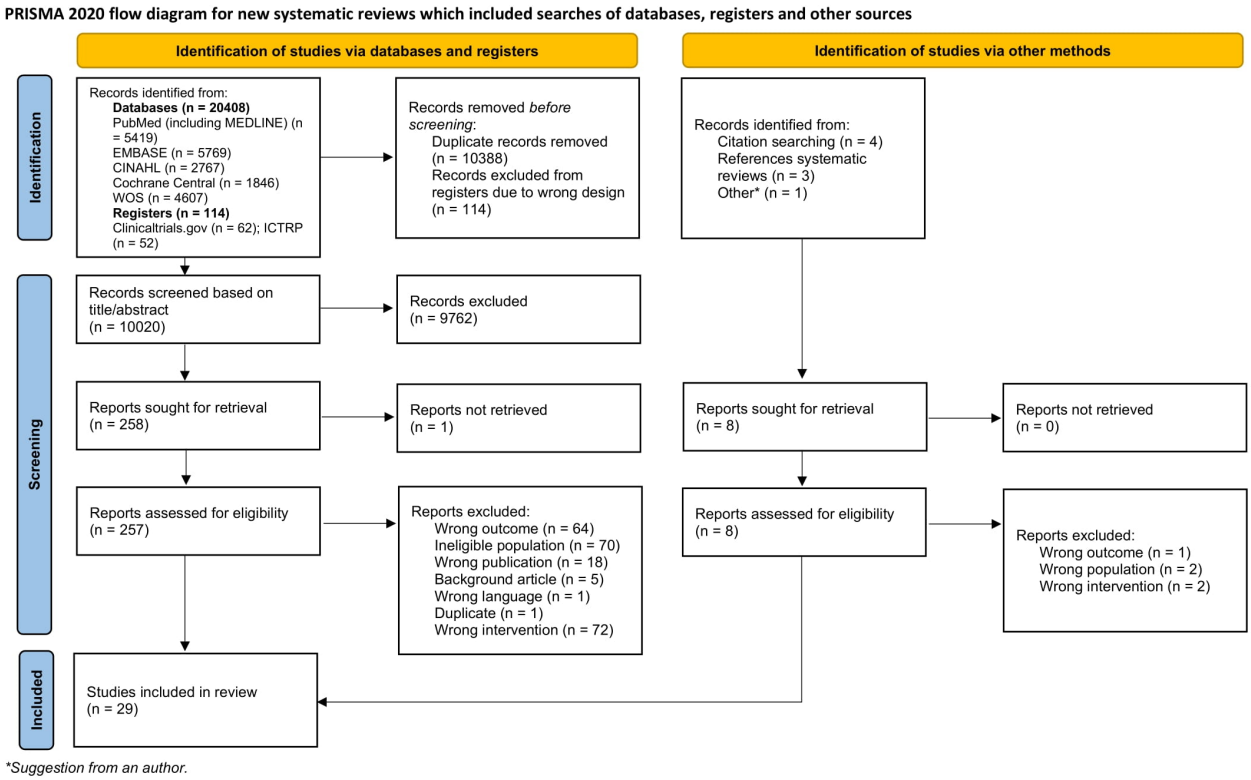

Figure 1: The PRISMA 2020 Flow Diagram.

Study quality assessment

Overall, 14 studies scored low, 13 moderate and 2 high on the sensitivity analysis (table 2, appendix 2). The majority scored low (n=14) or moderate (n=11) on the evaluation of the relevance to the research question; mainly due to the inadequate reporting on how determinants were identified in the included studies. Methodological quality varied, with 9 studies scoring low, and 10 scoring moderate and high, primarily due to incomplete reporting of the data collection, analysis process, and external validity of the results.

Table 2: Results sensitivity analysis.

#	Title	Relevance to research question*	Methodological quality (MMAT)**	Sensitivity analysis score***
1	Experiences of general practitioners, home care nurses, physiotherapists and seniors involved in a multidisciplinary home-based fall prevention programme: a mixed method study. (Amacher, 2016) [39]	Moderate	High	Moderate
2	An interprofessional team approach to fall prevention for older home care clients 'at risk' of falling: health care providers share their experiences. (Baxter, 2009) [47]	Moderate	High	Moderate
3	Perceptions of physicians on the barriers and facilitators to integrating fall risk evaluation and management into practice. (Chou, 2006) [48]	Moderate	High	Moderate
4	Falls Prevention Process in Assisted Living Communities. (Coughlin, 2019) [32]	Low	Low	Low

5	How do general practitioners engage with allied health practitioners to prevent falls in older people? An exploratory qualitative study. (Grant, 2015) [40]	Low	Moderate	Low
6	"Better for others than for me": A belief that should shape our efforts to promote participation in falls prevention strategies. (Haines, 2014) [41]	Low	Low	Low
7	Stakeholders' perceptions of programme sustainability: findings from a community-based fall prevention programme. (Hanson, 2011) [45]	Moderate	High	Moderate
8	Perceptions of Family Physicians about Fall Risk Screening, Fall Risk Assessment, and Referral Practices for Fall Prevention in Malaysia. (Jaafar, 2019) [29]	Low	Low	Low
9	Determinants of Fall Prevention Guideline Implementation in the Home- and Community-Based Service Setting. (Juckett, 2021) [27]	Moderate	Moderate	Moderate
10	Urban Australian general practitioners' perceptions of falls risk screening, falls risk assessment, and referral practices for falls prevention: an exploratory cross-sectional survey study. (Kielich, 2017) [37]	Low	Low	Low
11	Engaging community-based organizations in fall prevention education. (Kramer) [44]	Low	Low	Low
12	The use of fall prevention strategies in home care: a survey in Flanders. (Leysens, 2017) [36]	High	High	High
13	Influences on general practitioner referral to allied health professionals for fall prevention in primary care. (Liddle) [28]	Low	High	Moderate
14	Making fall prevention routine in primary care practice: perspectives of allied health professionals. (Liddle, 2020) [35]	Low	High	Moderate
15	Perceptions of primary health staff about falls prevention in primary care settings in the west of Ireland. (Mackenzie, 2018) [34]	Low	Moderate	Low
16	How Do General Practitioners (GPs) Engage in Falls Prevention With Older People? A Pilot Survey of GPs in NHS England Suggests a Gap in Routine Practice to Address Falls Prevention. (Mackenzie, 2019) [31]	Low	Moderate	Low
17	Perspectives of Australian GPs on tailoring fall risk management: a qualitative study. (Mackenzie, 2021) [26]	Moderate	High	Moderate
18	Engagement of general practitioners in falls prevention and referral to occupational therapists. (McIntyre,2019) [33]	Low	Moderate	Low
19	Formative evaluation of the telecare fall prevention project for older veterans. (Miake-Lye, 2011) [43]	Low	Low	Low
20	The Enhanced Primary Care program and falls prevention: Perceptions of private occupational therapists and physiotherapists. (Middlebrook, 2012) [42]	Moderate	Moderate	Moderate
21	Use of a fall prevention practice guideline for community-dwelling older persons at risk for falling: a feasibility study. (Milisen, 2009) [46]	Moderate	High	Moderate
22	Barriers to implementation of STRIDE, a national study to prevent fall-related injuries. (Reckrey, 2021) [25]	High	High	High
23	Fall prevention behaviour after participation in the Stepping On program: a pre-post study. (Tiedemann, 2021) [24]	Moderate	Low	Low
24	Older adults' experience with fall prevention recommendations derived from the STEADI. (Vincenzo, 2021) [30]	High	Moderate	Moderate
25	Policy recommendations for the implementation of fall and fracture prevention in community-dwelling older persons. (Vlaeyen, 2016) [38]	Low	Low	Low

26	Interprofessional Collaboration in Fall Prevention: Insights from Qualitative Study (Baumann, 2022) [22]	Moderate	Moderate	Moderate
27	Feasibility of a new multifactorial fall prevention assessment and personalized intervention among older people recently discharged from the emergency department (Hepkema, 2022) [21]	Moderate	Low	Low
28	A Qualitative Study of Older Adults' Facilitators, Barriers, and Cues to Action to Engage in Falls Prevention using Health Belief Model Constructs (Vincenzo, 2022) [23]	Low	Moderate	Low
29	Perceptions of Facilitators and Barriers to Implementation of Falls Prevention Programs in Primary Health Care Settings in China (Ye, 2022) [20]	High	Moderate	Moderate

*The relevance to the research question: (1) Is the applied intervention defined?; (2) Did the authors use a framework to present determinants?; (3) Did the authors state how the determinants have been measured?; (4) Were the determinants categorized in a barrier or facilitator?; (5) Were the determinants measured on different levels (micro/meso/macro)?; (6) Was the intervention tested and evaluated in clinical practice (community setting)?

**MMAT: 5 designs: qualitative research, randomized controlled trials, non-randomized studies, quantitative descriptive studies, and mixed methods studies. For each design, 5 criteria were assessed.

***Sensitivity analysis score:

High + High = High

Moderate + Moderate = Moderate

Low + Low = Low

High + Moderate = Moderate

High + Low = Moderate

Moderate + Low = Low

Description of studies

The majority of the studies were conducted in Australia (n=8)[24, 26, 28, 35, 37, 40-42] and the United States of America (n=8)[23, 25, 27, 30, 32, 43, 44, 48]. Other studies were performed in Belgium (n=3)[36, 38, 46], Canada (n=2)[45, 47], United Kingdom (n=2)[31, 33], Switzerland (n=2)[22, 39], Ireland (n=1)[34], Malaysia (n=1)[29], China (n=1)[20] and The Netherlands (n=1)[21]. In total, 16 studies had a qualitative design[20, 22, 23, 25-28, 30, 34, 35, 40, 42, 44, 45, 47, 48], 7 studies were quantitative descriptive[29, 31, 33, 36, 37, 41, 46], 2 studies were non-randomized controlled trials[21, 24] and 4 studies had a mixed methods study design[32, 38, 39, 43]. The study population were mainly healthcare professionals (n=21)[20, 22, 26-29, 31, 33-40, 42, 43, 45-48], informal caregivers (n=1)[22] and older adults (n=10)[20, 21, 23-25, 30, 39, 41, 43, 45]. Few studies (n=4) explored determinants at organizational level[20, 25, 32, 44] and no studies explored determinants at policy level. Eight studies reported the use of a framework to structure the determinants: RE-AIM[41], CFIR[20, 25, 27], Implementation Model of Grol and Wensing[36], Normalization Process Theory[26] and Health Belief Model[23, 30](table 3, appendix 2, appendix 3).

Table 3: Description of included studies.

Title (Author, year)	Aim	Country	Design
Experiences of general practitioners, home care nurses, physiotherapists and seniors involved in a multidisciplinary home-based fall prevention programme: a mixed method study.	To investigate the experiences of the seniors, GP, HCNs and PT and identifying and analysing the facilitators and barriers of the FPP.	Switzer-land	Mixed methods

(Amacher, 2016) [39]			
An interprofessional team approach to fall prevention for older home care clients 'at risk' of falling: health care providers share their experiences. (Baxter, 2009) [47]	(1) How do interprofessional teams describe their experiences when involved in a research intervention requiring collaboration for a 9-month period? (2) What are the barriers and facilitators to teamwork?	Canada	Qualitative
Perceptions of physicians on the barriers and facilitators to integrating fall risk evaluation and management into practice. (Chou, 2006) [48]	To investigate the specific barriers and facilitators to fall risk evaluation and management in primary care. Determine the themes that highly informed physicians identify as integral to fall risk evaluation and management and based on these findings, offer suggestions to a broader audience to improve implementation.	United States of America (USA)	Qualitative
Falls Prevention Process in Assisted Living Communities. (Coughlin, 2019) [32]	To explore the components of the fall prevention processes utilized in Wisconsin ALCs, to help create a standardized, proactive approach to address the falls prevention process in ALCs.	USA	Mixed methods
How do general practitioners engage with allied health practitioners to prevent falls in older people? An exploratory qualitative study. (Grant, 2015) [40]	To explore GPs' perceptions about their use of CDM items to access allied health interventions to prevent falls, in particular occupational therapy and physiotherapy, and to identify GP support needs in order to facilitate the development of partnerships with local allied health practitioners.	Australia	Qualitative
"Better for others than for me": A belief that should shape our efforts to promote participation in falls prevention strategies. (Haines, 2014) [41]	To identify the prevalence of the ''better for others than for me'' perception amongst community-dwelling older adults in relation to four evidence-based falls prevention strategies, and to identify reasons, and factors associated with, its presence.	Australia	Quantitative
Stakeholders' perceptions of programme sustainability: findings from a community-based fall prevention programme. (Hanson, 2011) [45]	To understand the perceptions of program sustainability held by key stakeholders involved in the community-based fall prevention project.	Canada	Qualitative
Perceptions of Family Physicians about Fall Risk Screening, Fall Risk Assessment, and Referral Practices for Fall Prevention in Malaysia. (Jaafar, 2019) [29]	To identify and explore factors that influence the implementation of falls prevention programs from the perspective of the GP.	Malaysia	Quantitative
Determinants of Fall Prevention Guideline Implementation in the Home- and Community-Based Service Setting. (Juckett, 2021) [27]	(1) What determinants influence the implementation of fall prevention guidelines within HCBS organizations? (2) Based on these determinants, what strategies may support effective fall prevention guideline implementation?	USA	Qualitative
Urban Australian general practitioners' perceptions of falls risk screening, falls risk assessment, and referral practices for falls prevention: an exploratory cross-sectional survey study. (Kielich, 2017) [37]	To explore GP perceptions of falls risk factors and falls prevention interventions, how GPs identify and screen older people at risk of falls and their referral practices to allied health practitioners, as well as any barriers and facilitators to implementing evidence-based falls prevention interventions in practice.	Australia	Quantitative

Engaging community-based organizations in fall prevention education. (Kramer, 2011) [44]	Process evaluation at the centre level (not the individual participant level) of InSTEP.	USA	Qualitative
The use of fall prevention strategies in home care: a survey in Flanders. (Leysens, 2017) [36]	(1) What fall prevention interventions are applied by professional caregivers (GP, PT, OT, nurses) for community-dwelling older people in Flanders? (2) What are barriers professional caregivers (GP, PT, OT, nurses) experience when applying these fall prevention interventions in community-dwelling older people in Flanders.	Belgium	Quantitative
Influences on general practitioner referral to allied health professionals for fall prevention in primary care. (Liddle, 2020) [28]	To explore influences of GP to AHP referral in primary care practice to better equip AHPs to engage with GPs regarding fall prevention.	Australia	Qualitative
Making fall prevention routine in primary care practice: perspectives of allied health professionals. (Liddle, 2018) [35]	To explore how AHPs were making falls prevention practice routine in primary care and the factors that influenced their falls prevention practice, including the project workshops.	Australia	Qualitative
Perceptions of primary health staff about falls prevention in primary care settings in the west of Ireland. (Mackenzie, 2018) [34]	To explore the perceptions of general practitioners, occupational therapists and physiotherapists working in the primary care setting about the management of falls risk in their practice.	Ireland	Qualitative
How Do General Practitioners (GPs) Engage in Falls Prevention With Older People? A Pilot Survey of GPs in NHS England Suggests a Gap in Routine Practice to Address Falls Prevention. (Mackenzie, 2019) [31]	(1) To determine the current practice of GPs in relation to falls prevention, to explore how GPs identify older people at risk of falls and their understanding of effective falls prevention interventions, to identify the referral practices of GPs to allied health falls prevention services. (2) To test the feasibility of the online survey GP-method to gain information about the practice of GPs in fall prevention.	United Kingdom (UK)	Quantitative
Perspectives of Australian GPs on tailoring fall risk management: a qualitative study. (Mackenzie, 2021) [26]	To investigate how GPs adapted to the iSOLVE process and how they changed their practice to implement fall prevention with their older patients.	Australia	Qualitative
Engagement of general practitioners in falls prevention and referral to occupational therapists. (McIntyre, 2019) [33]	(1) To identify if and how English GPs address falls prevention in their routine practice with community-living older people. (2) To identify GP understandings of falls risk factors and effective falls-prevention interventions. (3) To investigate how GPs identify and/or screen older people at risk of falls. (4) To examine GP referral practices to AHPs. (5) To document any barriers or facilitators for GPs in implementing evidence about falls prevention in practice.	UK	Quantitative
Formative evaluation of the telecare fall prevention project for older veterans. (Miake-Lye, 2011) [43]	To report on the formative evaluation of the first project emerging from ongoing fall prevention projects at GLA using a nurse telephone-based outreach service to assess patients' risk factors	USA	Mixed methods

	for falls and refer these patients to appropriate services. In this evaluation the implementation process, including whether the implementation occurred as planned, identify the barriers and facilitators to implementation, and assess the quality of care for patients in the project.		
The Enhanced Primary Care program and falls prevention: Perceptions of private occupational therapists and physiotherapists. (Middlebrook, 2012) [42]	To investigate the experiences of private OTs and PTs in their use of the EPC program and to outline the processes that underpin the use of EPC items to deliver falls prevention interventions for older people.	Australia	Qualitative
Use of a fall prevention practice guideline for community-dwelling older persons at risk for falling: a feasibility study. (Milisen, 2009) [46]	To test the feasibility of integrating a falls prevention practice guideline into the daily practice of 4 primary healthcare disciplines, i.e. general practitioners, nurses, occupational therapists and physiotherapist.	Belgium	Quantitative
Barriers to implementation of STRIDE, a national study to prevent fall-related injuries. (Reckrey, 2021) [25]	To examine stakeholder perspectives about barriers to implementation of the STRIDE intervention and strategies employed to mitigate those barriers.	USA	Qualitative
Fall prevention behaviour after participation in the Stepping On program: a pre-post study. (Tiedemann, 2021) [24]	(1) To measure the impact of the Stepping On program by documenting fall prevention strategies and behaviours undertaken by participants during the 6 months after they completed the Stepping On program. (2) To document participants satisfaction with the program, and to identify motivators for, and barriers to, uptake of fall prevention behaviour and strategies.	Australia	Quantitative non-randomized trails
Older adults' experience with fall prevention recommendations derived from the STEADI. (Vincenzo, 2021) [30]	To conduct fall risk screenings and assessments using the STEADI and explore older adults': (1) recall of their fall risk and prevention recommendations; (2) perceptions of factors related to adherence to recommendations for fall prevention; (3) perceptions of what health care providers can do to facilitate participation in fall prevention activities 6 months after voluntarily attending a community fall risk assessment event.	USA	Qualitative
Policy recommendations for the implementation of fall and fracture prevention in community-dwelling older persons. (Vlaeyen, 2016) [38]	To summarize the main bottlenecks for implementation and providing recommendations for optimizing disseminations and implementations to optimise fall prevention implementation in community-dwelling setting.	Belgium	Mixed methods
Interprofessional Collaboration in Fall Prevention: Insights from Qualitative Study. (Baumann, 2022) [22]	To explore the experiences of Swiss health care providers involved in a community fall prevention pilot project on barriers and facilitations in interprofessional cooperation between 2016 and 2017 in three regions of Switzerland.	Switzer-land	Qualitative
Feasibility of a new multifactorial fall prevention assessment and personalized intervention among older people recently discharged from the emergency department.	To test the feasibility of a transitionally organized fall prevention assessment with accompanying personalized intervention initiated at the ED.	The Nether-lands	Quantitative Non - Randomized Controlled trial

(Hepkema, 2022) [21]		
A Qualitative Study of Older Adults' Facilitators, Barriers, and Cues to Action to Engage in Falls Prevention using Health Belief Model Constructs. (Vincenzo, 2022) [23]	To explore older adults' perceptions about engagement in falls prevention behaviours using constructs from the Health belief Model (HBM).	USA	Qualitative
Perceptions of Facilitators and Barriers to Implementation of Falls Prevention Programs in Primary Health Care Settings in China. (Ye, 2022) [20]	To identify the associated factors and provide recommendations to inform the better implementation of falls prevention in the Chinese primary health care system.	China	Qualitative

Determinants

In total, 40 barriers and 35 facilitators were found in the included studies. Most identified determinants were related to the domains of incentives and resources, patient, individual health professional and professional interactions. 'Availability of necessary resources' is the most reported determinant (Barrier (B):n=21, Facilitator (F):n=7). Other commonly reported determinants are 'patient beliefs and knowledge' (B:n=15, F:n=6) and 'patient motivation' (B:n=11, F:n=7), 'communication and influence' (B:n=12, F:n=6), 'team processes' (B:n=11, F:n=6), 'domain knowledge of individual health professional' (B:n=13, F:n=4), 'intention and motivation of individual health professional' (B:n=13, F:n=3). Only two determinants were mentioned at social, political and legal level: 'legislation' (B:n=1) and 'payer or funder policies' (B:n=6, F:n=1). Table 4 and appendix 2 entail an overview of barriers and facilitators within the TICD checklist.

Table 4: Overview barriers and facilitators. [11]

	B	F																													
(1) Guideline factors																															
Recommendation																															
Quality of evidence supporting the recommendations	0	0																													
Strength of recommendations	0	2																				11	17								
Clarity	2	3																			20	1	1	17	19						
Cultural appropriateness	0	1																					29								
Accessibility of the recommendation	1	1																				29	20								
Source of the recommendation	1	0																				7									
Consistency with other guidelines	2	0																			19	16									
Recommended clinical intervention																															

Feasibility	3	4																			27	22	5	5	19	21	27						
Accessibility to the intervention	7	1															25	23	19	15	12	4	3	23									
Recommended behaviour																																	
Compatibility	11	6										29	26	25	22	18	17	16	12	10	8	3	3	9	14	17	18	29				
Effort	2	1																			20	19	17										
Trialability	0	1																					17										
Observability	0	0																															
(2) Individual health professional factors																																	
Knowledge and skills																																	
Domain knowledge	13	4								29	27	25	18	17	15	14	13	12	8	5	4	3	3	9	13	20						
Awareness and familiarity with the recommendation	3	2																		19	10	8	14	15								
Knowledge about own practice	2	0																			10	8											
Skills needed to adhere	3	0																		20	18	16										
Cognitions (including attitudes)																																	
Agreement with the recommendation	1	4																				15	14	15	21	29						
Attitudes towards guidelines in general	3	0																		9	5	4										
Expected outcomes	4	4																	26	18	16	15	1	13	14	21						
Intention and motivation	13	3							26	25	22	16	15	14	12	10	8	7	4	3	1	7	9	14								
Self-efficacy	2	0																			29	13										
Learning style	0	1																					15									
Emotions	0	1																					14									
Professional behaviour																																	
Nature of the behaviour	1	1																				4	14									
Capacity to plan change	0	2																					1	9								
Self- monitoring or feedback	2	4																			29	13	3	13	17	29						
(3) Patient factors																																	
Patient needs	7	4														28	22	20	16	8	2	1	2	19	27	28						
Patient beliefs and knowledge	15	6						29	28	27	25	24	23	20	16	14	12	10	8	6	3	1	1	17	19	24	28	29				
Patient preferences	5	3																16	13	10	5	1	3	15	23							

Patient motivation	11	7											25	24	23	21	18	15	14	12	4	2	1	1	11	15	23	24	27	28		
Patient behaviour	1	0																					19									
(4) Professional interactions																																
Communication and influence	12	6										27	22	21	20	15	14	13	12	9	5	2	1	2	5	13	15	19	26			
Team processes	11	6											29	20	18	15	14	13	12	9	7	2	1	2	3	7	14	15	20			
Referral processes	8	5														25	18	15	14	13	12	9	1	5	9	13	17	26				
(5) Incentives and resources																																
Availability of necessary resources	21	7	29	27	26	25	22	21	20	19	18	17	16	15	12	11	10	9	8	7	5	4	3	2	5	7	9	10	11	13		
Financial incentives and disincentive	9	3													29	25	16	11	10	8	7	3	1	1	7	28						
Nonfinancial incentives and disincentive	1	1																					29	9								
Information system	1	4																					27	5	27	28	29					
Quality assurance and patient safety systems	1	0																					9									
Continuing education system	1	0																					9									
Assistance for clinicians	2	2																				25	17	17	29							
(6) Capacity for organizational change																																
Mandate, authority, accountability	0	1																						13								
Capable leadership	1	0																					7									
Relative strength of supporters and opponents	0	2																						7	29							
Regulations, rules, policies	2	1																				25	12	7								
Priority of necessary change	3	0																			29	22	14									
Monitoring and feedback	1	0																					29									
Assistance for organizational changes	0	0																														
(7) Social, political and legal factors																																
Economic constraints on the health care budget	0	0																														
Contracts	0	0																														
Legislation	1	0																					12									

Payer or funder policies	6	1															29	20	14	12	9	5	29							
Malpractice liability	0	0																												
Influential people	0	0																												
Corruption	0	0																												
Political stability	0	0																												
The study number of Table 2 (not reference) is given in the coloured boxes. Implementation barriers are structured at the left side of the zero-line (in red) and implementation facilitators are given at the right side of the zero-line (in green). A determinant (barrier or facilitator) is counted once per article, however if an article reported the same determinant as barrier and facilitator, the determinant is counted once as barrier and once as facilitator for this article.																														
Notes: n: number of studies, B: barrier, F: facilitator																														

1. Guideline factors

The most frequently identified barrier is incompatibility of the recommended behaviour. Studies show that the recommended interventions are incompatible with current practice due to time constraints or complexity of falling.[20, 22, 25, 26, 29, 31, 33, 36-38, 48] Another barrier is the inaccessibility of the intervention due to transport difficulties and lack of organizations offering falls prevention interventions in the area.[24, 32, 34, 36, 38, 43, 48] The feasibility of the clinical intervention is mentioned by 3 articles as a barrier. The duration and the complexity of the intervention were potential reasons.[21, 25, 40]. Other barriers were: lack of clarity about the aim and target group[39, 42], inconsistency with other guidelines[31, 43], high amount of effort (e.g. high workload)[42, 43], inaccessibility of easy-to understand health information [20] and source of the recommendation (e.g. lack of buy-in from clinical practice)[45].

On the contrary, compatibility with already performed activities[20, 26, 27, 33, 35, 48] and feasibility of the intervention[21, 40, 43, 46] were identified as common facilitators. Clarity (e.g. the use of a substantiated model)[26, 39, 43] and strength of the recommendation (e.g. acknowledging that falls prevention is an added value)[26, 44] were also mentioned. Other facilitators were: making sure the intervention is cultural appropriate by using a region tailored guidance plan[20], accessibility (e.g. availability of local programs and/or transport to programs)[24], the amount of effort the clinical practice has already invested[26] and having the opportunity to practice the intervention (i.e. trialability)[26].

2. Individual, health professional factors

The most reported barriers were: lack of knowledge and skills and no intention or motivation. Included studies show that healthcare professionals often do not know how to recognize people at risk of falling, do not understand falls prevention interventions or lack sufficient information about the available referral options.[20, 21, 26, 28, 29, 31-36, 38, 40, 42, 48]. Regarding the intention and motivation, falls prevention is often not seen as a priority by the healthcare professionals in relation to other competing morbidities.[22, 25, 29, 31, 32, 34-39, 45, 48] Additionally, healthcare professionals were not always convinced of the effectiveness

of the interventions or referrals to other healthcare professionals (i.e. expected outcome)[22, 31, 33, 34], were unaware and unfamiliar with a falls prevention guideline [29, 37, 43] and had negative attitudes towards guidelines in general[27, 32, 40]. Other barriers were: no knowledge about their own practice[29, 37], not agreeing with the recommendation[34] and low self-efficacy[20, 28].
Furthermore, knowledge regarding falls prevention[27, 28, 42, 48], acknowledging and believing the value of falls prevention interventions[20, 28, 34, 35, 39, 46], self-monitoring or positive feedback about the process and updates from older adults and healthcare professionals[20, 26, 28, 48] were described as facilitators. Other facilitators were: positive intention and motivation of healthcare professionals [27, 35, 45], awareness and familiarity with falls prevention interventions[34, 35], having time to apply interventions[27, 39], using effective and practical learning styles[34] and having the feeling of making a difference[35].

3. Patient factors

At the domain of the patient all determinants of the TICD checklist were identified. Patient beliefs and knowledge are barriers to perform falls prevention interventions due to the social stigma, denial of their risk for falling, misperception that falls prevention interventions are for older, more frail people and negative attitudes towards the effect of the intervention.[20, 21, 23, 24, 29-31, 35-39, 41, 42, 48] If people are aware of their risk of falling and believe in the benefits, it can facilitate the uptake of the intervention.[20, 23, 26, 30, 39, 43] In addition, older adults are not always motivated to participate in falls prevention interventions due to lack of social support, ill health, scarcity in time or resources.[24, 30, 32-36, 38, 39, 46, 47] However, if people share their experiences, feel improvement and receive encouraging words they are more likely to apply falls prevention interventions.[21, 23, 24, 30, 34, 39, 44]

Patient needs and preferences are also often mentioned as both barriers and facilitators. Older adults do not always feel capable of performing a falls prevention intervention, do not have the necessary resources, are not willing to make adaptations to their home or require more immediate demands.[23, 25, 29, 31, 39, 42, 47] Furthermore, older adults were receptive for falls prevention interventions and advice, especially if they had experienced a fall in the past, were involved in the evaluation of risk factors and the decision-making process, and when programs aim to support independent living.[21, 23, 24, 34, 43, 47, 48]

4. Professional interactions

Barriers are the lack of (face to face) communication and follow-up between disciplines, individuals and older people, as well as the absence of, or difficulties with, the referral processes.[21, 25, 27, 33-36, 38-40, 42, 46, 47] Care fragmentation and a lack of understanding of each other's roles and value often impedes the implementation process (i.e. team processes).[20, 27, 28, 33-36, 39, 42, 45, 47] Falls prevention implementation can be facilitated when healthcare professionals acknowledge a team process, recognize each other's

value, invest in personal relationships and networking, are familiar with other healthcare professionals, refer to local organizations and healthcare professionals, involve family, create a respectful work climate and communicate with each other.[20, 21, 23, 24, 26, 30, 34, 39, 43, 44, 47, 48]

5. **Incentives and resources**

Unavailability of necessary resources and financial (dis)incentives were the most frequently mentioned barriers. Time constraints, lack of (trained) staff and referral options, busy workload, absence of falls prevention services were barriers.[20-22, 25-27, 29, 31-34, 36-38, 40, 42-46, 48] In addition, low financial incentives and reimbursement of healthcare professionals[20, 29, 31, 37-39, 44, 45, 48], unavailability of nonfinancial incentives (e.g. no national falls prevention action plan or guideline)[20], lack of an information system (e.g. no secure medical messaging platform)[21], no quality assurance and patient safety system[27], no engagement of leadership[27] and limited assistance of clinicians impede the implementation process.[26, 38]

Availability of necessary resources like support for the general practitioner (e.g. a nurse practitioner), the possibility to modify the interventions to the local resources and trained professionals can facilitate falls prevention implementation.[27, 28, 37, 40, 44, 45, 47] Also electronic reminders, communication platforms (i.e. information system)[20, 21, 23, 40] and the availability of necessary financial resources (i.e. financial incentives) facilitate the implementation.[30, 39, 45]

6. **Capacity for organizational change**

Lack of prioritization of falls prevention, the absence of well-regulated falls prevention policies, poor leadership and coordination are reported barriers.[20, 25, 35, 36, 38, 45]

Feeling supported by experienced staff, opinion leaders or managers (i.e. relative strength of supporters and opponents) and adapting policies within the organization facilitate implementation (i.e. regulations, rules, policies).[20, 45]

7. **Social, political and legal factors**

Insufficient funding options and structural regulations to work proactively are classified as barriers.[20, 27, 35, 36, 40, 42] For example, healthcare professionals believe that the lack of insurance coverage limits the extent to which older people have access to and can afford falls prevention services.[27] Additionally, the scale-up of falls prevention in national policies could facilitate implementation.[20]

Discussion

Determinants were classified as barriers (n=40) and facilitators (n=35). The availability of necessary resources is the most reported determinant. Other common determinants are

knowledge, intention/beliefs and motivation of older people and healthcare professionals, fitting of the intervention into current practice, communication, team and referral processes and financial (dis)incentives. This review highlights the complex dynamics and interactions between determinants. For example, resources like time, staff, training, referral options and the availability of falls prevention services can interact with other determinants such as awareness, knowledge, skills, intention and motivation of healthcare professionals. It also shows that notably more determinants were described as barriers and were mainly described at the domains of individual health professional, older person, professional interactions, and incentives and resources. Determinants at the domain social, political and legal factors were often not mentioned. Possible reasons could be that certain factors like contracts or corruption are not common for falls prevention implementation or that the perspective of policy makers was not explored in previous research, since the included studies mainly focused on healthcare professionals and older adults.

The findings of this review can be related to the findings of a recent systematic review exploring strategies to implement multifactorial falls prevention interventions.[7] Vandervelde et al. gives an overview and description of implementation strategies following the taxonomy of behaviour change methods of Kok et al.[9] The described implementation strategies can be used to address several of the determinants found in the current systematic review. At the individual level for older people and healthcare professionals, the implementation strategies most often described are: 'tailoring', 'active learning', 'personalize risk', 'individualization', 'consciousness raising', and 'participation'. At the organization, community and policy/society levels, the most frequently mentioned implementation strategies are: 'technical assistance', 'use of lay health workers, peer education', 'increasing stakeholder influence', and 'forming coalitions'. However, it is important to implement in a systematic manner; first assess the determinants and understand how they influence the implementation process before selecting implementation strategies. Implementation is a context-specific and dynamic process, that requires tailoring of implementation strategies. In this process it is key to involve stakeholders, to prioritize determinants and to select suitable theories and implementation strategies that may likely address several determinants. [8-10] For example, the determinant 'beliefs and knowledge' at the level of the older person is in this study both mentioned as a barrier and as a facilitator, it also has multiple meanings (e.g. social stigma, denial of fall risk, misperception about target group and effect of the intervention). By understanding this determinant it is possible to select different implementation strategies (e.g. 'personalize risk,' 'individualization,' 'consciousness raising,' and 'participation.'). These strategies can address different determinants found in this review (e.g. patient knowledge and beliefs, needs, preferences, motivation and behaviour). [49] This example shows the complementarity of both reviews, with caution for tailoring to the local context.

The methodological rigor is an important strength. This review has a comprehensive search strategy, followed the PRISMA statement, was registered in PROSPERO and each step of the process was performed independently by two researchers.[12, 13] The determinants were

categorized following the widely used TICD checklist; and as such contributes to the improvement of conceptual clarity, comprehensiveness and study replication.[11, 50] Despite the comprehensive search strategy, we identified additional studies from reference lists of included studies and systematic reviews. Therefore, it is possible that certain studies were missed. Other limitations were the overall moderate to low quality of the included studies. Additionally, some studies did not specify the interventions. We would recommend reporting a detailed description of the interventions following a reporting guideline such as 'Template for intervention description and replication checklist and guide' (TIDieR).[51] Next, it was difficult to categorize the determinants into the TICD checklist. Main reasons were that only eight studies reported the determinants following a framework or taxonomy, not all studies clearly identified a determinant as barrier or facilitator and some determinants (e.g. support of family) could not be easily classified into the TICD checklist, while other determinants could be classified into several determinants and domains. The latter highlights the multi-dimensional context, the dynamics and interactions between determinants.[52] To impede this limitation, two researchers independently categorized the determinants against the definitions of the TICD checklist and discrepancies were resolved with a third reviewer. In this review the determinants were mapped in the TICD checklist and quantified. It is possible that due to this methodological approach the richness of the qualitative data went lost. The results give an overall and holistic view on the determinants influencing the implementation of a multifactorial falls risk assessment and/or multidomain interventions in the community setting, but it is not clear how important a determinant is and how it can influence the implementation process. We recommend future studies to use a framework such as the TICD checklist to explore determinants and to also perform a contextual analysis independent of the constructs of a framework.

Conclusions

This review gives a comprehensive view on determinants influencing the implementation of a multifactorial falls risk assessment and/or multidomain interventions on all levels of the context. It highlights the multi-dimensional context, dynamics, and interactions between these determinants. It shows that mapping of determinants is needed to choose implementation strategies tailored to the context, and to enhance the uptake and effectiveness of a multifactorial falls risk assessment and/or multidomain interventions. Future research is needed to explore the importance of determinants and underlying interactions.

List of abbreviations

The Integrated Checklist of Determinants of Practice (TICD checklist)

Mixed Method Appraisal Tool (MMAT)

Facilitator (F)

Barrier (B)

Consolidated Framework for Implementation Research (CFIR)

Promoting Action on Research Implementation in Health Services framework (PARIHS)

Template for Intervention Description and Replication checklist (TIDIeR)

Appendices

Appendix 1: Search strategy

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publications

Not applicable

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Availability of data and material

All data generated or analyzed during this study are included in this published article and its additional files.

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Authors' contributions

SAV, NV, KT, TV development of the search strategy. SAV, NV, EV, BDdC, KM: study design. SAV, NV, GB: data collection. SAV and NV: drafting the figures and tables. SAV: drafting the manuscript. EV, BDdC, JF, KM: supervision. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

References

1. Montero-Odasso M, van der Velde N, Martin FC, et al. World guidelines for falls prevention and management for older adults: a global initiative. Age and Ageing. 2022;51(9).

2. James SL, Lucchesi LR, Bisignano C, et al. The global burden of falls: global, regional and national estimates of morbidity and mortality from the Global Burden of Disease Study 2017. Inj Prev. 2020 Oct;26(Supp 1):i3-i11.

3. Hopewell S, Adedire O, Copsey BJ, et al. Multifactorial and multiple component interventions for preventing falls in older people living in the community. Cochrane Database Syst Rev. 2018 Jul 23;7:CD012221.

4. Child S, Goodwin V, Garside R, et al. Factors influencing the implementation of fall-prevention programmes: A systematic review and synthesis of qualitative studies. Implementation Science. 2012;7(91):1-14.

5. McConville A, Hooven K. Factors influencing the implementation of falls prevention practice in primary care. J Am Assoc Nurse Pract. 2020 Apr 1;33(2):108-16.

6. Wensing M, Oxman A, Baker R, et al. Tailored implementation for chronic diseases (TICD): A project protocol. Implementation Science. 2011 2011/09/07;6(1):103.

7. Vandervelde S, Vlaeyen E, Dierckx de Casterlé B, et al. Strategies to implement multifactorial falls prevention interventions in community-dwelling older persons: a systematic review. Implementation Science. 2023;18(1).

8. Moullin JC, Dickson KS, Stadnick NA, et al. Ten recommendations for using implementation frameworks in research and practice. Implementation Science Communications. 2020 2020/04/30;1(1):42.

9. Kok G, Gottlieb NH, Peters G-jY, et al. A taxonomy of behaviour change methods : an Intervention Mapping approach. Health psychology review. 2016;10(3):297-312.

10. Nilsen P. Making sense of implementation theories, models and frameworks. Implement Sci. 2015 Apr 21;10:53.

11. Flottorp SA, Oxman AD, Krause J, et al. A checklist for identifying determinants of practice : A systematic review and synthesis of frameworks and taxonomies of factors that prevent or enable improvements in healthcare professional practice. Implementation Science. 2013;8(35).

12. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021 Mar 29;372:n71.

13. Vandervelde S, Van den Bosch N, Belaen G, et al. Factors influencing the implementation of falls prevention interventions in community-dwelling older persons: A systematic review. PROSPERO; 2022 [4 July 2023]; Available from: https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=295988.

14. Rethlefsen ML, Kirtley S, Waffenschmidt S, et al. PRISMA-S: an extension to the PRISMA Statement for Reporting Literature Searches in Systematic Reviews. Systematic Reviews. 2021 2021/01/26;10(1):39.

15. Bramer WM, Giustini D, De Jong GB, Holland L, Bekhuis T. De-duplication of database search results for systematic reviews in endnote. Journal of the Medical Library Association. 2016;104(3):240-3.

16. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan-a web and mobile app for systematic reviews. Syst Rev. 2016 Dec 5;5(1):210.

17. Hong Q, Pluye P, Fàbregues S, et al. Mixed Methods Appraisal Tool (MMAT), version 2018. 2018.

18. Damschroder LJ, Reardon CM, Widerquist MAO, Lowery J. The updated Consolidated Framework for Implementation Research based on user feedback. Implementation Science. 2022 2022/10/29;17(1):75.

19. Skivington K, Matthews L, Simpson SA, et al. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. BMJ. 2021;374:n2061.

20. Ye P, Jin Y, Er Y, et al. Perceptions of Facilitators and Barriers to Implementation of Falls Prevention Programs in Primary Health Care Settings in China. JAMA Netw Open. 2022 Aug 1;5(8):e2228960.

21. Hepkema BW, Köster L, Geleijn E, et al. Feasibility of a new multifactorial fall prevention assessment and personalized intervention among older people recently discharged from the emergency department. PLoS One. 2022;17(6):e0268682.

22. Baumann I, Wieber F, Volken T, Rüesch P, Glässel A. Interprofessional Collaboration in Fall Prevention: Insights from a Qualitative Study. Int J Environ Res Public Health. 2022 Aug 23;19(17).

23. Vincenzo J, Patton S, Lefler L, et al. A Qualitative Study of Older Adults' Facilitators, Barriers, and Cues to Action to Engage in Falls Prevention using Health Belief Model Constructs. Archives of Gerontology and Geriatrics. 2022 12/01;99:104610.

24. Tiedemann A, Purcell K, Clemson L, Lord SR, Sherrington C. Fall prevention behaviour after participation in the Stepping On program: a pre-post study. Public Health Res Pract. 2021 Mar 10;31(1).

25. Reckrey JM, Gazarian P, Reuben DB, et al. Barriers to implementation of STRIDE, a national study to prevent fall-related injuries. J Am Geriatr Soc. 2021 Feb 13.

26. Mackenzie L, Liddle J, Clemson LM, et al. Perspectives of Australian GPs on tailoring fall risk management: a qualitative study. Aust J Prim Health. 2021 Oct;27(5):409-15.

27. Juckett LA, Bunger AC, Jarrott SE, et al. Determinants of Fall Prevention Guideline Implementation in the Home- and Community-Based Service Setting. Gerontologist. 2021 Aug 13;61(6):942-53.

28. Liddle J, Clemson L, Mackenzie L, et al. Influences on general practitioner referral to allied health professionals for fall prevention in primary care. Australas J Ageing. 2020 Mar;39(1):e32-e9.

29. Jaafar MH, Mat S, Mackenzie L, Tan M. Perceptions of Family Physicians About Fall Risk Screening, Fall Risk Assessment, and Referral Practices for Fall Prevention in Malaysia. Topics in Geriatric Rehabilitation. 2020 01/01;36:38-43.

30. Vincenzo JL, Patton SK. Older Adults' Experience With Fall Prevention Recommendations Derived From the STEADI. Health Promot Pract. 2021 Jul 27:1524839919861967.

31. Mackenzie L, McIntyre A. How Do General Practitioners (GPs) Engage in Falls Prevention With Older People? A Pilot Survey of GPs in NHS England Suggests a Gap in Routine Practice to Address Falls Prevention. Front Public Health. 2019;7:32.

32. Coughlin D, Nordman-Oliveira SE, Schlaak M, Ford JH, 2nd. Falls Prevention Process in Assisted Living Communities. J Appl Gerontol. 2019 Jun;38(6):805-24.

33. McIntyre A, Mackenzie L, Harvey M. Engagement of general practitioners in falls prevention and referral to occupational therapists. British Journal of Occupational Therapy. 2019;82(2):71-9.

34. Mackenzie L, Clifford A. Perceptions of primary health staff about falls prevention in primary care settings in the west of Ireland. British Journal of Occupational Therapy. 2018;81(9):525-34.

35. Liddle J, Lovarini M, Clemson L, et al. Making fall prevention routine in primary care practice: perspectives of allied health professionals. BMC Health Serv Res. 2018 Aug 3;18(1):598.

36. Leysens G, Vlaeyen E, Vanaken D, et al. The use of fall prevention strategies in home care: a survey in Flanders. Tijdschr Gerontol Geriatr. 2017 Jun;48(3):121-33.

37. Kielich K, Mackenzie L, Lovarini M, Clemson L. Urban Australian general practitioners' perceptions of falls risk screening, falls risk assessment, and referral practices for falls prevention: an exploratory cross-sectional survey study. Aust Health Rev. 2017 Mar;41(1):111-9.

38. Vlaeyen E, Etienne J, Geeraerts A, et al. Policy recommendations for the implementation of fall and fracture prevention in community-dwelling older persons. Tijdschr Gerontol Geriatr. 2016 Sep;47(4):164-71.

39. Amacher AE, Nast I, Zindel B, et al. Experiences of general practitioners, home care nurses, physiotherapists and seniors involved in a multidisciplinary home-based fall prevention programme: a mixed method study. BMC Health Serv Res. 2016 Sep 5;16:469.

40. Grant A, Mackenzie L, Clemson L. How do general practitioners engage with allied health practitioners to prevent falls in older people? An exploratory qualitative study. Australas J Ageing. 2015 Sep;34(3):149-54.

41. Haines TP, Day L, Hill KD, Clemson L, Finch C. "Better for others than for me": a belief that should shape our efforts to promote participation in falls prevention strategies. Arch Gerontol Geriatr. 2014 Jul-Aug;59(1):136-44.

42. Middlebrook S, Mackenzie L. The Enhanced Primary Care program and falls prevention: perceptions of private occupational therapists and physiotherapists. Australas J Ageing. 2012 Jun;31(2):72-7.

43. Miake-Lye IM, Amulis A, Saliba D, et al. Formative evaluation of the telecare fall prevention project for older veterans. BMC Health Serv Res. 2011 May 23;11:119.

44. Kramer BJ, Vivrette RL, Rubenstein LZ. Engaging community-based organizations in fall prevention education. Gerontol Geriatr Educ. 2011;32(2):182-96.

45. Hanson HM, Salmoni AW. Stakeholders' perceptions of programme sustainability: findings from a community-based fall prevention programme. Public Health. 2011 Aug;125(8):525-32.

46. Milisen K, Geeraerts A, Dejaeger E. Use of a fall prevention practice guideline for community-dwelling older persons at risk for falling: a feasibility study. Gerontology. 2009;55(2):169-78.

47. Baxter P, Markle-Reid M. An interprofessional team approach to fall prevention for older home care clients 'at risk' of falling: health care providers share their experiences. Int J Integr Care. 2009 May 28;9:e15.

48. Chou WC, Tinetti ME, King MB, Irwin K, Fortinsky RH. Perceptions of physicians on the barriers and facilitators to integrating fall risk evaluation and management into practice. J Gen Intern Med. 2006 Feb;21(2):117-22.

49. Bartholomew LK, Kok G, Ruiter RAC, Fernandez ME, Markham CM. Planning Health Promotion Programs: An Intervention Mapping Approach. 4th ed ed. Hoboken: John Wiley & Sons; 2016.

50. Nilsen P, Bernhardsson S. Context matters in implementation science: a scoping review of determinant frameworks that describe contextual determinants for implementation outcomes. BMC Health Serv Res. 2019 Mar 25;19(1):189.

51. Hoffmann TC, Glasziou PP, Boutron I, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. Bmj. 2014 Mar 7;348:g1687.

52. Mielke J, De Geest S, Zúñiga F, et al. Understanding dynamic complexity in context—Enriching contextual analysis in implementation science from a constructivist perspective. Frontiers in Health Services. 2022;2.