Beyond Technology: Integrating Diverse Services to Support Physical Activity Among Older Adults Aging in Place

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Older adults, particularly those living alone, often face complex challenges to engaging in physical activity (PA) due to the interplay of a multitude of barriers. In this position paper, we summarize our research on designing PA-promoting technologies for older adults and reflect on our research findings, emphasizing the need for collaborative multidisciplinary efforts to design systems that can holistically address PA challenges across internal, social, and environmental levels. Through a human-centered design approach, our research uncovers older adults' diverse motivations and multifaceted barriers to PA engagement. We underscore that the success of promoting PA among older adults requires coordinated efforts across healthcare, social, and information services to provide comprehensive support. Building on these insights, we propose that local communities could serve as central hubs for integrating these services, facilitating social interaction and access to PA resources. We particularly call for interdisciplinary collaboration among different stakeholders, including HCI researchers, healthcare professionals, and community-based organizations to connect various services and support PA among older adults aging in place.

CCS CONCEPTS • Human-centered computing • Human computer interaction (HCI) • Empirical studies in HCI

Additional Keywords and Phrases: Older adults, Living alone, Physical activity, Social services, Healthcare services, Community organizations, Interdisciplinary collaboration

1 INTRODUCTION

Older adults, especially those living alone [11], tend to be less regularly active than other age groups [5], often falling short of recommended physical activity (PA) levels. While prior research has shown varied barriers encountered by older adults to PA engagement (e.g., health problems [6], a lack of support from their friends and family [3], and limited access to free or affordable PA resources [1]) as well as the potential of technology in supporting PA among older adults [4], existing PA promoting technologies are poorly aligned with older adults' needs of PA support [2,7]. Therefore, we conducted research on investigating how technology can be better designed to support PA among inactive older adults living alone.

In this position paper, we first summarize our research and then reflect on our research findings. Particularly, we underscore that supporting older adults' PA and aging in place relies on an integrated effort across multiple areas, including healthcare, social, and information services.

2 SUPPORTING PA IN LATER LIFE

Using a human-centered design methodology, our research involved three phases—understanding older adults' PA experiences and needs, co-designing solutions to address these needs, and evaluating design concepts to identify design opportunities. Below, we provide an overview of each phase, including methods and key findings.

2.1 Understanding Older Adults' PA Experience

Phase 1 [8] aimed to understand older adults' PA experiences, including their motivations for and the challenges encountered in remaining physically active. To this end, we conducted semi-structured interviews and diaries with 17 participants (aged 66–93; female 14, male 3).

Our findings show that older adults have a diversity of motivations for PA, including maintaining health, completing errands, socializing with friends, enjoying the peripheral sensory experiences from the environment (e.g., nature, street views), and deriving pleasure from exercise. However, their PA routines are frequently disrupted by both permanent and intermittent challenges, including evolving health conditions, environmental changes, lack of commitment to PA, and limited access to suitable PA resources. While those challenges have already been revealed in prior research (e.g., [1,3,6]), our findings uncover how those multidimensional barriers, ranging across personal to environmental circumstances, interrelate with each other to impact older adults' PA engagement. For example, while prior research has shown the motivational benefits of exercising with others, our work adds nuance on the complexities older adults encounter in finding appropriate exercise partners who could match to their fitness levels, have shared interests for conversation, and have similar schedules and locations—these requirements tend to change as older adults' circumstances are constantly changing. Thus, our findings emphasize that older adults do not just face individual hurdles when trying to stay physically active; they must navigate a maze of interrelated barriers. It is the combination and interaction of those barriers that not only make maintaining PA routines a significant difficulty for older adults but also render designing PA promoting technology a complex challenge.

2.2 Co-Designing Solutions to Addressing PA Barriers

Phase 2 aimed to explore older adults' perceptions of existing PA technologies and their preferences of PA support. We conducted a series of co-design workshops with a subset of the Phase 1 participants (n=8; aged 72–93; female6, male 2) to gather their insights on how PA technology should be designed to support the development and maintenance of PA routines among older adults.

Through those workshops, participants contributed to ideas for new PA promoting technologies, we also gained a deeper understanding of how older adults weigh the benefits against the potential costs and risks from using PA technologies, further clarifying how existing technologies are poorly aligned with older adults' needs. Our findings reveal the approaches older adults find most useful in overcoming barriers to maintaining PA routines, emphasizing the importance of providing support across internal, social, and environmental levels. Specifically, social interaction can play a multifaceted role in enhancing both intrinsic and extrinsic motivations for PA, alleviating personal challenges, and facilitating knowledge exchange. Thus, we suggest that increasing social interaction could be a first step in mitigating interconnected barriers older adults face to PA engagement. More importantly, our findings highlight how PA support for older adults should extend beyond the capabilities of current technologies, calling for integrated support from healthcare, social, and information services.

2.3 Identifying Opportunities of Designing Technology

Building on the findings from Phases 1 and 2, in Phase 3, we first developed a series of design concepts, in the form of storyboards, envisioning digital and non-digital tools for tackling interrelated barriers to PA engagement. Using these concepts as prompts, we conducted semi-structured interviews with 15 participants (aged 65–86; 13 female, 1 male, 1 undisclosed) to elicit their reactions to the designs and their perspectives on PA support [9].

Our findings provide deeper insights on how older adults want technology to help them overcome barriers to maintaining their PA routines, revealing promising approaches to overcoming PA routine disruptions. For instance, our participants wanted to decide PA routines on their own, as they felt they knew their body and mood conditions better than anyone else. Their desire of taking control of PA routines requires professional support to helps them adapt to assorted changes such as health conditions and weather that might interrupt their regular PA. Thus, most participants considered it useful when technology offers alternative exercises (as shown in Figure 1) and helps build exercise into daily life. Yet, designing such technology requires collaboration among varied expertise from healthcare professionals, technology experts, and local senior communities.

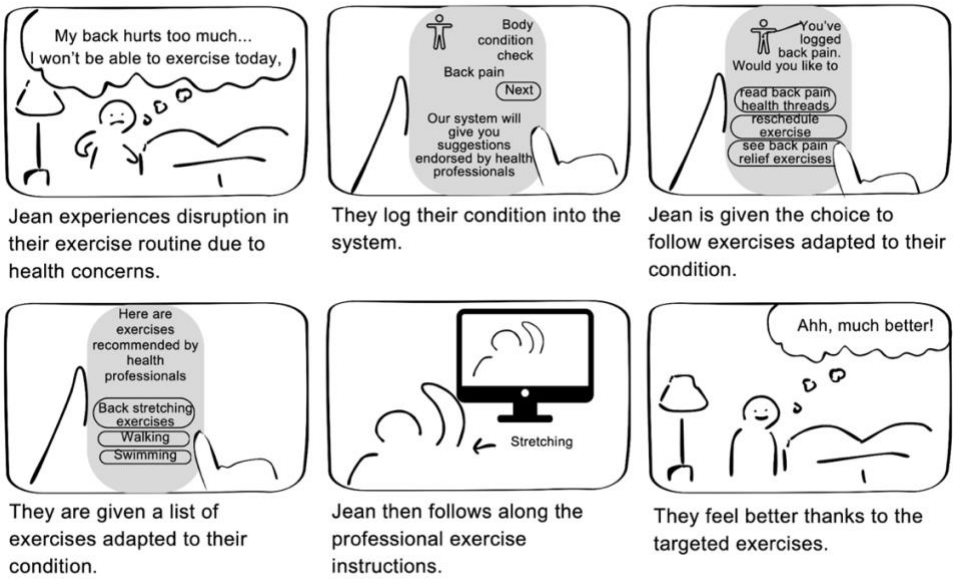

Figure 1: Storyboard showing the design concept of providing alternative exercises.

3 A COLLABORATIVE APPROACH TO PROMOTING PA AND AGING IN PLACE

Our research findings underscore that older adults have a unique composition of challenges and needs for PA engagement. The crux of promoting PA for this group, therefore, lies in providing a holistic support system that integrates multiple forms of support, including social, healthcare, technological, and environmental resources. Specifically, social support from friends, family members, and local communities can provide emotional encouragement for older adults to maintain their internal motivations for PA, offer access to information about PA resources by facilitating information exchange, and foster accountability partnerships to sustain motivations. Healthcare support is essential to help older adults overcome health challenges that hinder their ability to maintain PA routines. Technology

support, coupled with education, can empower older adults to adopt PA promoting technology, with which they could gain access to more PA resources. Environmental support, including walkability of streets and proximity to PA resources, can further enhance older adults' PA engagement.

While providing these supports individually may be straightforward, delivering them in combination presents a significant challenge, as it requires coordinated efforts and expertise from diverse areas, including social services, healthcare, information services, and local infrastructure. A prior study [10] proposes a community-based integrated service model that involves several key elements for helping older adults living alone maintain independence, including providing basic daily life support, tailored healthcare and community primary care, and support of seeking local resources. Building on this, we suggest that local community could serve as a central hub for coordinating these services to provide contextual and holistic support for promoting PA in older adults, thereby supporting aging in place. However, realizing this vision requires a shift in how we approach design and research. While past work has mostly focused on designing for individuals or groups of peers, we underscore the importance of exploring how to build technology for a broader collaboration among older adults and various services in future research.

Building technology that bridges diverse areas would not be possible without greater interdisciplinary collaboration among different stakeholders with various expertise, such as HCI researchers, healthcare professionals, information experts, local community-based organizations, and policy makers. Workshops like this are a valuable opportunity to start discussions among participants on fostering interdisciplinary dialogue and identifying actionable steps for future collaboration. For example, it is important to discuss empirical directions—what frameworks or models in different areas can guide the integration of diverse services, and how we can design technology that connects older adults with those diverse services. It is also worthwhile to explore methodological possibilities—how we can better involve stakeholders from different domains in the co-design of technology, and what other approaches are to facilitating collaboration among multiple stakeholders. Initiating these conversations will be a critical first step towards connecting various areas and expertise necessary for supporting aging in place.

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