

Title: Effect of physical activity on cognitive frailty in the elderly: A Scoping review with implications for occupational therapy



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Background & Rationale

- Cognitive frailty is an emerging concept that reflects co-existing physical frailty and cognitive decline in older adults.
- Worldwide prevalence across studies range from 4.4- 19.9%
- Physical activity is considered to be a potentially modifiable factor.
- Evidence is growing but fragmented across intervention types.
- Occupational therapy perspectives are rarely synthesized.

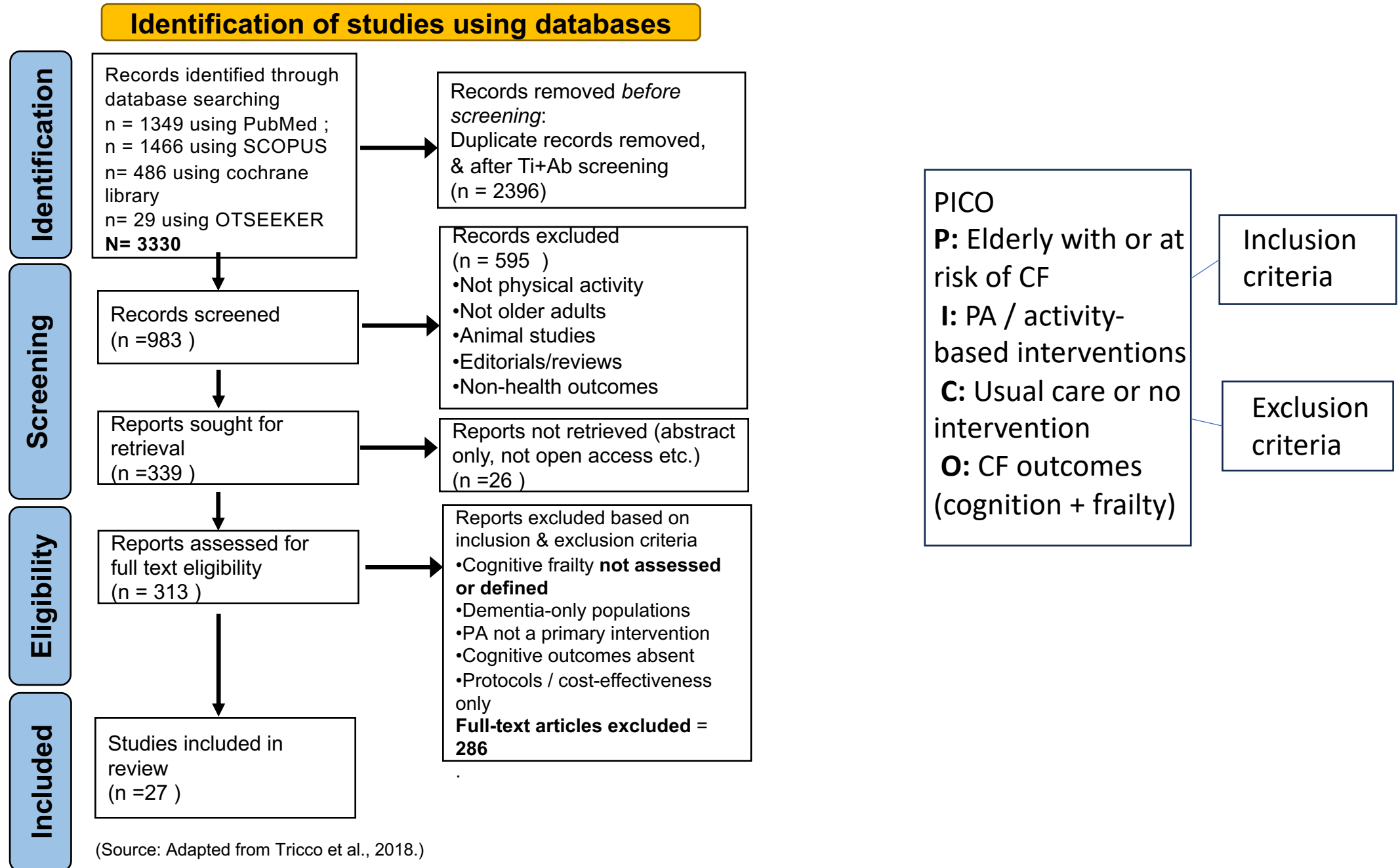
Objectives

To systematically map the existing literature on the influence of physical activity on cognitive frailty in the elderly.

Methods

- Study design: A Scoping review
- The methodological framework for scoping reviews developed by Arksey and O'Malley with enhancements from the Joanna Briggs Institute (JBI) framework was used
- Reporting was in line with PRISMA–ScR guidelines.
- The study protocol was registered at open science framework (<https://osf.io/4bw7d>)

Fig : PRISMA ScR flow diagram for the selection process



Results: Characteristics of Included Studies (n = 27)

Participants

- Sample sizes ranged from **~30 to >300 participants**
- Majority of studies included **40–120 older adults**
- Participants were predominantly **community-dwelling**, with some institutional settings

Age Profile

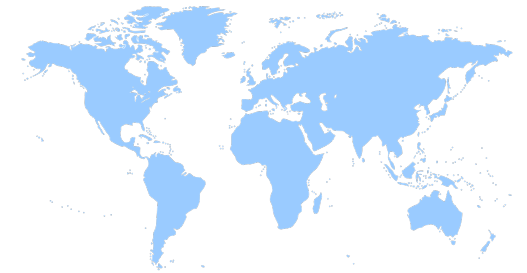
- Mean participant age across studies consistently fell within **70–80 years**
- Limited representation of the **oldest-old (>85 years)**

Study Designs

- Predominantly **randomized controlled trials**
- Included **cluster-RCTs**, secondary analyses, and feasibility/pilot trials

Outcome Measures

- **Cognitive:** MMSE, MoCA, executive function, dual-task performance
- **Physical:** gait speed, grip strength, balance, frailty phenotype
- **Syndrome-specific:** cognitive frailty, PCDS, MCI with physical frailty
- **Participation-level outcomes were infrequently assessed**



Geographical Distribution

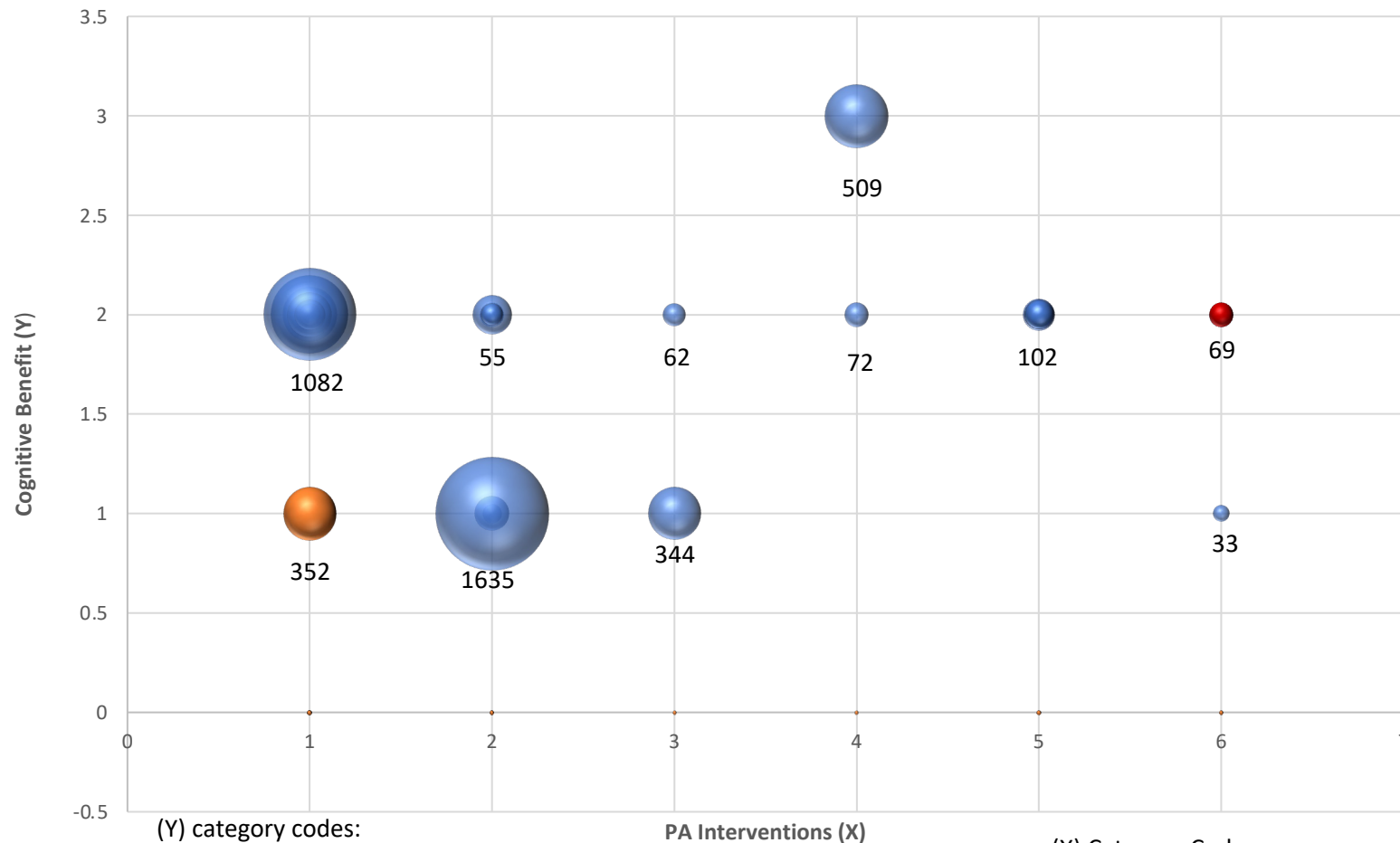
Asia: Majority of studies (China, Taiwan, Japan, South Korea, Malaysia)

Europe: Moderate representation (Portugal, Spain, Italy, France)

North America: Limited representation (USA, Canada)

Results

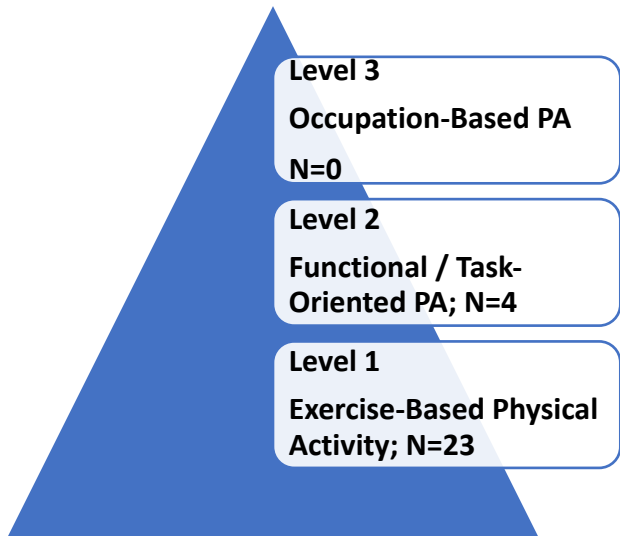
Summarises Findings : PA Interventions and their effect



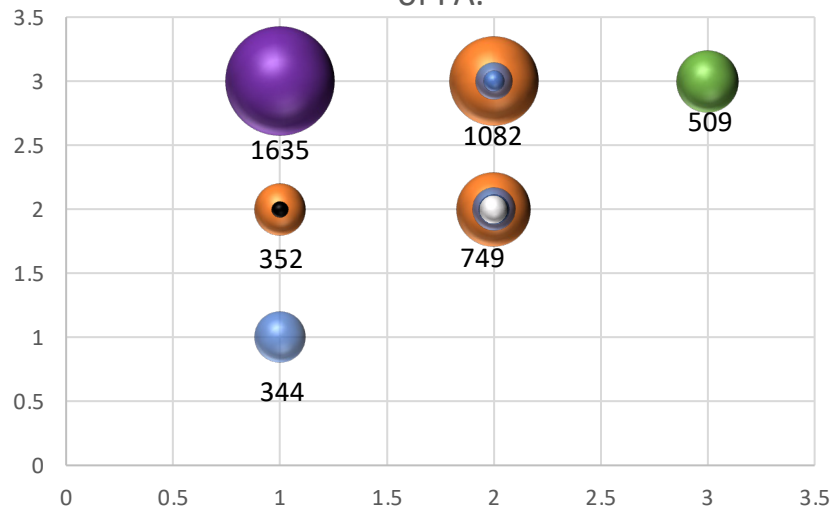
(Y) category codes:
 Cognitive outcome/ Benefit Score:
 0 = No effect
 1 = Small / domain-specific
 2 = Moderate, multi-domain
 3 = Strong / reversible cognitive frailty

● Cognitive Benefit (Y) ● Study design

(X) Category Codes:
 1 = Multidomain
 2 = Resistance / Strength/Otago
 3 = Aerobic / Flexibility
 4 = Dual-task
 5 = Mind-body (Tai Chi / Baduanjin)
 6 = Technology-based



Physical (X-axis) & cognitive (Y axis) benefit of PA.



1 Multidomain – red, 2 Resistance- violet
 3 Aerobic- blue, 4 Dual-task –green,
 5 Mind-body- white, 6 Technology- black

Mapping Physical Activity Interventions for Cognitive Frailty to OT Frameworks

PA Category	Examples (from studies)	OTPF Domain	ICF Component	Key OT Insight
Structured Exercise	Resistance, Otago, Vivifrail	Performance Skills	Body Functions	Improves strength & cognition
Mind–Body Exercise	Tai Chi, Baduanjin	Performance Skills	Body Functions	Balance, executive control
Dual-Task / Interactive	Boxing–cycling, dual-task walking	Activity	Activity	Functional cognitive–motor link
Technology-Assisted PA	VR-ADL, Exergaming	Activity → Participation	Activity → Participation	Simulated real-life tasks
Occupation-Based PA*	Walking, dancing, gardening	Activity, Participation	Participation	Meaningful & sustainable

*Supported by OT & Gerontology literature

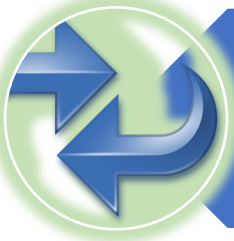
Discussion

- Improvements in cognitive frailty were primarily mediated through gains in physical capacity, supporting physio–cognitive interaction pathways¹
- Multidomain and dual-task interventions showed broader benefits than single-mode exercise, indicating added cognitive engagement
- Cognitive frailty was mostly operationalised using deficit-based criteria, with limited assessment of participation or daily-life functioning
- The dominance of structured exercise reflects a biomedical emphasis, with occupation-based physical activity largely underrepresented
- This gap positions occupational therapy to bridge capacity gains with meaningful activity and participation outcomes

Implications for OT



Use everyday occupations (e.g., gardening, household tasks, dance) as therapeutic movement .



Design hybrid routines: mind–body practices (e.g., Tai Chi, Baduanjin) as both exercise & meaningful daily activity



Select activities with real-world demands, not isolated drills.



Maximize adherence through meaning PA embedded in daily life that are easier to sustain than prescriptive exercise



Grade task and environment to match individual capacity

Body Functions
(Structured Exercise)

Walking circuits



Activity

(Functional Tasks)

Carrying objects • Dual-tasking



Participation

(Meaningful Occupation)

Navigation • Dual-tasking

Conclusion

- Physical activity interventions are effective in improving physical performance and selected cognitive outcomes in older adults with cognitive frailty
- Evidence is dominated by structured and multidomain exercise, with limited focus on real-life, occupation-based physical activity. More researches needed
- Translating exercise gains into daily functioning remains an underexplored but critical area for intervention.

Key References

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- Ruan Q, et al. *Physical Activity, Frailty, and Cognitive Decline in Older Adults*. J Am Med Dir Assoc, 2020
- Montero-Odasso M, et al. *Dual-task gait and cognition in ageing*. Age Ageing, 2012
- World Health Organization. *ICF Framework*, 2001
- AOTA. *Occupational Therapy Practice Framework (OTPF–4)*, 2020
- *(Plus 27 included studies)*

THANK YOU !!!

“Active bodies, resilient minds.”

