A bibliometric literature review on international trends in robotic technology research in the field of dementia

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Purpose Dementia is one of the seven leading causes of death and a primary factor for requiring long-term care. The number of dementia patients worldwide exceeds 55 million, with approximately 10 million new cases occurring annually. In this context, the utilization of robots is advancing to address the increasing number of dementia patients. This study focuses on the application of robotic technology in dementia care and aims to identify the most influential authors, educational and research institutions, countries, regions, and references internationally through a quantitative literature review. A quantitative literature review reveals the current state and trends of a particular field, providing significant insight for future research directions. Bibliometrics, a method for quantitatively analyzing literature, is essential for objectively understanding research trends. **Method** This study uses network visualization analysis based on science knowledge mapping in bibliometrics to elucidate international trends in research related to application in the field of dementia. To ensure representative literature, the Web of Science Core Collection (WoSCC) provided by Clarivate Analytics was used. The literature for analysis was selected based on the following inclusion and exclusion criteria. Inclusion criteria: (1) papers related to robotic technology in dementia, (2) peer-reviewed papers published as of May 31, 2024, (3) papers obtained from WoSCC. Exclusion criteria: (1) unpublished papers, (2) conference proceedings and summaries, book chapters, prefaces, (3) duplicate papers, (4) literature unrelated to robotic technology in dementia. The search resulted in 290 papers, with 195 original research papers meeting the criteria for analysis. The search was conducted on June 16, 2024, and the period for the target papers was from 2004, when the first paper was published in WoSCC, to 2024. About ethical considerations, this study performed statistical analysis using bibliographic information from prior literature published as of June 16, 2024. Therefore, ethical review for human subjects was deemed unnecessary. **Results and Discussion** The analysis was conducted on authors, educational and research institutions, countries/regions, and references. Among the references, the paper by Petersen S. et al., published in 2017 on the use of robotic pets in dementia care was frequently cited (frequency: 32, centrality: 0.05) across the entire network. On the other hand, the paper by Broekens J. et al., published in 2009 on social support robots for the elderly, showed the highest betweenness centrality, indicating its effect as an interaction hub within the network. As a result of clustering, 13 main clusters were identified. The larger, prominent clusters were research on robotic psychology (median year: 1996, size: 86), long-term care (median year: 2013, size: 57), and smart home (median year: 2013, size: 51). The clustering of references revealed that the development of the field was based primarily on papers related to 13 themes. Furthermore, it was shown that until the late 20th century, literature on robotic psychology was mainly referenced, while in the 21st century, research has advanced by referencing literature on long-term care and smart home.

References

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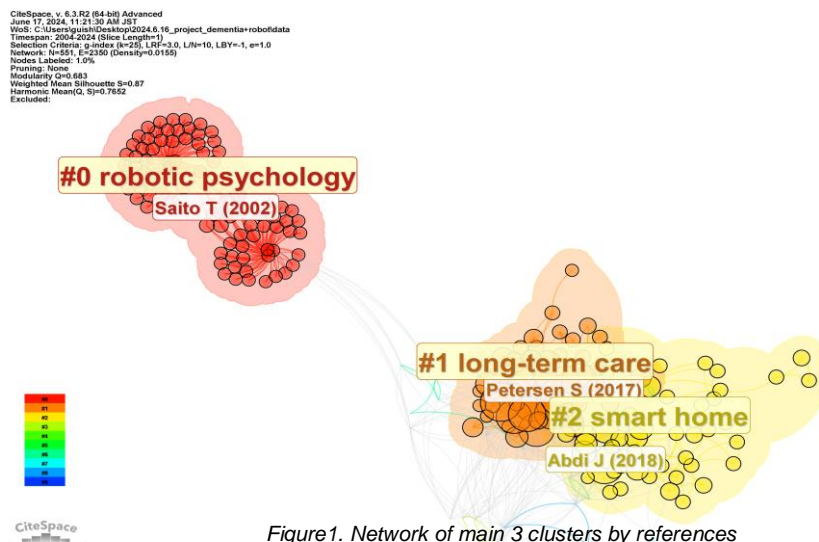Broekens, Joost & Heerink, Marcel & Rosendal, Henk. (2009). Assistive social robots in elderly care: A review. Gerontechnology. 8. 94-103. 10.4017/gt.2009.08.02.002.00.

Figure1. Network of main 3 clusters by references