

How to Cite:

Al Otaibi, S. G., Alhejaili, A. R., Alanazi, H. H. F., Al Ahmadi, S. A. M., Almughathawi, A. S., Alhejaili, S. E. F., Alreshidi, M. S., Alsuhaymi, F. G., & Alyamani, I. M. (2019). The challenges and solutions to improve health technology use among older adults. *International Journal of Health Sciences*, 3(S1), 436–443.
<https://doi.org/10.53730/ijhs.v3nS1.15322>

The challenges and solutions to improve health technology use among older adults

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Abstract--This review analyzes the difficulties associated with enhancing health technology utilization among older adults, emphasizing the significant impact of health literacy. The aging population in the U.S. exhibits a notable disparity in health literacy, with a considerable segment showing limited ability to comprehend and apply health information. Age-related cognitive and physical decline, characterized by diminished comprehension, memory retention, and sensory impairments such as vision and hearing loss,

substantially affects older adults' capacity to process health information and comply with medication regimens. This review examines the current literature regarding the interplay between health literacy, cognitive function, and health outcomes, emphasizing discrepancies in results attributed to differences in assessment methodologies and participant demographics. Some studies indicate a correlation between education level and health literacy, while others identify age and cognitive function as more significant predictors. The review examines the shortcomings of existing health literacy assessment tools, specifically their failure to account for age-related cognitive decline. The necessity for developing culturally sensitive assessment tools and interventions, including Embodied Conversational Agents (ECAs), is highlighted to improve health information accessibility and enhance health outcomes for older adults. The conclusion emphasizes the necessity of addressing individual and societal factors to enhance health literacy and reduce disparities in healthcare access for this expanding demographic.

Keywords---Age-Related Decline, Health Technology, Cognitive Function, Health Literacy, and Older Adults.

1. Introduction

Health literacy is acknowledged as a significant determinant in healthcare, affecting a patient's capacity to make informed health decisions. Allen et al. (1) define health literacy as the degree to which individuals possess the skills necessary to acquire, process, and understand vital health information and services. Studies indicate that inadequate health literacy is associated with adverse health outcomes. Individuals with lower health literacy are more likely to utilize emergency services frequently, incur higher healthcare costs, engage less in preventive services such as vaccines and screenings, and demonstrate elevated mortality rates (2-5). Multiple factors, including socioeconomic status, age, race, cognitive function, and educational attainment, are associated with health literacy levels, with age identified as a significant predictor of low health literacy (6).

2. Health Literacy in Older Adults

Individuals aged 65 and older represent the fastest-growing demographic in the U.S. population, anticipated to account for 20% of the population by 2030 (7). In a national assessment conducted in 2003, only 3% of older adults demonstrated proficient health literacy skills (8). Limited proficiency may be partially attributed to age-related cognitive and physical changes that impact an individual's capacity to process health information. Cognitive decline, characterized by reduced comprehension and memory retention, affects older adults' capacity to comprehend healthcare instructions (9). Physical impairments, including vision and hearing loss, significantly limit individuals' ability to access and interpret health information (10). Furthermore, psychosocial factors such as socioeconomic challenges and difficulties in coping can adversely impact health literacy (11). These barriers can result in feelings of shame or embarrassment, which

complicate communication with healthcare providers and worsen health literacy challenges among older adults.

3. The justification for this review

A systematic review was conducted to examine health literacy in older adults, focusing on research related to this demographic and investigating the relationship between health literacy, health outcomes, and possible interventions. This review incorporated research published beyond the typical five-year limit due to a lack of recent studies. Eight studies focused on health literacy among older adults fulfilled the inclusion criteria. Subsequent studies have explored various dimensions of health literacy, including health outcomes in low-literacy older adults, older cancer patients, and general measures of health literacy across diverse populations (12). Kilfoyle et al. (12) examined both young and older adults, with five studies dedicated to the older demographic. Research indicates that older adults with diminished health literacy typically encounter adverse health outcomes. An updated systematic review on health literacy among older adults is necessary to offer insights and recommendations for improving their healthcare decision-making capacity, in light of the growing demand for responsible healthcare management.

4. Demographics and Health Literacy

This review encompasses studies that frequently evaluated demographic factors such as education, race, income, and age in connection with health literacy. Research findings were inconsistent; certain studies established a correlation between education and health literacy (13), whereas others found no such relationship (14). Khodabakhshi-Kolaei (13) identified that participants exhibiting lower health literacy tended to be older, non-White, and possess lower household incomes. Patel et al. (15) found that education level and age were more effective predictors of health literacy compared to specific assessment scores. In contrast, Li et al. (16) reported that African American participants exhibited lower health literacy and higher depression scores than their Caucasian counterparts. Race, income, and age were identified as significant factors in multiple analyses, demonstrating a clear correlation between advanced age, lower income, and diminished health literacy.

5. Adherence to medication regimens

Effective medication management is essential for older adults, as inadequate adherence may result in heightened morbidity, mortality, and healthcare costs (17). Recent research conducted by Mosher et al. (18) examined the relationship between health literacy and medication knowledge, adherence, and adverse drug events. Individuals with lower health literacy demonstrated a reduced ability to recognize their medication names and purposes, as evidenced by significantly fewer medications identified compared to those with adequate literacy (18). Nevertheless, no substantial correlation was identified between health literacy and self-reported medication adherence or adverse drug events, indicating that other factors may affect medication management behaviors.

6. Cognitive Health and Health Literacy

Three significant studies have emphasized the connection between cognitive health and health literacy among older adults. Khodabakhshi-Kolaei (13) investigated the relationship among health literacy, physical functioning, mental health, and mortality, revealing a significant correlation between cognitive health and health literacy. The authors concluded that health literacy and mental health exhibit a threshold relationship, indicating that lower mental health scores are associated with lower health literacy scores, though this correlation is not linear. Participants in the lowest health literacy categories exhibited poorer mental health compared to those in the highest literacy scores.

Pagán et al. (19) examined the relationships among health literacy, memory, cognitive performance, and functional ability. The study found a significant association between health literacy and both memory and functional ability, while no correlation was observed with age or education. Education and cognition significantly influence health literacy, underscoring the importance of strong memory capacity in this domain. Omelchenko et al. (20) conducted a study that corroborated these findings, establishing a connection between working memory, health literacy, and the recall of stroke symptoms. Omelchenko's study found that participants' ability to recall stroke symptoms was affected by health literacy, education, and cognitive function, highlighting the significance of cognitive health in the retention of health information.

Technological interventions have been designed to improve health literacy in older adults with restricted cognitive abilities. Bickmore et al. (21) developed a computer interface that employs Embodied Conversational Agents (ECAs) to replicate face-to-face communication, an effective method for delivering health information. This intervention sought to address the disparity in health literacy levels by utilizing a familiar communication style to enhance understanding. Research indicated that older adults exhibiting lower health literacy demonstrated a reduced likelihood of engaging in health-related discussions on the ECA platform. Overall, the ECAs demonstrated strong acceptance and usability, suggesting their potential as an effective tool for delivering health information to audiences with varying literacy levels in both clinical and community contexts.

7. Novel Tools for Assessing Health Literacy

Recent studies have developed novel metrics of health literacy specifically designed for older adults. Patel et al. (15) conducted a comparison of the Newest Vital Sign (NVS) health literacy assessment and the commonly utilized S-TOFHLA in a sample of African American seniors. The NVS demonstrated greater efficiency for younger adults, while older adults required a significantly longer duration (mean of 11.7 minutes) to complete the assessment, indicating its limitations as a rapid screening instrument for this demographic. The educational level was found to be a more significant predictor of health literacy compared to the NVS score, highlighting potential issues regarding the appropriateness of specific literacy assessments for older adults. Singh et al. (22) evaluated the effectiveness of the Single Item Literacy Screener (SILS) among Spanish-speaking older adults, revealing that a targeted question regarding confidence in completing medical

forms successfully identified low health literacy, though it exhibited insufficient specificity. The findings suggest the necessity for the development of more precise and culturally sensitive health literacy tools tailored for older adults.

8. Limitation of Existing Studies

This review examines the challenges and limitations associated with health literacy research in older adults. Numerous studies employ various health literacy measures that are not validated for older populations, resulting in inconsistencies in findings. The sample size and demographic representation differ significantly among studies, which impacts the generalizability of the findings. Moreover, most studies concentrate on a narrow age range (65+), neglecting younger older adults, which may result in biased conclusions.

9. Conclusion

Enhancing health literacy in older adults is essential for improving health outcomes, decreasing healthcare expenses, and fostering well-being in aging populations. Working memory is a critical component of cognitive function that significantly influences health literacy, affecting older adults' capacity to comprehend and utilize health information. Effective interventions, including conversational agents and targeted screening tools, as well as initiatives to address educational and socioeconomic barriers, can mitigate disparities in health literacy among older adults. Future research must focus on validating health literacy measures for older populations and investigating the role of technology in enhancing accessibility of health information for individuals with cognitive limitations.

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التحديات والحلول لتحسين استخدام تكنولوجيا الصحة بين كبار السن

الملخص

تحل هذه المراجعة الصعوبات المرتبطة بتحسين استخدام تكنولوجيا الصحة بين كبار السن، مع التركيز على التأثير الكبير لمحو الأمية الصحية. تُظهر الفئة العمرية المتقدمة في الولايات المتحدة تفاوتًا ملحوظًا في مستوى محو الأمية الصحية، حيث يظهر جزء كبير منها قدرة محدودة على فهم وتطبيق المعلومات الصحية. يؤثر التدهور المعرفي والبدني المرتبط بالعمر، والذي يتميز بانخفاض الفهم، والاحتفاظ بالذاكرة، والعيوب الحسية مثل فقدان البصر والسمع، بشكل كبير على قدرة كبار السن على معالجة المعلومات الصحية والامتثال لبرامج الأدوية. تستعرض هذه المراجعة الأدبيات الحالية المتعلقة بالتفاعل بين محو الأمية الصحية، والوظيفة المعرفية، ونتائج الصحة، مع التركيز على التباينات في النتائج التي تعزى إلى الاختلافات في منهجيات التقييم وخصائص المشاركين. تشير بعض الدراسات إلى وجود علاقة بين مستوى التعليم ومحو الأمية الصحية، بينما تحدد دراسات أخرى العمر والوظيفة المعرفية كمتنبئات أكثر أهمية. تستعرض المراجعة أوجه القصور في أدوات تقييم محو الأمية الصحية الحالية، وتحديدًا فشلها في أخذ التدهور المعرفي المرتبط بالعمر في الاعتبار. يتم تسليط الضوء على ضرورة تطوير أدوات تقييم وتدخلات حساسة ثقافيًا، بما في ذلك وكلاء المحادثة المجسدة (ECAs)، لتحسين إمكانية الوصول إلى المعلومات الصحية وتعزيز نتائج الصحة لكبار السن. تؤكد الخاتمة على ضرورة معالجة العوامل الفردية والاجتماعية لتعزيز محو الأمية الصحية وتقليل الفجوات في الوصول إلى الرعاية الصحية لهذه الفئة العمرية المتزايدة.

الكلمات المفتاحية: التدهور المرتبط بالعمر، تكنولوجيا الصحة، الوظيفة المعرفية، محو الأمية الصحية، وكبار السن