

University of Southampton

Faculty of Medicine

Medicine and Elderly Care

**“A systematic review and narrative synthesis
on the barriers and facilitators to
engagement in fall interventions among
older adults from ethnic backgrounds”**

Shopeitha Ravithas

33454094

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Lay abstract

Background: Falls affect a third of the older adult population and results in long term disabilities, injuries or death. As a result, the financial cost of treating falls and fall-related injuries is high. Therefore, adhering to fall prevention interventions is crucial to reducing financial costs and rate of falls. There are many different types of interventions available such as exercise training and education. Unfortunately, adherence to these interventions is low, especially amongst older adults from ethnic minority groups. There is currently a paucity of research in this area particularly among older adults from ethnic minority groups.

Aim: A systematic review to identify the main facilitators and barriers to the uptake of fall prevention programs in older adults from ethnic minority groups.

Methods: A systematic search was conducted on Medline, Embase and CINAHL which generated 601 articles. Titles and abstracts were checked using the inclusion criteria and articles that were not in English or did not include data on ethnic minority groups were removed.

Results: Nine out of the twelve studies included were qualitative studies with the remainder being mixed method studies (including qualitative and quantitative data). Ethnic groups included were Hispanics, South Asians, Chinese and African Americans. Key facilitators were psychosocial benefits and social support. Key barriers included cultural beliefs, language barriers and inadequate support from healthcare professionals. The following factors showed statistically significant links to adherence: low mood, living alone, education level and cultural belief.

Conclusions: To encourage older adults from ethnic minority groups to attend fall interventions, healthcare professionals should address the stigma associated with falls and the fatalistic beliefs that serve as barriers. Additionally, effective marketing strategies need to be implemented to inform older adults of the psychosocial benefits of attending sessions such as social engagement and improved mood.

Lay abstract word count: 292

Key words: fall intervention, ethnic minority groups, adherence, exercise, culture

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Acknowledgement word count: 66

My contributions

My supervisor, Dr Stephen Lim, proposed the research question after discussing with Hampshire City Council. I then read up on relevant literature and realised the extent to which research was limited in my chosen topic. I created a search strategy and ran this into the database with the help of Paula Sands. Then, I screened the papers after uploading it onto Endnote and carried out data extraction. Dr Samantha Meredith acted as my second supervisor and extracted data from a sample of the papers to improve validity. These findings were later discussed and refinements to the data extraction form were made. After discussing how to format the results in the report with my supervisor, I completed the write-up of the report independently. Throughout this process, I had questions which Dr Stephen Lim and Dr Samantha Meredith were able to help me with through meetings and proofreading.

My contributions word count: 145

Abbreviations used

COM-B model = Capability Opportunity Motivation- Behaviour Model

MeSH = Medical Subject Heading

PICOD = Population, Intervention, Comparison, Outcome, Design

JBI tool = Joanna Briggs Institute Critical Appraisal Tool

CALD = Culturally and Linguistically Diverse

FaB scale = Shortened Fall Behavioural Scale

FES-I score = Falls Efficacy Scale– International Score

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1.0 Introduction

A fall, as defined by the World Health Organisation, is 'an event which results in a person coming to rest inadvertently on the ground or floor or other lower level' (1). This can lead to mortality, morbidity, and long-term disabilities, particularly in older adults. The incidence of falls is a major public health issue with an estimated 28-35% of people aged 65 and over falling each year. As a result, the financial costs of falls are high with an estimated annual cost of £2.3 billion to the NHS (2); this includes emergency care, long-term rehabilitation and loss of independence. Given their widespread impact, understanding the risk factors and adhering to fall prevention programs is crucial to reduce incidence and associated costs.

1.1 Risk factors for falls

With an increasingly ageing population, identifying the risk factors for falls is crucial. This can be broadly categorised into intrinsic and extrinsic factors. Intrinsic factors include increasing age, gender, impaired balance, deficits in muscle function, fear of falling, frailty status, impaired vision, medication side effects and chronic conditions such as osteoporosis, arthritis, neurological disorders and cardiovascular disease (3). Extrinsic factors refer to hazards found in the environment and home. This includes slippery surfaces, uneven flooring, poor lighting and lack of handrails. A thorough understanding of these risk factors is essential for the development of fall prevention interventions (4).

1.2 Falls prevention interventions

A systematic review exploring fall interventions for community dwelling older adults showed that multifactorial interventions which addressed both intrinsic and extrinsic risk factors were the most effective approach to prevent falls (5). This included four components: strength and balance training, home hazard assessment and intervention, vision assessment and referral, and medication review. The most common component mentioned amongst the four was exercise; this was the most effective at reducing the rate of falls (5).

Exercise based training allows the restoration of muscle strength and improves balance (6). Several studies have confirmed the benefits of this with up to 50% of community-dwelling older adults showing a reduction in falls (7). Tai Chi, an ancient Chinese martial art has been an increasingly recognised form of exercise for fall prevention. It involves slow, low-impact motions primarily performed in a semi-squatting position. These movements incorporate trunk rotation, posture control and weight transfer which are all beneficial for both upper and lower limb flexibility and strength (8).

Another effective exercise intervention is resistance training. This involves stand-alone exercises in a community setting or at home and focuses on building muscle tone and strength, especially in the lower limbs (7). This is crucial for fall prevention as muscular strength decreases by up to 5% per year with increasing age, thus leading to poor balance. In addition to loss of strength, it is common to experience age-related loss of Type II skeletal muscle fibres. However, resistance training has been shown to increase both the quantity and size of these Type II skeletal muscle fibres, hence facilitating healthy ageing (9).

Whilst exercise-based programs are an effective approach to fall prevention, the use of assistive devices is also recommended for older patients at increased risk of falling. This includes installing handrails at home, utilising non-slip mats for the bathtub and shower, stair lifts, walking aids or an alarm for warning falls, etc (10). Using assistive devices can reduce the fear of falling and the risk of sustaining an injury as it improves balance, mobility and confidence. The use of a suitable assistive device can enhance quality of life by promoting independence in daily activities, allowing individuals to remain functional for longer periods of time. These advantages also contribute to improved emotional well-being and increased social engagement among older adults (10).

1.3 Uptake of falls prevention interventions in ethnic minority groups

Whilst there are many interventions available for fall prevention, their effectiveness at reducing the rates of falls rely heavily on uptake and adherence. However, uptake for fall interventions averages around 50% and can be as low as 10%; this is further exacerbated in ethnic minority groups (11). A key reason for this is the substantial health inequalities that exist between different ethnic groups, thus significantly affecting participation in fall prevention programs.

Health inequalities exist between ethnic groups of all ages; however, the greatest differences are found amongst the older adult population, likely due to the increasingly ageing population (12). These health disparities exist due to many reasons such as socio-economic factors, including income, employment, lower levels of education and the built environment. In addition to these, various other vital factors contribute to health inequities such as cultural differences in belief and behaviour as well as discrimination in access to health and social care (12). Consequently, participation in fall prevention interventions tends to be lower. Therefore, it is important to understand the factors that facilitate and reduce adherence to fall interventions among older adults from ethnic minority groups to develop effective strategies to enhance their uptake (13).

1.4 The COM-B Model

A widely used behaviour change framework called the Capability Opportunity Motivation-Behaviour (COM-B) model can be used to identify factors that enable and hinder engagement in fall prevention interventions. This model was developed to create a more comprehensive framework to understand behaviour change and over time has been incorporated in numerous studies due to its cohesive and structured nature (14). According to the COM-B model, the pattern of adherence to fall interventions can be linked to three components: capability, opportunity and motivation. Capability refers to whether the individual holds the knowledge, abilities and skills required to engage in a certain behaviour. This can be categorised into either psychological capability (knowledge) or physical capability (physical strength or stamina). Opportunity refers to the external factors which allow the particular behaviour to take place and can be categorised into physical (time, resource, location) and social opportunity (cultural norms, social cues, social factors). Motivation refers to the internal systems that determine an individual's behaviours or decision-making process. This can be categorised into either reflective motivation (making plans or evaluating previous decisions) and automatic motivation (impulses, desires and inhibitions) (15).

Older adults from ethnic minority groups may experience reduced physical or psychological capability due to health issues such as physical impairments or poor mental health. Impaired mobility or conditions such as depression can be debilitating and can hinder adherence to these programs (16). Opportunity to adhere to fall programs can be hindered by physical and social factors such as difficulty accessing the programs due to transport issues or cost. Social factors include language barriers and a lack of culturally appropriate programs. This can be resolved by program facilitators including translated materials and providing transport to these interventions (17). Motivation for fall interventions include cultural or personal beliefs, stigma associated with falls and aging as well as misinformative views on fall prevention programs. These issues can be addressed by promoting culturally sensitive outreach from trusted community leaders as well as education regarding the key aspects of fall prevention programs. Building motivation through this approach can increase trust and engagement in these programs. Therefore, understanding these components is key to identifying facilitators to adherence and could thus drive research into implementing more effective intervention strategies.

1.5 Aims

There is paucity of literature regarding fall intervention engagement among ethnic minority groups. This systematic review aims to identify the facilitators and barriers to the uptake of fall prevention programs in older adults from ethnic minority groups. Findings from this review can assist policy makers and those involved in delivering falls prevention interventions to consider key factors that may promote engagement from ethnic minority groups.

Word count: 1257

2.0 Methodology

The Preferred Reporting Items for Systematic Reviews and Meta- Analyses (PRISMA) statement was used as a guideline to conduct this systematic review. Study protocol was registered onto PROSPERO CRD42024586433. The research question was developed in collaboration with Hampshire City Council after identifying gaps in the literature on this topic. From these searches, the PICOD (population, intervention, comparator, outcome, study design) were identified. This can be seen in Table 1 below. All relevant studies from the point of inception to present time were included in the search.

Table 1. *PICOD for the systematic review*

Population	Intervention	Comparator	Outcome	Study design
Older adults aged 65 years and over from ethnic minority groups	Falls intervention groups/ exercise	Participants who do not receive an intervention e.g. the control group	Facilitators and barriers for uptake of falls prevention programmes in older adults and ethnic minority groups	All study designs included

2.1 Search strategies

Searches were conducted on Medline, Embase and CINAHL databases to find the articles used in this systematic review. These databases were used as they cover a wide range of studies relevant to the topic. All the main search terms are included below in Table 2 and were chosen with the aim of covering a large variety of publications. Both free text search and MeSH terms were used with free text search being indicated with “.mp” and MeSH terms indicated with “/”.

Table 2. *Combined search terms*

Concept	Search terms	MeSH terms
Falls	Fall* OR collaps* OR injur*	Accidental Falls/
Intervention	Program* OR intervent* OR manag* OR mitigate* OR exercise* OR strateg*	Primary Prevention/ or Secondary Prevention/ exp Exercise Therapy/
Age	Older adult* OR elder* OR older people OR older patient* OR senior* OR aged OR geriatric*	exp Aged/ or frail elderly/
Ethnic	Ethnic minorit* OR ethnic group* OR ethnic inequalit* OR minority group* OR ethnic* OR BAME OR Black OR Asian OR Indian OR minorit* OR race	exp population groups/ or African people/ or exp Asian people/ or black people/ Black or African American/ or Ethnicity/ or Racial Groups/
Promoters	Motivator* OR facilitator* OR encourage OR factor* OR stimulator OR engage*	
Barriers	Barrier* OR prevent* OR inhib* OR obstacle* OR impeded*	

2.2 OVID MEDLINE search strategy

In this database, free text search followed by Medical Subject Headings (MeSH) search terms were used to retrieve relevant publications for the research question. The term “fall” was used with synonyms included using the OR function. Truncation was used where possible to avoid omitting any relevant articles that used different forms of the same word. This search strategy generated 146 publications (last updated 1/12/24) and can be found below in table 3.

Table 3. *OVID Medline search strategy*

1	fall*.mp.
2	(prevent* adj5 (program* or intervention*)).mp.
3	(prevent* adj5 management*).mp.
4	(prevent* adj5 'exercise programme*').mp.
5	(prevent* adj5 strateg*).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]

6	(prevent* adj5 'exercise intervention*).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]
7	2 or 3 or 4 or 5 or 6
8	1 and 7

2.3 EMBASE search strategy

Despite the OVID Medline and EMBASE databases being on the same platform, identical search strategies could not be generated due to different MeSH headings. However, the same syntax was used with free text being indicated with a “mp” and MeSH headings being indicated with a “/”. The “exp” function was also used to ‘explode’ a MeSH heading to include all subject headings to ensure no papers were omitted. This search strategy generated 370 publications (last updated 1/12/24) and can be found in the appendix.

2.4 CINAHL search strategy

CINAHL was used as the third database as it contains literature about nursing and allied health which is relevant to the review topic. The ‘advanced search tool’ was used to generate searches with limits being ‘English language publications only’. In this database, free text search and MeSH headings were also included to generate all relevant articles. This led to the generation of 85 publications (last updated 1/12/24) and can be found in the appendix.

Table 4. *Inclusion and exclusion criteria*

Inclusion	Rationale	Exclusion	Rationale
Interventions that focus on fall prevention	This was the chosen intervention for this systematic review	Systematic reviews	These do not contain original data
English Language	Translation services unavailable for non-English texts	No data on ethnic minorities	The review specifically focuses on ethnic minority groups
All papers from point of inception to final search	To include all relevant literature and to avoid missing out on any crucial studies	Aged <65 years	Older adults from ethnic minority groups were our chosen population
Full text	Required to critically appraise the paper and extract data		

2.5 Data extraction and synthesis

A standardised data extraction table was created on Microsoft Word for the final 12 studies. This included information about each paper, study type, method of data collection, type of data analysis, participant information and relevant findings. A second researcher then assisted in conducting a rigor screening with 3 of the articles to compare the data extracted.

This was then used to refine the data extraction table before extracting data for the remaining articles. A template of the data extraction form can be found in the appendix of this report.

After data extraction of the 12 articles, the software NVivo 15 was used to analyse the data. All 12 articles were uploaded onto NVivo and coded line by line. These codes were divided into facilitators and barriers using the 3 components of the COM-B model: capability, opportunity and motivation. Data was analysed using thematic analysis and direct quotes from the article were categorised into subcodes according to the relevant theme.

2.6 Quality assessment

The Joanna Briggs Institute Critical Appraisal Tool (JBI) was used to undertake a quality assessment of the chosen studies. Papers were scored out of 9 or 10 depending on how well they met the criteria, with options being yes, no or unclear. Table 8 outlines the quality assessment for qualitative studies using the JBI Critical appraisal tool. Table 9 outlines the quality assessment for the mixed methods studies using the JBI critical appraisal tool for quantitative studies. These can be found in the appendix.

Word count = 666 (excluding tables)

3.0 Results

3.1 Summary of included studies

Overall, 601 papers were found in Medline, EMBASE and CINAHL databases and were imported into Endnote 20. After removing duplicates, 493 article abstracts were screened and 353 studies did not meet the inclusion criteria. After full-text screening, a further 126 were excluded leaving 12 studies to be included in the review: 9 qualitative studies and 3 mixed-method studies. (Figure 1).

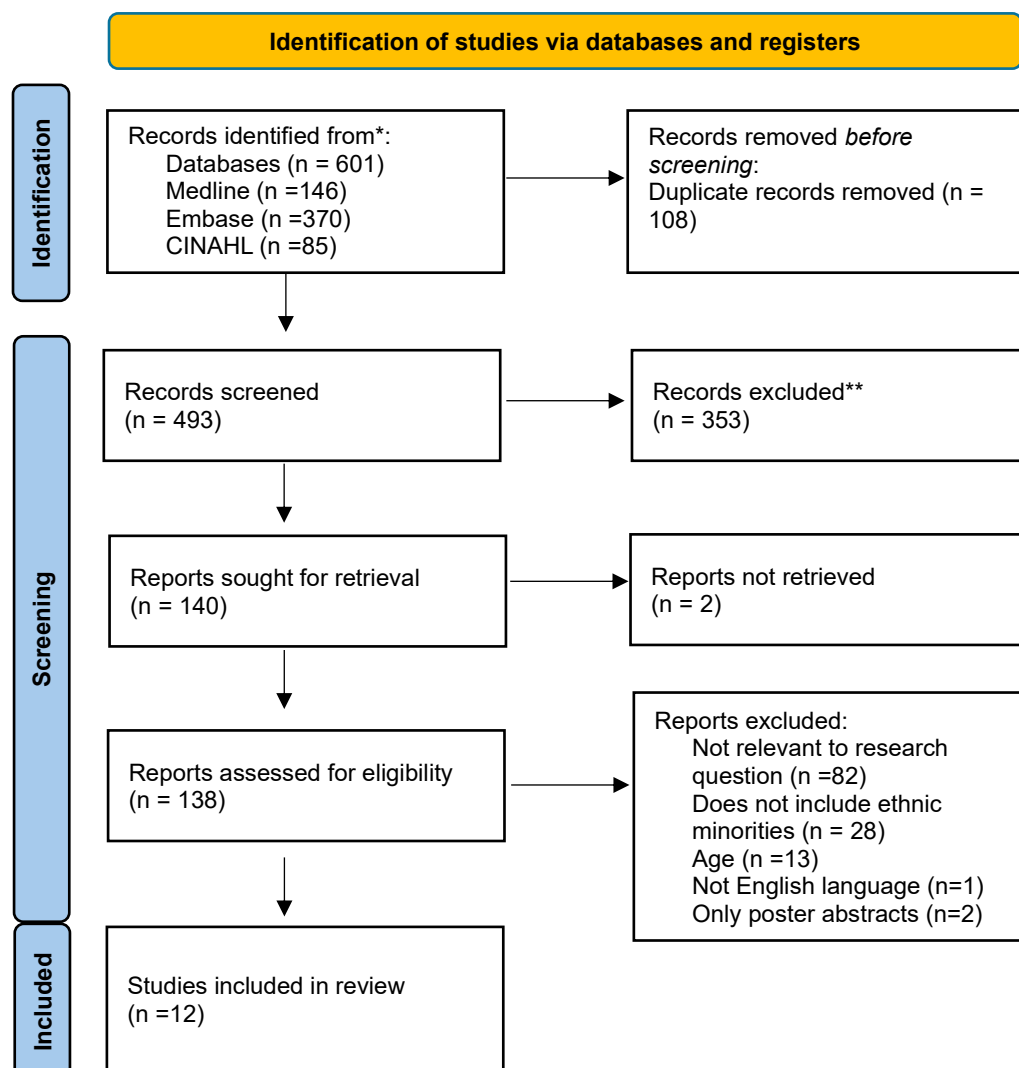


Figure 1 – PRISMA flowchart showing screening process

1176 participants were included, with 11 studies focusing on mixed genders and 1 study focusing exclusively on female participants. The studies included Hispanic, South Asian, African American, Chinese and Caucasian ethnicities (Table 7). The contexts included the hospital (16), community health centres (17-21), falls clinics (22-24), voluntary organisations (25) and senior centres (26, 27).

Table 5. Characteristics of included studies

Author, year and country	Study title	Sample size and gender	Mean age in years	Type of study	Aim of study	Data collection method	Type of analysis
F. Aminzadeh et al, 1998 (Canada)	Exploring seniors' views on the use of assistive devices in fall prevention	N=30 F=21; M=9	72.2	Cross – sectional, qualitative	To explore the views of 'British Canadian' and 'Italian Canadian' community dwelling older peoples' views on the use of assistive devices for fall prevention	Interviews Focus groups	Thematic analysis
A. Dickinson et al, 2011 (United Kingdom)	The role of health professionals in promoting the uptake of fall prevention interventions: a qualitative study of older people's views	N =187 F=137; M=50	75.0	Qualitative	To explore older people's perceptions of the facilitators and barriers to participation in fall prevention interventions in the UK	Focus groups Semi-structured interviews	Constant comparative analysis
A. Dickinson et al, 2011 (United Kingdom)	Fall prevention in the community: what older people say they need	N =187 F=137; M=50	75.0	Qualitative	To explore the views, preferences and experiences of older people in relation to fall prevention interventions, to identify barriers and facilitators to uptake in fall prevention interventions from South Asian and Chinese ethnic groups	Focus groups Semi-structured interviews	Thematic analysis
M. Horne et al, 2009 (United Kingdom)	What do community-dwelling Caucasian and South Asian 60-70 year olds think about exercise for fall prevention?	N = 127 F=81; M=46	65.7	Qualitative	To identify salient beliefs that influence uptake and adherence to exercise for fall prevention among community dwelling Caucasian and South Asians in the UK	Focus groups Semi-structured interviews	Framework analysis

K. Horton et al, 2011 (United Kingdom)	The role of culture and diversity in the prevention of falls among older Chinese people	N =130 F= 21; M=9	70.2	Qualitative	To explore the perceptions, attitudes, and beliefs of Chinese older people who had experienced a range of falls injury prevention programs, and, to identify the facilitators and barriers to their participation in those programs.	Focus groups Interviews	Thematic analysis
J, Jagnoor et al, 2014 (United Kingdom)	A qualitative study on the perceptions of preventing falls as a health priority among older people in Northern India	N= 90 Both F and M	N/A	Qualitative	To investigate fall prevention as a health priority among older people, to understand people's perception of risk and fall injury prevention and to explore acceptability of yoga as an intervention for falls prevention in the community	Focus group	Thematic analysis
H. Jang et al, 2021 (Australia)	Fall prevention programs for culturally and linguistically diverse groups: program provider perspectives	N= 24 F= 21; M = 3	N/A	Qualitative	To explore the experiences, needs and challenges that individual program providers encountered in implementing and delivering a fall prevention program for CALD groups and meeting the linguistic, cultural and contextual needs of the program participants	Semi-structured interviews	Thematic analysis
M. Mora Pinzon et al, 2019 (United Kingdom)	"Pisando Fuerte": an evidence-based falls prevention program for Hispanic	N= 24 F =17; M = 7	70.5	Mixed methods	To describe the implementation of Pisando Fuerte at 2 community organisations in Wisconsin using the RE-AIM framework.	Questionnaires Semi-structured interviews	Content analysis Descriptive statistical analysis

M.G. Stineman et al, 2011 (United States of America)	Attempts to reach the oldest and frailest: recruitment, adherence, and retention of urban elderly persons to a falls reduction exercise program	N= 204 F = 152 M = 52	76.5	Mixed methods RCT	To assess the recruitment, adherence, and retention of urban elderly, predominantly African Americans to a falls reduction exercise program.	Focus groups Clinical trials	Statistical analysis
B. Teng et al, 2023 (United States of America)	Predictors of real-world adherence to prescribed home exercise in older patients with a risk of falling: A prospective observational study	N = 68 F = 68 M = 0	78.9	Quantitative	Using a multi-ethnic Asian population, this study assessed adherence to prescribed home exercise programs, explored factors predicting adherence, and evaluated whether home exercise adherence was associated with physical activity.	Questionnaires	Statistical analysis
E.S. Wolfe et al, 2018 (United States of America)	Evaluating the Effectiveness of the Translated "A Matter of Balance" Fall Prevention Program Materials for Non-English-Speaking Participants	N = 90 F = 77; M = 13	N/A	Mixed methods	To evaluate whether A Matter of Balance (MOB) was associated with reduced Fear of Falling (FOF) in Chinese- and Spanish-speaking participants and included an English- speaking comparison group.	Questionnaires Phone interviews	Statistical analysis
J.Y. Xiao et al, 2008 (Australia)	Older Chinese Australians' understanding of falls and falls prevention: Exploring their needs for information	N= 15 F =13 M =2	N/A	Qualitative	To explore older Chinese Australians' knowledge and attitudes towards falls and falls prevention, to identify their information needs in preventing falls, and their preference in receiving information and education.	Questionnaires Focus groups	Thematic analysis

N/A – data not provided

3.2 Findings from quality assessment

All studies did well on the JBI quality assessment tool with key findings showing sufficient congruity between the research methodology and the research question. However, there was a lack of information regarding the researchers' influence on the study. This is important as the relationship between the researcher and the participants is not addressed which is a limiting factor since their relationship could influence the outcome and the validity of the result.

3.3 Synthesis of findings

3.3.1 Qualitative studies

The COM-B model was used to arrange the qualitative data into three categories: capability, opportunity and motivation. Within these categories, key themes identified in the review were organised and separated into the facilitators (Table 6) and barriers (Table 7).

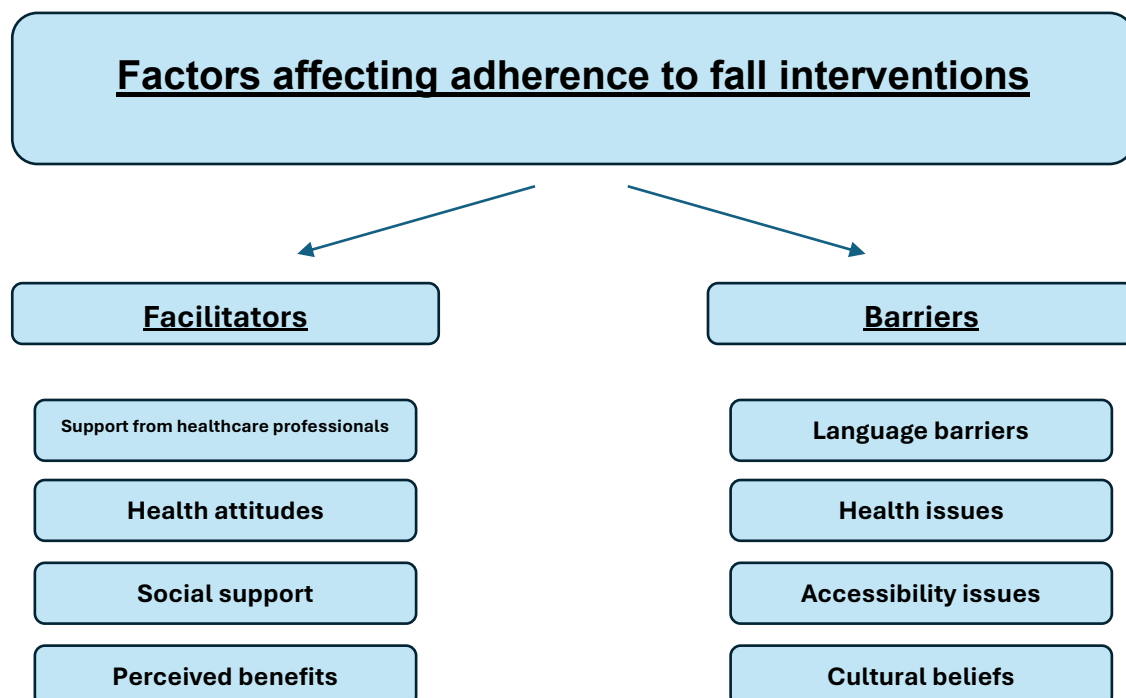


Figure 2 – Summary of key facilitators and barriers

Table 6: Facilitators for engagement in fall intervention programs

Behaviour model	Theme	Quote
Capability	Overcoming differences in language	<i>'Participants identified Chinese newspapers (magazines), Chinese radio, flyers and information sessions as the preferred information sources. Participants said they read Chinese newspapers or listen to Chinese radio every day, and, as a result, information in the newspaper or in radio programs would be widely accessed. In addition, flyers and posters at public places where Chinese older people may visit frequently—such as supermarkets, medical clinics, local hospitals and community centres—were also identified as useful methods of informing older people about falls and falls prevention.'</i> (author) (12)
		<i>'Simplifying the homework and other resources was also recommended for those who had low level of literacy.'</i> (author) (7)
		<i>'it is recommended that MOB master trainers and coaches consider their participants' level of literacy and comprehension abilities when planning their courses.'</i> (author) (11)
	Support from healthcare professionals	<i>'I'm diabetic and I started staggering around earlier this year, round about May. And I saw the doctor and the doctor recommended me to go to the Falls Clinic and I have had some benefit from it really. The main thing was for me physiotherapists who put me on to certain exercises and they made a difference.'</i> (participant) (2)
		<i>'Yes, she's excellent. I remember once, when I was not too well she telephoned me and asked how I was. I was so surprised but thought it was a very nice and thoughtful gesture. So, when I felt better, I returned here...'</i> (participant) (3)
	Appropriate design of assistive devices	<i>'I am losing my strength. I have difficulty with my balance. This cane has given me the best support I've ever had.'</i> (participant) (1)
<i>'When you use a cane, you get spoiled. I am telling you; they are opening the doors for me. It is terrific. They help you. They respect you.'</i> (participant) (1)		
Opportunity	Adequate accessibility	<i>"It either needs to be in the town centre where people are coming for their shopping and that sort of thing, or to the market on a Tuesday for instance, or it needs to be in the community centres out on that estate or that estate or in a village so people can get to it within their own neighbourhood.'</i> (participant) (3)
		<i>'They scheduled all on-site exercise classes, reminded participants to attend, and facilitated transportation to the centre through taxi vouchers. To enhance adherence to the home program, the community interventionists made weekly phone calls to encourage the participants and remind them to complete their exercise calendars.'</i> (author) (9)

	Knowledge of intervention	<p><i>'Device training should also include sufficient instructions and practice to provide elderly persons with the necessary knowledge and skills required for effective use and maintenance.'</i> (author) (1)</p> <p><i>'Various interventions provided advice on getting up after a fall, an area where many needed information: '...in the afternoon, after you've done all your exercises in the morning, we had a talk from somebody ... and also they showed you how to get up when you had fallen because I can't get up off the floor very easily.'</i> (participant) (3)</p>
Motivation	Health attitudes	<p><i>'Baseline medication use predicted positive home exercise adherence, possibly due to differences in study design, sample characteristics, and attitude towards health instructions.'</i> (author) (10)</p> <p><i>'Motivation for health improvement may vary based on medication usage, with individuals taking fewer medications showing less concern, while those with multiple medications making greater efforts, aligning with the Health Belief Model.'</i> (author) (10)</p>
	Culture	<p><i>'Chinese older people also stressed the importance that the intervention should be culturally appropriate. Tai chi was suitable due to its Chinese origins, but dance based interventions were deemed totally unsuitable. But I am not into that sort of thing. Too old now. What would my daughter think of me dancing? At my age, it's a laughing matter. My dead husband would have been shocked.'</i> (participant) (5)</p> <p><i>'The cultural appropriateness of the venue was of importance to older Muslim Asian women; in particular, the venue had to be somewhere they felt comfortable to attend with no men in the group.'</i> (participant) (3)</p>
	Perceived benefits	<p><i>'I haven't had a fall and that's why I want to continue doing T'ai Chi, because I think doing exercise like this helps me. I think it makes me stronger. My muscles, my leg muscles are stronger, I think.'</i> (Chinese Focus Group: T'ai Chi Group)' (participant) (5)</p> <p><i>'Social and emotional benefits were apparent for all older people, regardless of ethnicity or gender, and had an important effect on adherence. These related to feeling better 'in yourself' and enjoyment from attending, making and meeting friends and improved confidence.'</i> (participant) (3)</p>
	Public image	<p><i>'Compared to canes, bathroom aids may be less frequently associated with aging and disability and more easily accepted and used by elderly persons. This finding supports previous research indicating that users may apply different standards to devices utilized solely at home versus those used in public.'</i> (author) (1)</p> <p><i>'the approach to device utilization among older adults should be a nonmedical, non-disability approach. Improving the comfort, convenience, and attractiveness of assistive devices (e.g., fashion canes and colourful and aesthetic bathroom aids) is one strategy to enhance their image and acceptability.'</i> (author) (1)</p>

	Social support	<p><i>'Hearing about an intervention from others appeared to be an effective stimulus to attendance and uptake. Often this was from friends, relatives or neighbours, as these participants explain: 'Through a friend who has done it for years and is a right bossy lady and she said "you should go" so I thought I'd give it a try.'</i> (participant) (3)</p> <p><i>'The relative preference for community-based group programs may be greater among African Americans than in the general population. The importance of socialization is reflected in many cultural activities ranging from family reunions to religious worship and may explain why adherence to the on-site exercise class was so much higher.'</i> (author) (9)</p>
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Facilitators: capability

Overcoming differences in language

Overcoming differences in language by using translated materials and bilingual program leaders (24, 26) helped ethnic minority groups feel included in the interventions which improved their adherence rate. Also, receiving information about classes through methods that participants frequently used was helpful. For instance, Chinese participants preferred receiving information through radio programs or newspapers distributed in supermarkets, since they were places frequently visited by them (21).

Support from healthcare professionals

Healthcare professionals were seen as highly influential to those who came to seek their advice. Participants highlighted that when doctors explicitly told them to attend these sessions, they 'made a point of going' as anything recommended by doctors was 'taken particularly seriously' (11). Additionally, the way they articulated themselves was important as increased motivation to attend was seen when facilitators checked up on participants regularly as they felt more appreciated and heard (28).

Furthermore, undertaking regular home visits to identify hazards and finding a safe place to exercise in was well received by participants. This further enhanced their physical capability in participating in the intervention classes (27).

Appropriate design of assistive devices

Uptake of assistive devices was high due to the number of reported benefits. These included improved function, reduction in pain and enhanced feelings of safety (18). Additionally, the design of assistive devices was crucial as participants preferred canes over walkers as they were 'less bulky and more fashionable' (18). This highlights the importance of designing devices that meet the needs of users to promote their uptake.

Facilitators: opportunity

Adequate accessibility

Having programs with adequate transport access provided older adults with the opportunity to attend these sessions. Having the class 'in the town centre where people come to do their shopping' or in a community centre was preferred as people visited these places often (23).

One study mentioned the provision of taxi vouchers to attend these sessions (27) whilst another study mentioned 'daytime attendance was preferable to evenings' (28). In general, the cost was not a major issue identified; however, older adults did value subsidised interventions (25).

Knowledge of intervention

To engage older adults in fall interventions, appropriate knowledge and awareness of the intervention is vital. For instance, device training including sufficient instructions and practice was necessary to equip adults with the skills required for effective use and maintenance of devices (18). This therefore allowed them to use the devices correctly and experience the benefits of it, further increasing their motivation to adhere.

Facilitators: motivation

Health attitudes

In one study, it was shown that baseline medication use predicted positive home adherence to exercise. Individuals taking fewer medications showed less concern in participating in their prescribed fall interventions whereas individuals taking multiple medications demonstrated greater efforts in partaking in the fall intervention, thus aligning with the Health Belief model (16).

Culture

Culture emerged as a key motivator to participating in fall interventions as older Indian adults were keen to attend yoga classes (20) whereas Chinese older adults were keen to learn Tai Chi since it was 'good for health' and an exercise derived from their culture (21, 28). Moreover, in Chinese culture, dressing appropriately for one's age by wearing trainers instead of high heels was taken seriously, reflecting their willingness to take care of their health and partake in fall interventions (25).

Additionally, single- sex classes had a higher uptake rate for Muslim women, who felt more comfortable when classes were segregated (28). Participants from culturally and linguistically diverse (CALD) backgrounds were more motivated to attend if the intervention was held in partnership with existing community organisations such as migrant resource centres, multicultural health organisations and churches as they integrated spiritual and physical well-being – key aspects of cultural significance (24, 27). Also, incorporating cultural music and foods during the sessions helped engage more older adults in the program (24).

Perceived benefits

Older Chinese participants mentioned doing Tai Chi continuously as it made their 'leg muscles stronger' and preferred to continue experiencing this benefit (25). Another strong motivator was socialisation. Indian men from all demographics favoured regular walking due to the 'positive aspects of exercise for socialisation and mental health' as well as it being a 'good opportunity for an outing' (20). Similarly, in CALD groups, the psychosocial health benefits encompassed in the interventions were a major motivator to adherence. 'Increased knowledge and a sense of achievement and community' encouraged these participants to attend who otherwise would have experienced social isolation (24).

Public image

Interventions that maintained older adults' public image and did not give connotations of being 'handicapped' or 'old' were strongly favoured. For instance, bathroom aids were more easily accepted which shows that 'users apply different standards to devices utilised solely at home versus those used in public' (18). Also, to enhance device use, marketing strategies emphasising the 'nonmedical, non- disability approach' as well as 'improving the comfort, convenience, and attractiveness of assistive devices' was important (18).

Social support

Social support has been a key motivator for uptake. For example, adherence to prescribed exercises was positively associated with social support as it strengthens 'self -efficacy and expectations regarding exercise benefits' (16). Similarly, discovering interventions from family and friends was an effective stimulus to uptake, as one participant mentioned 'a friend who has done it for years said, "you should go", so I thought I'd give it a try' (23). Likewise, fall education aimed at carers were necessary to target CALD communities and motivate them to adhere to fall interventions (24).

Table 7: Barriers for engagement in fall intervention programs

Behaviour model	Theme	Quote
Capability	Language barriers	<i>'Maybe they think I don't speak English, and they may feel it hard to explain. It must be hard for me to try and explain things in Chinese. I certainly don't expect them to do that, but if I was in Hong Kong and had to see a doctor, then that's simple. They speak to me in Chinese, and we are clear about what the problem is. But here, it's difficult. I tend to rely on my daughter to ask those questions.'</i> (participant) (2)
		<i>'The staff at that hospital could not speak Urdu or Punjabi, I can't speak English...'</i> (participant) (2)
	Flaws in assistive devices	<i>"Well, I found, when I fell, they [hip protectors] didn't help me, they shifted... I tend not to fall on my hips, it's either backwards or my knuckles go forwards and I noticed that they'd shifted – they sort of chipped as I swivelled round... perhaps protected me somewhere, but not where they were supposed to.'</i> (participant) (3)
		<i>'Some people did not wear pendant alarms, hip protectors and slippers (from the slipper exchange) because they were uncomfortable: '...and you see I always wear these sorts, this sort of a slipper but they hadn't got my size and she insisted that I have the little bootie one... I only took it to shut her up (laughs) and I gave it away to my friend.'</i> (participant) (3)
		Health issues
	<i>'Some individuals who were near 75 years of age did not feel fit to do any form of exercise and</i>	

		<i>reported avoiding stairs in their own houses.'</i> (author) (6)
	Lack of support	<i>Family members who were less supportive were also considered as limitations for modifying environmental risk factors. When considering marble flooring as a slip hazard, participants spoke of their children's less empathetic attitude towards their needs. One of the participants said: Youngsters don't listen to our needs. For them show-off (social status) is more important than life of their parents. They will go to religious places to earn blessings but not take care of elders in the house.'</i> (participant) (6)
		<i>'Social isolation, exacerbated by differences in language, culture, religion, socio-environment and smaller social network in the new country, was viewed as having a negative impact on participation in any community health programs among CALD older people'.</i> (author) (7)
	Response of health professionals	<i>'She is not interested. Anytime I go to speak to her, all she does is she keeps staring at her computer. She will not spare you a single glance while you are talking. As soon as I have finished talking, she hands me my prescription and out I am sent. If I insist I am feeling very unwell, then she will check my blood pressure.'</i> (participant) (2)
		<i>'...you know they just sort of washed my face and whatever and patched it up and there was a little scar, but they didn't do anything about it and there was no question of a Falls Clinic or anything like that at that stage.'</i> (participant) (2)
Opportunity	Accessibility issues	<i>'The urban slum FGDs felt that a fall was part of everyday life and had more significant concerns about the cost of hospitalisation, long waiting times for hospital or healthcare services leading to loss of daily wage and medication cost. These participants prioritised other chronic conditions like high blood pressure, sugar (diabetes) and arthritis'</i> (author) (6)
		<i>'For me, I wouldn't mind paying the odd pound but I guess it can mount up if you come twice a week, every week in the month.'</i> (participant) (5)
	Lack of information/education	<i>'Lack of knowledge about and more limited access to fall prevention educational opportunities may have influenced some Italian participants' views that prevention measures were unnecessary. This argument is supported by Italian participants' perceptions of their unequal access to health information.'</i> (author) (1)
		<i>'Participants reported relatively low awareness and utilisation of other health services and professionals who have a potential role in falls prevention. Most Chinese older people lacked knowledge about allied health professions such as</i>

		<i>podiatry, occupational therapy and physiotherapy, and how to access these services.'</i> (author) (12)
Motivation	Cultural beliefs	<i>'Some participants believed that Chinese herbal medicine might be more effective in treating injuries caused by falls, especially when they were informed by Western family doctors that there was not much that could be done to facilitate healing.'</i> (participant) (12)
		<i>'Amongst many South Asians 'inshallah' or the idea of illness being down to God's will was very apparent: Anything can happen at any time. I can't say I have any fears. Things can happen. God knows. God knows. This belief supported the notion that there was no need to change behaviour. Accepting that a fall is the will of God or Allah may become a significant barrier to behaviour change.'</i> (participant) (4)

Barriers: capability

Language barriers

Language barriers were a prevalent issue throughout this review (17, 21, 22, 24-26, 28). South Asian and Chinese participants had difficulty accessing information regarding fall interventions as well as communicating with staff regarding their treatment due to language barriers and an inadequate level of literacy (17, 26, 28). Additionally, having bilingual facilitators was important as the class was not attempted if they did not have any (24, 25).

Moreover, some participants from CALD backgrounds, were unfamiliar with using public transport and often had to rely on their children to get to classes (24). This served as an additional barrier to adherence.

Flaws in assistive devices

Some participants did not follow fall prevention advice due to the design issues of assistive devices. One woman noted that hip protectors 'were chipped and uncomfortable' and would 'shift' when falling, defeating their purpose of protecting the hips (23). Similarly, pull cords were installed in ineffective locations, such as near the toilet rather than close to the bath. This therefore increased anxiety as the fear of falling whilst getting out of the bath remained a constant concern. This shows the importance of manufacturing appropriate and suitable assistive devices for consumers, to promote their uptake.

Health issues

A key barrier to participating in fall interventions was health issues. Limited mobility, cognitive impairment and other comorbidities were all common reasons as to why older adults could not attend (20, 27, 28). Some individuals did not feel fit enough to do the exercises due to pain affecting 'various parts of their body' and mentioned 'avoiding stairs in their own homes' (20, 28). In addition, having to attend various hospital or dental appointments meant they had to withdraw from interventions.

Alongside the physical health impairment, the mental well-being of older adults was also a barrier to attending programs. Reduced mental well-being was 'significantly associated with reduced adherence' (20) which shows the impact health status has on uptake.

Lack of support

Lack of social support from friends and family was a barrier to attending fall interventions (16, 20, 28). It was reported that family members 'have limited time to supervise exercise, due to other work or social obligations' which deterred older adults from attending (16). Also, some participants were told to 'avoid going outside' by their adult children and felt 'less supported' since they tended to prioritise their own needs over their parents' health (20). Moreover, adequate support from facilitators was just as important to promote attendance. For instance, when regular exercise sessions ended, participants found it hard to join another suitable class and therefore stopped doing the intervention altogether (23).

Response of health professionals

A major barrier that ethnic minority groups faced was the lack of support from healthcare professionals regarding fall prevention (18, 20, 22). Some participants claimed that their GP showed little concern regarding falls. While other issues were taken more seriously, falls were treated with minimal intervention, such as being sent home after being patched up without giving information on fall clinics to attend or follow up. As a result, participants felt disappointed and uncertain about the steps they should take to prevent future falls (22).

Barriers: opportunity

Accessibility issues

The cost of the program was a concern as many relied on their pensions so having classes that were costly made it challenging to afford which was a barrier (18, 25). Additionally, in India, urban slum dwellers did not want to raise concerns over their falls due to high medical bills and long hospital waiting times reducing their daily wages. This therefore prevented them from accessing fall prevention interventions (20).

Another reason for absence was time pressures. Although many of these adults were retired, having other commitments affected their ability to attend all sessions. Caring responsibilities for their families was a bigger priority than attending fall intervention sessions themselves (28).

Moreover, care homes residents faced an additional barrier as they required staff to accompany them to sessions. However, this was not always possible due to staff shortages (27).

Lack of information/education

A key issue identified was the lack of awareness of fall severity and the significant impact of fall prevention. Many reported reaching a specific level of symptom severity before presenting to their doctor, with falls being something 'too trivial' whilst others reported doctors were 'too busy' to be worrying about falls (22). Therefore, many older adults from ethnic minority groups did not acknowledge their importance and hence found it harder to accept that fall prevention programs existed (24).

Lack of knowledge about fall interventions made participants reluctant and anxious to attend as invitation letters contained limited information on how the sessions would run. Hence, this resulted in a low uptake rate (16, 19, 28).

Participants from ethnic minority groups reported having unequal access to health information (18, 25) due to social and linguistic isolation. Most Chinese participants were unaware of allied health professionals such as podiatrists or physiotherapists and how to access their services as this was uncommon in China. This age group also relied heavily on multiple or psychoactive medications which is a risk factor for falling. However, very few reported having regular medication reviews, emphasising the need for education on the impact of polypharmacy (21).

Barriers: motivation

Cultural beliefs

Italian participants reported prevention measures as 'unnecessary' due to the stigma towards aging and cane use being 'a symbol of frailty' (18). Additionally, participants were reluctant to visit GPs regarding their falls as they felt 'a bit of a wimp' (11), further emphasising how stigma serves as a barrier.

Moreover, South Asian and Chinese participants believed falls were a part of 'luck' or 'God's will' that was unpredictable, hence falls were seen to be non-preventable (25). Instead, they followed their own health practices including Chinese herbal medicine. One study highlighted the reluctance of Chinese older adults to talk about negative aspects of their life such as falls with their friends or family due to cultural expectations. Instead, a sense of loyalty was expressed by taking care of themselves to avoid troubling their children, leading to reluctance to seek medical care regarding their falls (25).

Cultural beliefs also challenged medical advice given by physicians. South Asian participants were told not to eat ghee and milk which opposed their belief that these products were good for strength and prevented fall injury (20). Hence participants were dismissive of the recommendations given. Also, when doctors advised regular exercise, participants from rural or urban slums disagreed as they felt their domestic activities kept them sufficiently active (19, 20). Furthermore, cultural beliefs highlighting spending time with family and viewing exercise as less appropriate for older adults, resulted in low efficacy of the intervention programs(16).

3.3.2 Key findings from quantitative studies

The study by Pinzon et al (17) (24 Hispanics and Latinos, mean age 70.5 years) investigated a fall prevention program called "Pisando Fuerte" and the barriers and facilitators for implementation of this program. The primary outcomes measured were fidelity and maintenance using the FaB scale (Shortened Fall Behavioural Scale). The FaB scale improved significantly from an average of 2.69 at baseline to 3.16 at 6 months post completion ($p < 0.001$) which was consistent with increased uptake in fall protection behaviours. A key finding from the 6-month evaluation indicated that participants who completed the program were more likely to have at least a middle school education, been outside of the United States and had no difficulties reading in Spanish.

Stineman et al (27) explored the adherence, recruitment and retention of urban African American older adults to a fall reduction program. A multivariable model was developed to identify factors that independently predicted high adherence to the on-site program. 2 statistically significant variables were identified: living alone status (odds ratio = 3.0, 95% confidence interval [CI] = 1.1, 8.1; $p = 0.03$) improved adherence and depressed mood (odds ratio = 0.85, 95% CI = 0.72, 1.0; $p = 0.05$) reduced adherence.

A study by Wolfe et al (26) evaluated the effectiveness of the translated “A Matter of Balance” program for fall prevention among Chinese, Spanish and English older adults. Findings showed significantly different baseline FES-I (Falls Efficacy Scale-International) scores between the Chinese, Spanish and English-speaking groups, suggesting the participants’ language and culture could be predisposing factors to how they perceive their risk and fear of falling. The Chinese group showed the greatest change in mean FES-I scores (+7.1 points, $p = 0.009$), while the Spanish group had a smaller change (–6.6 points, $p = .016$), and the English group had the smallest change (–2.7 points, $p = .142$). There was also a significant difference in level of education, with Spanish and Chinese participants having less than a high school education; however, the reason for this increase in fear for this group was not identified.

Word count = 2604

4.0 Discussion

4.1 Key findings

The review identified 11 studies that looked at facilitators and barriers to uptake of fall interventions and 1 study (26) that focused solely on the barriers to uptake. Facilitators for the uptake of fall intervention programs included having translated materials and bilingual trainers, increased support from healthcare professionals, having accessible programs and respecting cultural needs and expectations. Another key motivator was health attitudes with some individuals following the Health belief model. This is where an individual adjusts their behaviour according to the perceived severity of the condition, how likely they feel they are to experience it, the advantages of altering their behaviour to prevent the condition, and any barriers to making the recommended changes in behaviour (29). This was seen when individuals taking fewer medications showed a lower adherence rate to prescribed exercise compared to their peers with a higher medication usage.

Barriers to uptake were numerous and some were consistently found throughout the studies, showing the clear need to tackle these gaps. Key barriers include cultural beliefs and stigma associated with aging which hinder older adults from following advice and using assistive devices. A lack of awareness of fall risk and the fatalistic beliefs of falls being due to luck or God was a significant barrier to effective intervention. These beliefs can lead to individuals perceiving fall interventions as useless and therefore reduce their motivation to attend sessions. Consequently, it is crucial to overcome this mindset and educate older adults on the benefits of preventative measures to reduce fall risk.

In this review, contradictory evidence was also found between studies. Aminzadeh et al (18) and Dickinson et al (22) both found that ethnic minority groups placed a heavy emphasis on advice and recommendations given by physicians. However, Jagnoor et al (20) found that

older adults desired more autonomy when managing their health and even dismissed dietary advice provided by physicians' such as reducing intake of ghee and milk. This behaviour may be influenced by differences in the ethnic minority groups studied and the place of residence of these participants as the first two studies were conducted in Western countries, whereas the latter was conducted in India.

4.2 Comparison with the existing literature

The findings of this review align with that of Bunn et al where older adults viewed themselves as physically incapable of undertaking exercise-based activity (30). However, there was also contradictory evidence found. Previous evidence such as Alison et al found that older adults viewed themselves as fit and healthy and denied the impact that aging had on attending fall intervention programs (31). However, in this review, poor health and limited mobility associated with ageing was a key barrier to adherence. This could be due to the difference in population groups that were interviewed as Bunn et al solely focused on community dwelling adults whereas this review also included institutionalised adults.

Another conflicting evidence found by Janet et al was the perception of home visits. In this review, home visits and additional support from healthcare professionals were seen as key facilitators to uptake since they identified hazards in the home as well as recommending spaces to exercise in (27). However, findings from Janet et al found that some participants perceived this as an intrusion of privacy. Having inexperienced professionals who acted as if 'they know best' meant older adults were deterred from following their advice (32). This contradictory finding could be due to differences in population groups as Janet et al focused on London dwelling participants who may have a different cultural influence compared to ethnic minority groups included in this review.

The studies of this review did not focus on previous experiences of fall intervention programs – a key psychosocial factor. Rejeski et al and Resnick et al found that having prior experience of interventions improved confidence and familiarity as it was seen as a 'habit' which was a strong motivator for uptake (33, 34). This is a key factor for adherence that needs to be explored further to enhance the understanding of factors that influence participation.

4.3 Strengths and limitations of included studies

Eleven out of the twelve papers used in the study conducted interviews or focus group discussions on study participants. This allowed for a more in-depth analysis of their views and perspectives with the provision of many crucial quotes. However, these findings are context specific and cannot be easily extrapolated to other minority groups due to differing views and beliefs.

Two studies (16, 24) in the review used convenience sampling which is a limitation as it introduced the possibility of selection bias as findings are limited to one particular group and cannot be extrapolated to other groups. Most of the studies used had a small sample size which limits the generalisability of findings and may not be accurate for the whole population. Dickinson et al and Horton et al both excluded older adults with cognitive impairments. Therefore, further research is needed on this group which is a limitation of this review. In addition, Stineman et al found recruitment and adherence to take part in the study as

challenging, hence the duration of the study had to be shortened which may have affected the ability to see any significant change.

The strengths of the review include no limit applied to the timeframe in which records could be searched. This expanded the search to include all relevant studies and avoided missing out on crucial evidence linked to the topic. Additionally, both quantitative and qualitative studies were included in the review. This allowed for a more in- depth data extraction method using interviews and focus groups to learn about specific facilitators and barriers as well as obtaining numerical data with statistical significance to support the findings.

A limitation of the review process itself is that only English language papers were included due to the unavailability of translation facilities. This may have limited findings in the review. Additionally, even though all studies included in the review undertook a quality assessment, they were included regardless of the outcome. This was to ensure no crucial evidence was omitted; however, it may have affected the overall quality of the review. Furthermore, the review was restricted to three databases, yielding only twelve papers. Many were excluded since they did not address ethnic minority groups, emphasising the scarcity of research in this area. This clear gap in research on ethnic minority groups is significant and reinforces the need to implement policy and practice to better meet their needs.

4.3 Implications

Healthcare workers need to adopt a more proactive approach to individual counselling as there is clear evidence of under recommendation by physicians. This includes referral to fall services and addressing any doubts regarding fall interventions to eliminate any misconceptions. It is imperative that fatalistic beliefs are addressed by healthcare professionals as they significantly hinder the uptake to interventions. These false health beliefs should not be the reason for non- referral or neglect of these ethnic minority groups, thus highlighting the significance of culturally appropriate fall intervention programs. Future additional improvements to policy include having fall screening, prevention information and referral in the UK Quality and Outcomes Framework of the GP's contract as well as staff in A&E providing follow up to fall patients. This would ensure that these older adults have adequate awareness and knowledge of interventions, which was highlighted as a key barrier to participation in this review.

Effective strategies that portray safety devices in a positive light are also crucial to overcome stigma, which was a key issue faced across many ethnic minority groups. There is a need for community- wide campaigns that target a variety of audiences as well as utilising frequently used avenues such as newspapers, radios and TV to spread information to older adults from ethnic minority groups. When promoting fall interventions, it is vital that the positive aspects of later life due to these interventions are highlighted as older adults were more likely to adhere due to the psychosocial benefits rather than the physical benefits. This included greater social engagement, increased confidence and mood, interest, enjoyment and a positive well- being.

4.4 Conclusion

In conclusion, this review has identified many facilitators and barriers to the uptake of fall interventions among ethnic minority older adults. Appropriate knowledge of interventions,

having bilingual facilitators and the perceived health benefits of attending were all key motivators. In addition, social support from friends and family was highlighted as a key motivator to attendance.

Barriers found in this review included a lack of support from healthcare professionals in referring and navigating them towards fall clinics and intervention programs. Language barriers and cultural beliefs deeming fall interventions to be ineffective were all key barriers to uptake. Therefore, to create an inclusive fall intervention program, these barriers need to be addressed to facilitate equal access to healthcare for older adults from ethnic minority groups.

Word count = 1474

Total word count: 6,001

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Appendix

Appendix 1**Table 8: Quality assessment table (JBI) QUALITATIVE**

Is there congruity between the stated philosophi	Paper
N	Aminzadeh et al, 1998
U	Dickinson et al, 2011
U	Dickinson et al, 2011
Y	Horne et al, 2009
Y	Horton et al, 2011
Y	Jagnoor et al, 2014
Y	Jang et al, 2021
N	Pinzon et al, 2019
Y	Stineman et al, 2011
Y	Teng et al, 2023
Y	Xiao et al, 2008

Is the research ethical according to current	Are participants, and their voices,	Is the influence of the researcher on the	Is there a statement locating the research	Is there congruity between the research methodology	Is there congruity between the research methodology and the analysis of data?	Is there congruity between the research methodology and the methods used	Is there congruity between the research methodology and the research
N	Y	N	N	Y	Y	Y	Y
Y	Y	N	N	Y	Y	Y	Y
Y	Y	N	N	Y	Y	Y	Y
U	Y	N	N	Y	Y	Y	Y
Y	Y	N	U	Y	Y	Y	Y
Y	Y	N	N	Y	Y	Y	Y
Y	Y	N	N	Y	Y	Y	Y
Y	Y	N	U	Y	Y	Y	Y
Y	Y	N	N	Y	Y	Y	Y
Y	N	N	N	Y	Y	Y	Y
Y	Y	N	N	Y	Y	Y	Y

Do the conclusions drawn in the research report flow from the analysis, or	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
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Y = Yes N = No U = Unclear

Table 9: Quality assessment table (JBI) Quasi-Experimental studies

Paper	Wolfe et al, 2018	Pinzon et al, 2019
Is it clear in the study what is the "cause" and what is the "effect" (i.e. there is no confusion about which variable comes first)?	Y	Y
Was there a control group?	Y	Y
Were participants included in any comparisons similar?	U	Y
Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Y	Y
Were there multiple measurements of the outcome, both pre and post the intervention/exposure?	Y	Y
Were the outcomes of participants included in any comparisons measured in the same way?	Y	Y
Were outcomes measured in a reliable way?	Y	Y
Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analysed?	Y	N
Was appropriate statistical analysis used?	Y	Y

Y = Yes N = No U = Unclear

Appendix 2

Medline search strategy

- 1 fall*.mp. 301807
- 2 (prevent* adj5 (program* or intervention*)).mp. 125066
- 3 (prevent* adj5 management*).mp. 37322
- 4 (prevent* adj5 'exercise programme*).mp. 137
- 5 (prevent* adj5 strateg*).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 107033
- 6 (prevent* adj5 'exercise intervention*).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 265
- 7 2 or 3 or 4 or 5 or 6 251273
- 8 1 and 7 8189
- 9 'older adult*.mp. 139129
- 10 elder*.mp. 339312
- 11 'older people'.mp. 43757
- 12 'older patient*.mp. 56439
- 13 senior*.mp. 56027
- 14 aged.mp. 6164872
- 15 geriatric*.mp. 126568
- 16 9 or 10 or 11 or 12 or 13 or 14 or 15 6336049
- 17 8 and 16 5236
- 18 ethnic*.mp. 239455
- 19 BAME*.mp. 804
- 20 Black*.mp. 275661
- 21 Asian*.mp. 198627

- 22 Indian*.mp. 129070
- 23 minorit*.mp. 115661
- 24 race*.mp. 197133
- 25 18 or 19 or 20 or 21 or 22 or 23 or 24 912813
- 26 17 and 25 232
- 27 motivator*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 4487
- 28 facilitator*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 44668
- 29 encourage*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 142097
- 30 factor*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 6931431
- 31 stimulator*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 92312
- 32 engage*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 256265
- 33 27 or 28 or 29 or 30 or 31 or 32 7308535

- 34 barrier*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 466094
- 35 prevent*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 2977967
- 36 inhib*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 3333900
- 37 imped*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 149072
- 38 34 or 35 or 36 or 37 6328609
- 39 33 and 38 1895791
- 40 26 and 39 139
- 41 Accidental Falls/ 29008
- 42 Primary Prevention/ or Secondary Prevention/ 41860
- 43 Early Intervention, Educational/ or Early Medical Intervention/ 7055
- 44 Case Management/ or Change Management/ 11020
- 45 exp Exercise Therapy/ 67616
- 46 42 or 43 or 44 or 45 126949
- 47 41 and 46 1598
- 48 exp Aged/ 3565747
- 49 "Aged, 80 and over"/ 1041185
- 50 exp "aged, 80 and over"/ or frail elderly/ 1048748
- 51 48 or 49 or 50 3565747

- 52 47 and 51 1325
- 53 ('ethnic and racial minorities*).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 1562
- 54 exp population groups/ or african people/ or exp asian people/ or black people/ 352292
- 55 "Black or African American"/ or Ethnicity/ or Racial Groups/ 164840
- 56 53 or 54 or 55 353065
- 57 52 and 56 8
- 58 40 or 52 1461
- 59 40 or 57 145

Embase search strategy

- 1 fall*.mp. 436014
- 2 (prevent* adj5 (program* or intervention*)).mp. 160048
- 3 (prevent* adj5 management*).mp. 64952
- 4 (prevent* adj5 'exercise programme*').mp. 173
- 5 (prevent* adj5 strateg*).mp. 139702
- 6 (prevent* adj5 'exercise intervention*').mp. 344
- 7 2 or 3 or 4 or 5 or 6 339850
- 8 1 and 7 11190
- 9 'older adult*'.mp. 172805
- 10 elder*.mp. 792360
- 11 'older people'.mp. 54618
- 12 'older patient*'.mp. 88088
- 13 senior*.mp. 80694
- 14 aged.mp. 6252209
- 15 geriatric*.mp. 197439

16 9 or 10 or 11 or 12 or 13 or 14 or 15 6520830
 17 8 and 16 6688
 18 ethnic*.mp. 397727
 19 BAME*.mp. 1375
 20 Black*.mp. 401882
 21 Asian*.mp. 255051
 22 Indian*.mp. 181531
 23 minorit*.mp. 149415
 24 race*.mp. 361293
 25 18 or 19 or 20 or 21 or 22 or 23 or 24 1366957
 26 17 and 25 401
 27 motivator*.mp. 5677
 28 facilitator*.mp. 56034
 29 encourage*.mp. 192616
 30 factor*.mp. 7770831
 31 stimulator*.mp. 139414
 32 engage*.mp. 334559
 33 27 or 28 or 29 or 30 or 31 or 32 8297329
 34 barrier*.mp. 615391
 35 prevent*.mp. 3672885
 36 inhib*.mp. 4523526
 37 imped*.mp. 193098
 38 34 or 35 or 36 or 37 8209195
 39 33 and 38 2384844
 40 26 and 39 218
 41 fall risk/ 6580
 42 exp accident prevention/ 19813
 43 secondary prevention/ or primary prevention/ 76163
 44 early intervention/ 36637

- 45 case management/ 14145
- 46 exercise/ 396279
- 47 42 or 43 or 44 or 45 or 46 537116
- 48 41 and 47 959
- 49 exp aged/ 4120265
- 50 senior center/ 493
- 51 exp geriatric patient/ 34384
- 52 49 or 50 or 51 4130775
- 53 48 and 52 477
- 54 ('ethnic and racial minorities*').mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]
776
- 55 ethnic group/ 87810
- 56 exp ancestry group/ 453676
- 57 exp black person/ 161015
- 58 North Asian/ or South Asian/ or West Asian/ or Asian continental ancestry group/ or Southeast Asian/ or Asian American/ or British Asian/ or Asian/ or East Asian/ 136106
- 59 exp indian/ 45406
- 60 54 or 55 or 56 or 57 or 58 or 59 636868
- 61 53 and 60 13
- 62 40 and 53 5
- 63 41 and 60 166
- 64 40 or 63 370

CINAHL search strategy

S1 fall* Expanders - Apply equivalent subjects Search modes - Find all my search terms

S2 collapse* Expanders - Apply equivalent subjects Search modes - Find all my search terms

- S3 injur* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S4 S1 OR S2 OR S3 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S5. Intervent* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S6. Programm* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S7 'intervention Programm*' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S8 management Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S9 mitig* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S10 'exercise program*' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S11 strateg* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S12 'exercise intervent*' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S13 S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S14 S4 AND S13 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S15 'older adult*' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S16 elder* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S17 'older people' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S18 'older patient' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S19 senior Expanders - Apply equivalent subjects Search modes - Find all my search terms

- S20 aged Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S21 geriatric* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S22 S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S23 'ethnic minorit*' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S24 'ethnic group*' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S25 'ethnic inequalit*' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S26 'minority group*' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S27 S23 OR S24 OR S25 OR S26 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S28 S22 AND S27 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S29 motivator* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S30 facilitator* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S31 encourage* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S32 factor* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S33 stimulator* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S34 engage* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S35 S29 OR S30 OR S31 OR S32 OR S33 OR S34 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S36 barrier* Expanders - Apply equivalent subjects Search modes - Find all my search terms

- S37 prevent* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S38 inhib* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S39 obstacle* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S40 impeded* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S41 S36 OR S37 OR S38 OR S39 OR S40 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S42 S35 AND S41 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S43 S14 AND S28 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S44 S42 AND S43 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S45 fall* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S46 collapse* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S47 injur* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S48 S45 OR S46 OR S47 Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S49 intervent* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S50 programm* Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S51 'intervention Programm*' Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S52 management Expanders - Apply equivalent subjects Search modes - Find all my search terms
- S53 mitig* Expanders - Apply equivalent subjects Search modes - Find all my search terms

S54 'exercise Programm*' Expanders - Apply equivalent subjects Search modes - Find all my search terms

S55 strateg* Expanders - Apply equivalent subjects Search modes - Find all my search terms

S56 'exercise intervent*' Expanders - Apply equivalent subjects Search modes - Find all my search terms

S57 S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56. Expanders - Apply equivalent subjects Search modes - Find all my search terms

S58 S48 AND S57 Expanders - Apply equivalent subjects Search modes - Find all my search terms

S59 'older adult*' Expanders - Apply equivalent subjects Search modes - Find all my search terms

S60 elder* Expanders - Apply equivalent subjects Search modes - Find all my search terms

S61 'older people' Expanders - Apply equivalent subjects Search modes - Find all my search terms

S62 'older patient*' Expanders - Apply equivalent subjects Search modes - Find all my search terms

S63 senior Expanders - Apply equivalent subjects Search modes - Find all my search terms

S64 aged Expanders - Apply equivalent subjects Search modes - Find all my search terms

S65 geriatric* Expanders - Apply equivalent subjects Search modes - Find all my search terms

S66 S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 Expanders - Apply equivalent subjects Search modes - Find all my search terms

S67 'ethnic minorit*' Expanders - Apply equivalent subjects Search modes - Find all my search terms

S68 'ethnic group*' Expanders - Apply equivalent subjects Search modes - Find all my search terms

S69 'ethnic inequalit*' Expanders - Apply equivalent subjects Search modes - Find all my search terms

S70 'minority group*' Expanders - Apply equivalent subjects Search modes - Find all my search terms

S71 S67 OR S68 OR S69 OR S70 Expanders - Apply equivalent subjects
Search modes - Find all my search terms

S72 S66 AND S71 Expanders - Apply equivalent subjects Search modes - Find all
my search terms

S73 motivator* Expanders - Apply equivalent subjects Search modes - Find all
my search terms

S74 facilitator* Expanders - Apply equivalent subjects Search modes - Find all
my search terms

S75 encourage* Expanders - Apply equivalent subjects Search modes - Find all
my search terms

S76 factor* Expanders - Apply equivalent subjects Search modes - Find
all my search terms

S77 stimulator* Expanders - Apply equivalent subjects Search modes - Find all
my search terms

S78 engage* Expanders - Apply equivalent subjects Search modes - Find all
my search terms

S79 S73 OR S74 OR S75 OR S76 OR S77 OR S78 Expanders - Apply equivalent
subjects Search modes - Find all my search terms

Appendix 3**Data Extraction Form**

Study Information:

Study Number	
Date Extracted	
Title	
Authors	
Journal	
Date Published	
Country of origin (and language if not English)	

Study Characteristics:

Aim of study	
Type of Study	
Inclusion and Exclusion Criteria	
What was examined?	

Participant Characteristics:

Sample Size	
Age Range (Years)	
Gender	
Ethnicity	
Method of recruitment	
Method of data collection	
Who was data collected from?	
Method of Data Analysis	

Outcomes

Key findings reported	
- Facilitators:	
- Barriers:	
Additional findings reported	