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SPECIAL ARTICLE

Diet and Activity Assessments and Interventions Using Technology in Older Adults

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This paper reports on the findings and recommendations specific to older adults from the "Tech Summit: Innovative Tools for Assessing Diet and Physical Activity for Health Promotion" forum organized by the North American branch of the International Life Sciences Institute. The summit aimed to investigate current and emerging challenges related to improving energy balance behavior assessment and intervention via technology. The current manuscript focuses on how novel technologies are applied in older adult populations and enumerated the barriers and facilitators to using technology within this population. Given the multiple applications for technology in this population, including the ability to monitor health events and behaviors in real time, technology presents an innovative method to aid with the changes associated with aging. Although older adults are often perceived as lacking interest in and ability to adopt technologies, recent studies show they are comfortable adopting technology and user uptake is high with proper training and guided facilitation. Finally, the conclusions suggest recommendations for future research, including the need for larger trials with clinical outcomes and more research using end-user design that includes older adults as technology partners who are part of the design process.

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INTRODUCTION

Older adults (aged 65 years and older) are a large and fast-growing population with a high rate of healthcare utilization and expenses. Increased focus on the costly healthcare issues associated with malnutrition or poor diet quality and lack of physical activity (PA) that increase demand for clinical care should be a research priority.[1,2] Even though there have been advances in the use of technology to assess and intervene on these lifestyle behaviors in younger adults,[3] companies and researchers are now turning their attention to enhancing "gerontechnology" to serve older adults. Although they continue to lag behind younger adults, older adults are becoming more technologically savvy, with an increasing percentage owning smartphones.[4] Further, as "baby boomers" transition into retirement, there will be a market of tech-informed older adults seeking appropriate support to maintain a healthy lifestyle in later life.

Older adults may particularly benefit from technological supports to help with recall and monitoring of behaviors; however, barriers to using technology include challenging user interfaces or devices not specifically designed for those with the cognitive, visual, auditory, and tactile deficits commonly associated with aging.

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Technology designers must also recognize the large variability that exists within the older adult population. Although classified as "older adults," these individuals can vary widely in age by as much as 5 decades (i.e., 65–105 years) and they experience varying levels of ability with different challenges and limitations. As age itself is not the only driver, designers and researchers must assess where along the aging-limitation continuum their target audience lies. Further, older adults may experience variability in functioning across days and weeks compared with younger adults because of chronic health conditions that can vary daily and can affect health-related behaviors. In addition, systems must be flexible and attentive to daily needs and safe returns from periods of illness, which are more common in older adults. Older adults often experience a gradual decline in physical and cognitive functioning because of the aging process and accumulation or progression of disease. This calls attention to opportunities for self-monitoring, but it also requires designers to consider this trajectory and understand that maintenance is often preventive and does not necessarily reverse worsening trends.

Researchers should acknowledge other unique features of older adult lifestyle behaviors in technological solutions, including the settings or contexts in which behaviors occur. For example, 93.5% of older adults live in their own home compared with only 6.5% who reside in residential healthcare settings.[5] By contrast, young populations spend the majority of time in communal settings, such as schools or workplaces. This poses challenges to intervention delivery and creates differences in schedules and social support opportunities. The organizational and social factors in a workplace or school-based setting may better support a sedentary behavior intervention using technology compared with a home environment[6,7]; therefore, technology has to be adapted to achieve change when used in isolation or it should provide a social component for those who are isolated. In contrast with younger adult populations, there may be more groups involved in the daily care of older adults, including family members, caregivers, and medical staff. There may be an increased need to share information with these groups and this raises unique ethical, privacy, and logistic considerations. Finally, relevant behaviors for younger populations may be less relevant for older adults and tools may need to address unique factors, such as falls prevention or hydration. Given the surge in technology for both measurement and interventions, better understanding of how to leverage its use with older adults is an important step for researchers. The purpose of this paper is to review and summarize the literature on methods and challenges for using technology with older adults. Specifically, this article provides an overview of current barriers to using technology for measurements and interventions. Finally, the conclusions section discusses gaps in the literature and future directions for research to advance the field and leverage technology to improve health for older adults.

KEY LEARNINGS FOR DIETARY AND PHYSICAL ACTIVITY MEASUREMENT AND INTERVENTION USING TECHNOLOGY WITH OLDER ADULTS

Using technology to capture diet and PA behaviors in older adults poses opportunities because of unique features of these behaviors in older populations as well as challenges of using technology within this age group. Capturing dietary intake (DI) in older adults is critical for the prevention of nutrition-related disorders and disease conditions and for effective treatment of individuals with health problems.[8] Measuring DI requires assessments covering both ends of the spectrum of malnutrition—namely, prevention of weight gain and obesity[9] and avoidance of undernutrition.[10] Current methods of DI capture used with adults include 24-hour recalls, food logs, and food frequency questionnaires administered using traditional and technology-based methods. These methods are equally suitable for use with older adults, provided the individual can report intake without any constraints imposed by cognitive challenges and eating capabilities. However, in general, there are several challenges to collecting dietary data in older adults.[11,12] Some of these challenges are a direct result of the aging process, such as (1) diminished smell and taste that affect eating and appetite; (2) cognitive changes and memory loss that make it difficult to remember whether or not a meal took place, what was eaten, and whether or not the meal was logged; (3) changes in functionality that make procurement of food difficult; and (4) adjustments to living conditions that make food preparation difficult or not possible with food provided by caregivers or institutions. The complex interplay of health conditions, medications, and supplements older adults usually take, as well as the effects of alcohol and hydration, are additional factors for DI capture and provision of interventions. Therefore, effective dietary assessment necessitates clearly distinguishing between older adults who can provide accurate intake information and those for whom observational data are best for DI quantification.

Similar to unique dietary issues, older adults' PA behaviors differ from younger groups, leading to challenges in designing technologies for this group. For PA, thresholds of movement that consider absolute intensity (e.g.,