

THE ECOSYSTEM OF EVIDENCE

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Efficacy of fall prevention interventions

A living systematic review and network meta-analysis

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30th 1996-2026 GIMBE EVIDENCE FOR HEALTH

Background



30% of older adults experience falls annually



59% of fall-related hospitalizations result in fractures



$50B annual fall-related healthcare costs in the United States



Rapidly expanding evidence base for fall prevention

Aims

What is the most optimal intervention strategy for preventing falls in adults aged 65 and over?

Study Objectives

1. What are the elements of an effective fall-prevention program in older people (aged >=65 years)?
2. What is the most efficacious combination of fall-prevention interventions is older adults, in the general population, and across different settings (e.g., LTC homes) and patient characteristics (e.g., adults with multiple chronic conditions).

Update Systematic Review: Tricco et. al., Comparisons of Interventions for Preventing Falls in Older Adults. *JAMA*. 2017: 318 (17)


JAMA | Original Investigation

Comparisons of Interventions for Preventing Falls in Older Adults

A Systematic Review and Meta-analysis

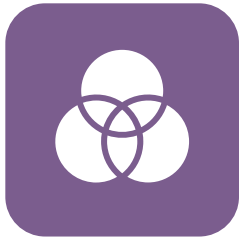
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Methods

Population: General older adult (65+) population



Intervention: Any fall-prevention intervention



Comparator: Any comparator, active or passive



Setting: Any setting



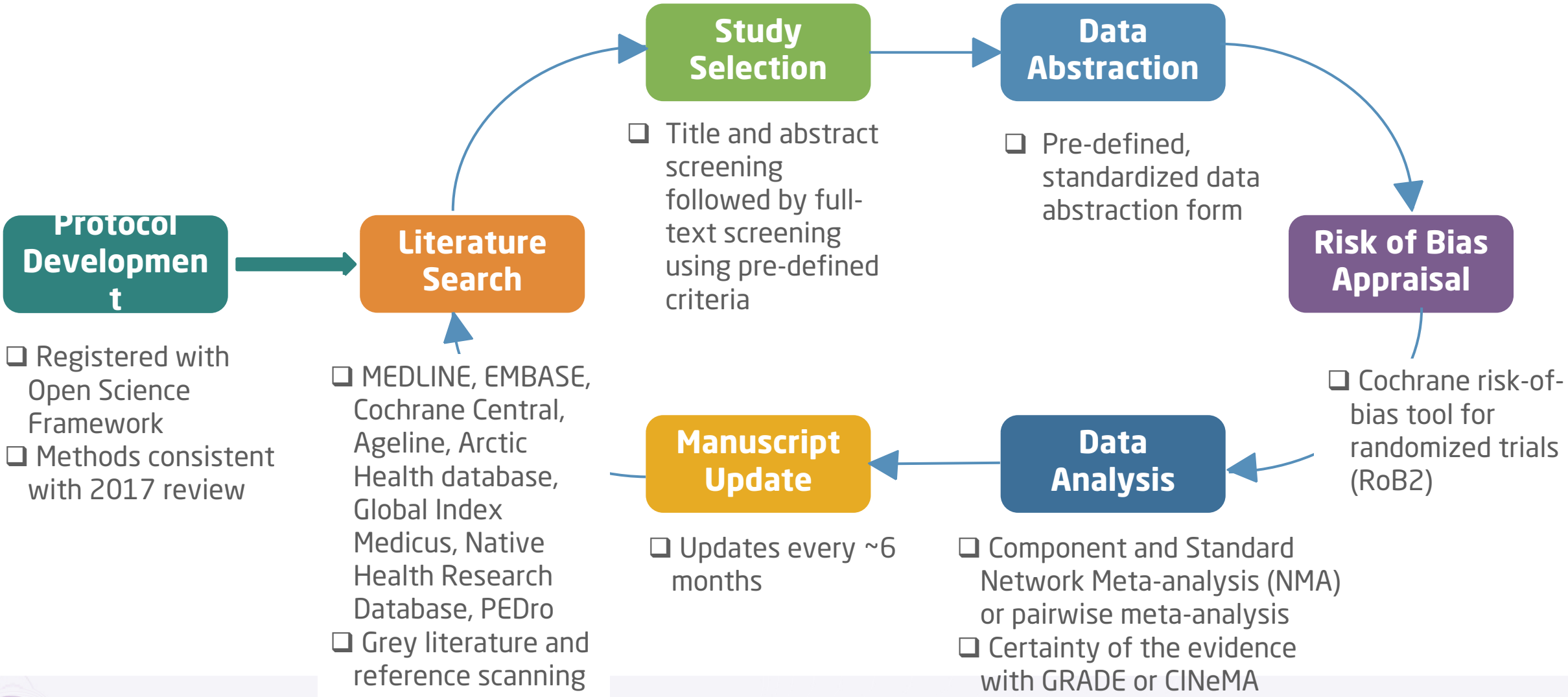
Primary Outcomes:

- Injurious falls
- Hospitalized falls

Secondary Outcomes:

- Number of people who fell
- Falls requiring a physician
- Falls requiring an ER visit
- Fall-related fractures
- Intervention-related harms
- Quality of life

Methods


Protocol Development
Literature Search
Study Selection
Data Abstraction
Risk of Bias Appraisal
Data Analysis
Manuscript Update
❑ Registered with Open Science Framework
❑ Methods consistent with 2017 review
❑ MEDLINE, EMBASE, Cochrane Central, Ageline, Arctic Health database, Global Index Medicus, Native Health Research Database, PEDro
❑ Grey literature and reference scanning
❑ Title and abstract screening followed by full-text screening using pre-defined criteria
❑ Pre-defined, standardized data abstraction form
❑ Cochrane risk-of-bias tool for randomized trials (RoB2)
❑ Component and Standard Network Meta-analysis (NMA) or pairwise meta-analysis
❑ Certainty of the evidence with GRADE or CINeMA
❑ Updates every ~6 months

Results

Includes

- **538 studies**
- **360,176 participants**

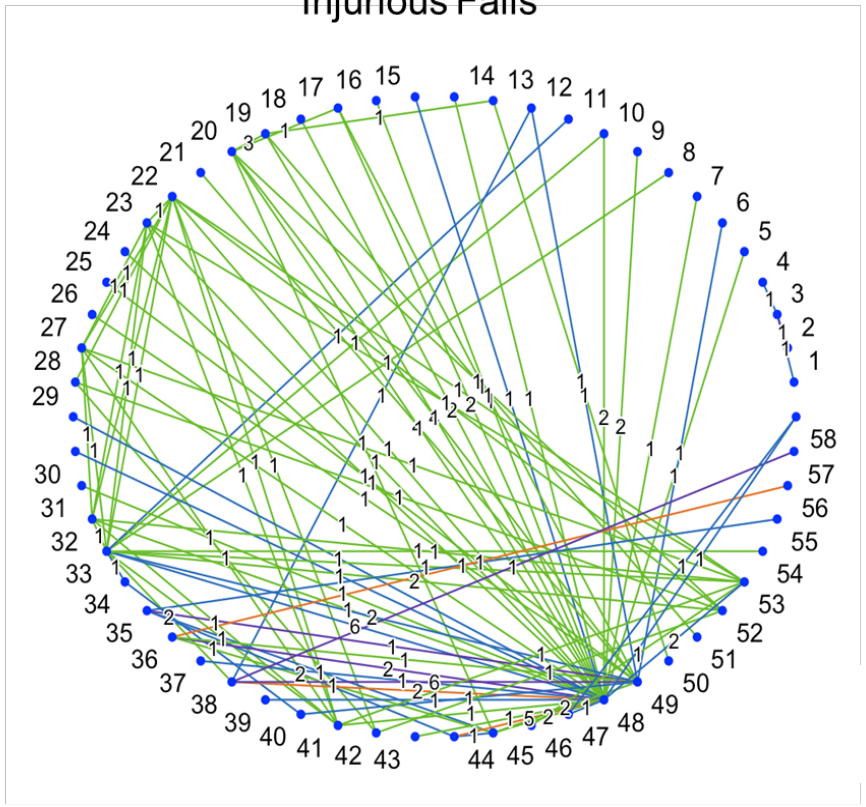
NMA and CNMA for:

- **Hospitalized fallers**
- **Injurious fallers**
- Number of fallers
- Fall-related fractures
- Quality of life

Pairwise meta-analysis f

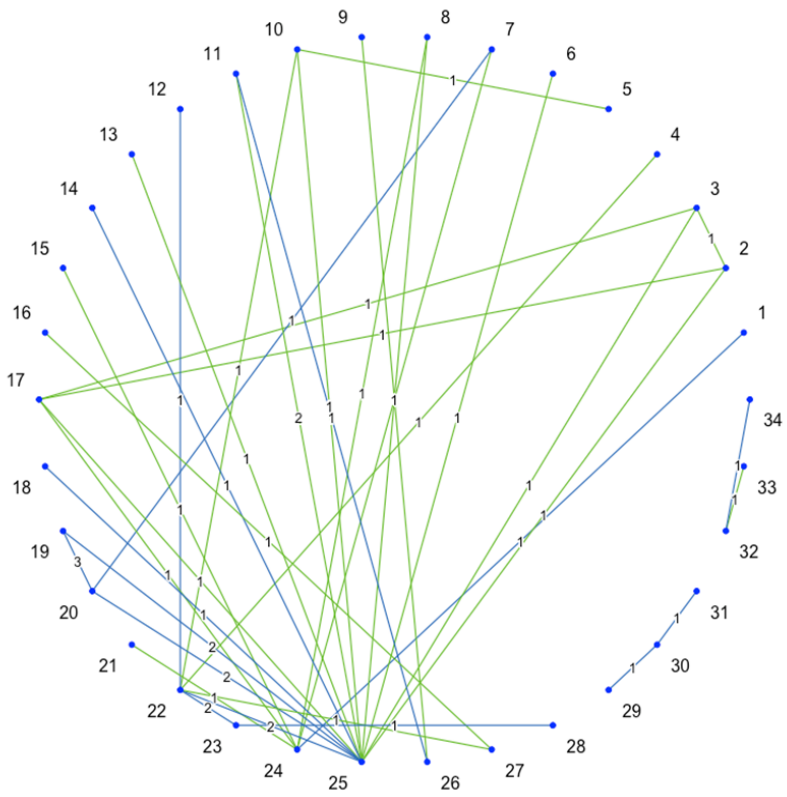
Comparison found in 2026 search
Comparison found in 2025 search
Comparison found in 2024 search
Comparison found in 2017 search

Injurious Falls



EX+UC	1	CQI	13	EA+EX+MF+PQI+VA	25	EX+MF+UC	37	PQI	49
MF+PQI+UC	2	CQI+AL+EX+MF+PQI	14	EA+EX+PQI+SQI	26	EX+PQI	38	CQI+PQI	50
PQI+UC	3	CQI+AL+UC	15	EA+EX+VA	27	EX+PQI+UC	39	CQI+MF+SQI	51
SO+UC	4	CQI+EX+MF	16	EA+EX+VID	28	EX+SO	40	SO	52
AL	5	CQI+EX+MF+PQI	17	EA+MF	29	EX+VA	41	VA	53
AL+EX+MF+PQI	6	CQI+EX+PQI	18	EA+MF+PQI+UC	30	EX+VID	42	HP+EX	54
CA+CQI+MF+VID	7	CQI+MF	19	EA+PQI	31	FL	43	MF+SO	55
CA+EX+EVB+VID	8	CQI+MF+PQI	20	EA+VA	32	MF	44	MF+UC	56
CB+CQI+PQI	9	CQI+MF+PQI+SO	21	EX	33	MF+PQI	45	HE	57
CB+EX+PQI	10	EA	22	EX+EVB	34	PQI+VA	46	VID	58
COG+EX	11	EA+EX	23	EX+MF	35	TES	47		
COG+PQI	12	EA+EX+MF	24	EX+MF+PQI	36	UC	48		

Hospitalized Falls



AL+EX+MF+PQI	1	EA+EX+MF	13	PQI	24
CA+EA+PQI+VID	2	EA+EX+MF+UC	14	UC	25
CA+PQI+VID	3	EA+EX+PQI+SQI	15	CQI+PQI	26
CP+EX+MF+PQI	4	EA+MF+SQI	16	SO	27
CQI	5	EA+PQI	17	PQI+UC	28
CQI+EX	6	EA+PQI+UC	18	EA+EX+MF+PQI	29
CQI+EX+PQI	7	EX	19	MF+UC	30
CQI+HP	8	EX+PQI	20	MF+VID	31
CQI+HP+PQI	9	HP+PQI	21	EX+MF	32
CQI+MF	10	MF	22	EX+MF+SQI	33
CQI+MF+PQI	11	MF+PQI	23	MF+SO	34
DI	12				

Results

Key Results are:

- Compared to usual care

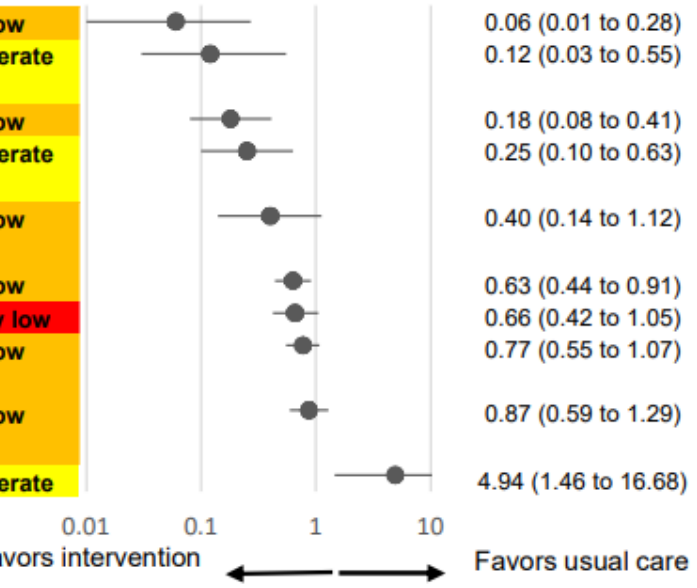
AND

- Top 5 P-Scores
- Four or more direct comparisons
- Moderate or high certainty of evidence

a) Injurious Falls

Intervention	Number of Studies[a]	n[b]	P-Score[c]	Certainty of Evidence[d]	OR (95% CI)
HP+EX: Hip protectors and exercise	0	NA	0.99	Low	0.06 (0.01 to 0.28)
CA+CQI+MF+VID: Clinical-level quality improvements, calcium, vitamin D, and a multifactorial intervention	1	199	0.95	Moderate	0.12 (0.03 to 0.55)
EX+VA: Exercise and vision assessment	1	273	0.94	Low	0.18 (0.08 to 0.41)
EA+MF+PQI+UC: Environmental assessment, multifactorial intervention, patient-level quality improvements, and usual care	1	430	0.89	Moderate	0.25 (0.10 to 0.63)
EX+EVB: Exercise and electromagnetic field therapy plus whole body vibration	0	NA	0.79	Low	0.40 (0.14 to 1.12)
EX: Exercise	6	1209	0.66	Low	0.63 (0.44 to 0.91)
MF: Multifactorial intervention	5	1260	0.55	Very low	0.66 (0.42 to 1.05)
CQI+MF+PQI: Clinical- and patient-level quality improvements and multifactorial intervention	4	7966	0.55	Low	0.77 (0.55 to 1.07)
CQI+MF: Clinical-level quality improvements and multifactorial intervention	4	1581	0.47	Low	0.87 (0.59 to 1.29)
MF+UC: Multifactorial intervention and usual care	0	NA	0.04	Moderate	4.94 (1.46 to 16.68)

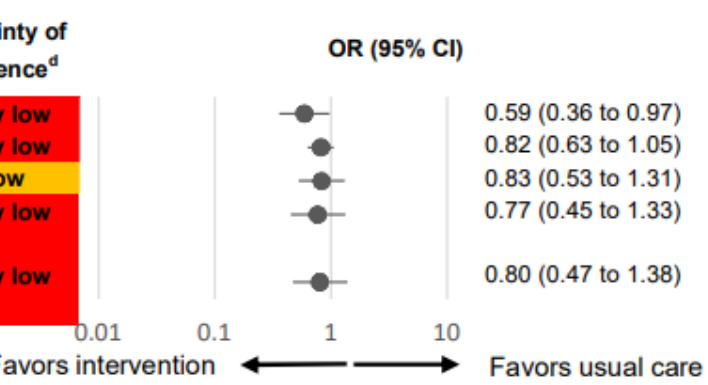
τ^2=0.17, I^2 =72%



b) Fall-Associated Hospitalizations

Intervention	Number of Studies[a]	n[b]	P-Score[c]	Certainty of Evidence[d]	OR (95% CI)
HP+PQI: Hip protectors and patient-level quality improvements	0	NA	0.91	Very low	0.59 (0.36 to 0.97)
PQI+UC: Patient-level quality improvements and usual care	0	NA	0.81	Very low	0.82 (0.63 to 1.05)
EX+PQI: Exercise and patient-level quality improvements	2	383	0.76	Low	0.83 (0.53 to 1.31)
EA+EX+MF+PQI: Environmental assessments, exercise, multifactorial, and patient-level quality improvements	0	NA	0.74	Very low	0.77 (0.45 to 1.33)
CQI+HP+PQI: Clinical- and patient-level quality improvements and hip protectors	0	NA	0.73	Very low	0.80 (0.47 to 1.38)

τ^2=0.024, I^2 =0%



EX: Exercise

Results



Exercise: Both as a component of interventions and alone, exercise was associated with reductions in fall-related fractures, the number of people who fell and injurious falls compared to usual care

Multi-Component Interventions: Some multi-component (including multiple intervention components that are all given to all participants) were associated with reductions in injurious falls and hospitalizations due to falls, included the following:







Limits

Limits of the Evidence:

- The certainty of evidence was **low or very low** for most comparisons. The most common reasons were **imprecision and heterogeneity**.
- **Reporting was inconsistent**, particularly for what is considered an injurious fall or an intervention-related harm.
- **Most intervention comparisons were supported by few studies or had high heterogeneity** (e.g. exercise varied by intensity, frequency, target body region).

Limits of the Review:

- **Implementation challenges were not assessed**, including factors such as adherence, acceptability, and feasibility in real-world settings.
- We planned to updated searches twice per year, but **the first update required one year** due to the volume of evidence.

Conclusions

Exercise, hip protectors, and selected multicomponent interventions reduce falls and fall-related injuries in older adults

Effective **multicomponent interventions** included:

- Calcium and vitamin D combined with clinical-level quality improvements within tailored multifactorial programs
- Environmental assessment combined with multifactorial and patient-level quality improvements
- Hip protectors combined with patient-level quality improvements

Evidence certainty was generally low, largely due to study heterogeneity and imprecision

Future RCTs should improve:

- Outcome reporting
- Protocol transparency/publication
- Allocation concealment

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Team Members and Collaborators

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Co-Investigators: Sharon Marr, David Moher, Mark Simmonds, Samantha Chakraborty, Wanrudee Isaranuwatchai, Jennifer Pillay, Lisa Hartling
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Application

This study is conducted in collaboration with and will inform the World Falls Guidelines