Robots for Older Adults with Cognitive Impairment: A Systematic Review P. Bhowmick, T. S. Warren, R. A. Mudar, W. A. Rogers. *Gerontechnology* 25(s)

Purpose Robotic technologies are increasingly being explored to support older adults with cognitive impairment, particularly for enhancing social engagement, emotional well–being, and care–related activities [1]. However, the maturity, methodological rigor, and conceptual grounding of this body of research remain unclear. We explored the current state–of–the–science for studies involving robots and older adults with cognitive impairments, identifying methodological and knowledge gaps and outlining critical directions for future research. **Method** We conducted a systematic literature review guided by PRISMA methodology. An initial pool of 635 articles was identified across 6 databases – PsycINFO, CINAHL, AgeLine, PubMed, IEEE, ACM DL. After title and abstract screening, 182 studies underwent full–text review, and 112 studies met the inclusion criteria: an original empirical study that included older adults with cognitive impairment and robots. Data were extracted on participant characteristics, robot types and capabilities, cognitive domains, task focus, study settings, and methodological reporting. The synthesis emphasized categorization of robots (assistive, social, and/or telepresence) [2], classification of activity type (activity of daily living, instrumental activities of daily living (IADL), or enhanced activities of daily living (EADL)), and the cognitive domain supported (attention, executive functions, language, memory, spatial, or social). **Results and Discussion** Our review highlighted clear patterns in the current landscape of robotic technologies designed for older adults with cognitive impairment. We observed a marked increase in publications between 2019 and 2021 (33 to 56 articles), coinciding with heightened interest in social robots during the COVID–19 pandemic. Over 55% of robots were classified as social robots, with 21% of them as social and assistive robots. The therapeutic robot, *Paro*, accounted for roughly one–half of all social robots, underscoring the field's frequent use of pet–like, socially assistive platforms. In terms of functional support, 80% of robots targeted EADL, whereas 20% focused on IADL. Correspondingly, the primary cognitive domains addressed was social cognition (54%), memory (17%), and executive functions (8%). Most studies were conducted in controlled environments, such as laboratories or long–term care facilities, raising questions about generalizability. Our analysis revealed substantial inconsistencies that hinder interpretability and cross–study comparisons. A notable proportion of papers incompletely reported participant characteristics, such as omission of mean or standard deviation of age (36%) or age ranges (17%) and lack of explicit inclusion criteria (7%). Moreover, around 19% of studies did not specify how cognitive impairment was assessed, often relying solely on caregiver reports rather than standardized measures. More critically, most studies did not differentiate outcomes by type or severity of cognitive impairment, with some even including participants without cognitive impairment without any separate analyses. Approximately 57% of studies included older adults with dementia, with limited insight into how needs may differ across etiologies. As a result, the role of cognitive decline is rarely meaningfully integrated into study design, recruitment, or interpretation, and how it shapes robot interaction and effectiveness remains underexamined. The complexity of multifunctional robots further made it challenging to isolate which cognitive abilities were engaged or supported during specific interactions. Taken together, these patterns suggest an expanding field that is limited by incomplete reporting, lack of differentiation across cognitive impairment, and narrow exploration of robot functionalities. Future research should prioritize participant characterization, cognitive assessment, and intentional alignment between robot design, cognitive domains, and contexts. Such efforts will be critical for building robust, actionable evidence on how robots can meaningfully support older adults living with cognitive impairment.

References

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