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Intrinsic and extrinsic risk factors associated with falls in older adults: a systematic review and meta-analysis of etiology and risk

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ADMINISTRATIVE INFORMATION

Support - MEC - FUNDAÇÃO COORDENAÇÃO APERFEIÇOAMENTO DE PESSOAL DE NÍVEL SUPERIOR.

Review Stage at time of this submission - Piloting of the study selection process.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202640019

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 7 April 2026 and was last updated on 7 April 2026.

INTRODUCTION

Review question / Objective Which intrinsic and extrinsic risk factors, isolated or combined, are associated with the risk of falls in older adults?

Rationale The risk of falls in older adults is a complex and multifactorial phenomenon resulting from the interaction between intrinsic and extrinsic factors. This complexity highlights need for comprehensive approaches that consider the interdependence among these components. The diversity of findings in the literature hinders the development of and integrates understanding of risk factors, reinforcing the importance of a systematic and structures synthesis of the available evidence. The assessment of older adults should be conducted from a multidimensional perspective, encompassing functional, clinical, cognitive and environmental aspects, as fragmented approaches may limit the

identification of risk factors and compromise the effectiveness of prevention strategies.

Condition being studied Falls in older adults are a significant public health concern. The risk of falls is a multifactorial condition resulting from the interaction between intrinsic factors (e.g., balance, cognition, comorbidities) and extrinsic factors (e.g., environmental hazards), requiring comprehensive assessment for effective prevention.

METHODS

Search strategy EMBASE: ('aged':ab,ti OR 'aged patient':ab,ti OR 'aged people':ab,ti OR 'aged person':ab,ti OR 'aged subject':ab,ti OR 'elderly':ab,ti OR 'elderly patient':ab,ti OR 'elderly people':ab,ti OR 'elderly person':ab,ti OR 'elderly subject':ab,ti) AND ('falling':ab,ti OR 'accidental falls':ab,ti OR 'fall':ab,ti) AND ('risk factor':ab,ti OR 'relative risk':ab,ti OR 'risk factors':ab,ti OR

'intrinsic factor':ab,ti) AND ('association':ab,ti OR associate':ab,ti) AND 'environment':ab,ti

SCOPUS: (TITLE (("aged" OR "aged patient" OR "aged people" OR "aged person" OR "aged subject" OR "elderly" OR "elderly patient" OR "elderly people" OR "elderly person" OR "elderly subject") AND ("falling" OR "accidental falls" OR "fall") AND (("risk factor" OR "relative risk" OR "risk factors") OR "intrinsic factor") AND (("association" OR "associate") AND "environment")) OR ABS (("aged" OR "aged patient" OR "aged people" OR "aged person" OR "aged subject" OR "elderly" OR "elderly patient" OR "elderly people" OR "elderly person" OR "elderly subject") AND ("falling" OR "accidental falls" OR "fall") AND (("risk factor" OR "relative risk" OR "risk factors") OR "intrinsic factor") AND (("association" OR "associate") AND "environment")))

Medline: ("aged"[Title/Abstract] OR "aged patient"[Title/Abstract] OR "aged people"[Title/Abstract] OR "aged person" [Title/Abstract] OR "aged subject"[Title/Abstract] OR "elderly"[Title/Abstract] OR "elderly patient" [Title/Abstract] OR "elderly people"[Title/Abstract] OR "elderly person"[Title/Abstract] OR "elderly subject" [Title/Abstract]) AND ("falling"[Title/Abstract] OR "accidental falls"[Title/Abstract] OR "fall"[Title/Abstract]) AND (("risk factor"[Title/Abstract] OR "relative risk"[Title/Abstract] OR "risk factors"[Title/Abstract] OR "intrinsic factor"[Title/Abstract]) AND ("association"[Title/Abstract] OR "associate"[Title/Abstract]) AND "environment" [Title/Abstract])

Web of Science: ("aged" OR "aged patient" OR "aged people" OR "aged person" OR "aged subject" OR "elderly" OR "elderly patient" OR "elderly people" OR "elderly person" OR "elderly subject") AND ("falling" OR "accidental falls" OR "fall") AND (("risk factor" OR "relative risk" OR "risk factors") OR "intrinsic factor") AND (("association" OR "associate") AND "environment")

LILACS: ("aged" OR "aged patient" OR "aged people" OR "aged person" OR "aged subject" OR "elderly" OR "elderly patient" OR "elderly people" OR "elderly person" OR "elderly subject") AND ("falling" OR "accidental falls" OR "fall") AND (("risk factor" OR "relative risk" OR "risk factors") OR "intrinsic factor") AND (("association" OR "associate") AND "environment")

COCHRANE: ("aged" OR "aged patient" OR "aged people" OR "aged person" OR "aged subject" OR "elderly" OR "elderly patient" OR "elderly people" OR "elderly person" OR "elderly subject") AND

("falling" OR "accidental falls" OR "fall") AND (("risk factor" OR "relative risk" OR "risk factors") OR "intrinsic factor") AND (("association" OR "associate") AND "environment") in Title Abstract Keyword – (Word variations have been searched)

CINAHL: ("aged" OR "aged patient" OR "aged people" OR "aged person" OR "aged subject" OR "elderly" OR "elderly patient" OR "elderly people" OR "elderly person" OR "elderly subject") AND ("falling" OR "accidental falls" OR "fall") AND (("risk factor" OR "relative risk" OR "risk factors") OR "intrinsic factor") AND (("association" OR "associate") AND "environment").

Participant or population Older adults aged 60 years or over.

Intervention Not applicable. The review foccuses on exposures (intrinsic and extrinsic risk fators) rather than interventions.

Comparator Older adults without a history of falls.

Study designs to be included Observtional studies, including: Cross-sectional, cohort (prospective and retrospective), case-control.

Eligibility criteria Studies will be included if they: are original; include participants aged > 60 years; investigate intrinsic and/or extrinsic risk factors for falls.

Exclusion criteria: review articles; conference abstracts; editorials or letters; theses and dissertations; studies published in predatory journals.

Information sources The following databases will be searched: MEDLINE, LILACS, CINAHL, EMBASE, Scopus, Web od Science and Cochrane CENTRAL. Adittionally, reference lists od included studies will be screened.

Main outcome(s) Risk fall in older adults, and measures of association (odds ratio, risk ratio, hazard ratio with 95% confidence intervals).

Additional outcome(s) Identification of intrinsic risk factors, Identification of extrinsic (enviromental) risk factors, combined or interacting effects of risk factors.

Data management Search results will be exported to Zotero for duplicate removal and then imported to Rayyan for screening, organization, and selection of studies.

Quality assessment / Risk of bias analysis The methodological quality included studies will be assessed using Joanna Briggs Institute (JBI) critical appraisal tools for observational studies.

Strategy of data synthesis A narrative synthesis will be conducted. If appropriate, a meta-analysis will be performed using: inverse variance method and effect measures (OR, RR, HR) with 95% CI. Heterogeneity will be assessed using the I^2 statistic: high heterogeneity with random-effects model and low heterogeneity fixed-effect model. Results will be presented using forest plots.

Subgroup analysis If sufficient data are available, subgroup analyses will be conducted based on: type of risk factor (intrinsic vs extrinsic), study design, population characteristics.

Sensitivity analysis Sensitivity analysis will be performed when applicable to assess the robustness of the findings.

Language restriction No language restrictions will be applied.

Country(ies) involved Brazil.

Other relevant information The review will follow the Joanna Briggs Institute (JBI) methodology for etiology and risk reviews and will be reported according to PRISMA 2020 guidelines. The study aims to provide a comprehensive synthesis of evidence on intrinsic and extrinsic risk factors associated with falls in older adults, supporting evidence-based clinical practice and prevention strategies.

Keywords Risk factors; Accidental falls; Aged; Intrinsic factor; Environment; Association; Review.

Dissemination plans The results will be disseminated through publication in a peer-reviewed scientific journal and presentation at scientific conferences, and may support evidence-based practice and the development of fall prevention strategies in older adults.

Contributions of each author

Author 1 - Jessika Cavalaro - Author 1 conceived and developed the study as the principal investigator.

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Author 2 - Karina Hammerschmidt - Author 2 assisted in the conception and conduct of the review.

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Author 3 - Kevin Dias - Author 3 acted as the second reviewer of the studies, as well as participated in all methodological stages.
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