Healthy Aging in Place with the Aid of Smart Technologies: A Systematic Review

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This study evaluates the current scope of smart technology applications that support aging in place and identifies potential avenues for future research. The global demographic shift towards an aging population has intensified interest in technologies that enable older adults to maintain independence and quality of life within their homes. We conducted a systematic review of the scientific literature from Web of Science, PubMed, and ProQuest, identifying 44 smart technologies across 32 publications. These technologies were classified into three categories: nonmobile technologies for individual monitoring, nonmobile technologies for home environment monitoring, and wearable technologies for health and activity tracking. Notably, the research in this area has grown significantly since 2018; yet, notable gaps persist, particularly within the traditional disciplines related to aging and in the use of quantitative methodologies. This emerging field presents substantial opportunities for interdisciplinary research and methodological advancement, highlighting the need for well-developed research strategies to support the effective integration of smart technology in aging in place.

smart technologies healthy application aging in place review

According to the 2019 World Population Prospects, by 2050, it is anticipated that the global older adult population (>60) will double [1]. The number of persons aged 80 years or older is expected to triple between 2020 and 2050, reaching 426 million [1]. Further, it was estimated that one in six people globally will be over the age of 65, up from one in eleven in 2019 [2]. The aging population is already undergoing a significant transition, with extensive research highlighting its profound implications for nearly all sectors of society, including the building and financial markets. Additionally, the growing demand for a high quality of life in older age, encompassing aspects such as housing and social connections, is expected to continue increasing.

Previous research shows that older populations prefer to remain independent at home and aging in place tends to improve older adults' quality of life, including their physical and mental health [3][4]. Moreover, the economic benefits of supporting older adults in remaining in place, rather than at nursing facilities, has also influenced policymakers and health providers as it alleviates the cost burden on the health care system. This review defines "place" as an older adult's home.

Smart technology for aging in place refers to devices that enable older people to live independently in a place they wish to remain, usually at home. It not only includes devices related to managing home environments for older adults but also the relationship that smart technology has with older adults and how it impacts their living environments later in life. In this research, smart home technology encompasses a wide array of interconnected devices and systems installed within a home to enhance the safety, health, and comfort of older adults. These technologies include the environmental monitoring systems that regulate conditions like temperature, humidity, and air quality; health and safety monitoring systems such as fall detection sensors and emergency alert devices; assistive technologies like automated lighting

controls, voice-activated assistants, and GPS trackers; wearable technologies including smartwatches that track health metrics; and integrated home automation systems that unify various smart devices into a single, remotely controllable interface.

In recent decades, the literature on “aging in place” has expanded in line with the globally increasing older population. With this demographic shift, emerging smart technology has garnered academic attention to how smart technology supports older adults in maintaining their health and quality of life. However, the range and scope of the studies on the effects of smart technology on older adults aging in place have not been explored yet. To address this gap, this study presents a systematic review of scientific articles on aging in place and smart technology. The review identifies the types and applications of smart technologies, evaluates their benefits—including cost savings and physical and mental health improvements—and examines the barriers to their adoption. The paper is organized as follows: Section 2 explains the materials used and the procedure for this review, Section 3 outlines the descriptive statistics, and Section 4 examines the findings from the in-depth review. The discussion and conclusion are drawn in Section 5.

References

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