

Computer-Supported Health and Well-Being Services: A Systems Approach to Telehealth and Coaching Systems

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ABSTRACT

With an aging population and shortage of primary care providers in the U.S., practitioners and researchers have begun to rethink traditional approaches to healthcare delivery for older adults. Telehealth – the use of technologies to provide clinical services over distance – offers new ways for clinicians to deliver care while allowing older adult patients to remain in their homes. However, much of the work on telehealth focuses on single technology modalities (e.g., tablet or computer) and is also primarily patient-centered focused at the expense of excluding important stakeholders (e.g., community centers) who can play a role in the delivery of health and wellness resources. While there are opportunities to extend sites of care to local community organizations using telehealth coaching services, current telehealth research is understudied in this regard. We expand upon existing work to propose a systems perspective of *computer-supported health and well-being services* in order to improve mental health and well-being of low resource older adults. We conclude with open questions for future work.

CCS CONCEPTS

• **Human-centered computing** → HCI theory, concepts and models

KEYWORDS

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Telehealth, coaching, community-based research, older adults

1 INTRODUCTION

Managing wellbeing is important for older adults who experience many social and health changes as they age. However, social isolation, loneliness, and mental health are major challenges with older adults, particularly less mobile older adults [13]. To help address these concerns, telehealth applications have been used to provide easy access to healthcare information and providers, alleviating transportation and scheduling challenges. Also, telehealth applications also enable healthcare providers to monitor and provide care to patients in their homes, which benefits aging adults who prefer to remain within their own homes [11]. The use of telehealth has made the process of monitoring older adult patients more feasible, and decrease patient hospitalizations or readmissions [6]. Taken together, telehealth applications offer an opportunity to better support older adults' health and well-being needs within their own homes.

However, according to a recent Pew Research report [1], tablets and in-home broadband are still not popular among low income, older, and low education older adults. Of U.S. adults over the age of 80 with a household income below \$30,000, only 27% of older adults have in-home Internet access and only 16% own a tablet [1]. Yet, many telehealth applications have mostly been studied through large-scale tablet or computer interventions (e.g., [3]). Thus, older adults who are most in need may be unable to benefit from telehealth services.

To address some of these concerns, a more systemic approach to designing telehealth solutions involving key community stakeholders is needed. For instance, a recent pilot study on community involvement and well-being for older adults describes a case of volunteers from the Meals on Wheels low-income delivery service for homebound adults and positive effects on health and quality of life [20]. Moreover, expanding telehealth into new technology

modalities in the home, such as intelligent speakers and interactive voice response (IVR), can benefit older adults who face challenges using other technologies due to dexterity difficulties or vision impairments.

Hence, we propose a socio-technical perspective that considers *computer-supported health and well-being* (CSHW) services, which is a systems approach to understanding and creating mental and well-being telehealth services for low-resource older adults. We also propose how this model can leverage what is known regarding prior literature on virtual coaching for improving health outcomes. CSHW accounts for the integration of various telehealth modalities and community stakeholders in two primary ways. First, the model focuses on building a suite of accessible CSHW services (e.g., intelligent speaker systems, IVR) for low-resource seniors. Focusing on home-based technologies is important for older adults who may lack transportation access, have challenges with mobility or prefer being in the comfort of their own homes. Second, engaging community stakeholders (e.g., senior community centers, homebound delivery services, libraries) provides additional resources for healthcare providers, especially those in primary care who are overburdened and unable to monitor their older adult patients. Using an approach with a focus on digital systems and community stakeholders enables a technologically flexible and socially supportive model of telehealth implementation that has been called for by earlier studies [10,11].

2 CHANGING GEOGRAPHIC SITES OF CARE

As telehealth becomes increasingly prevalent, clinical practice has expanded to “new geographies of care” [16] beyond hospitals and physician offices, including patient’s homes and community centers. While telehealth eliminates some of the constraints of geographical boundaries, the local context where care is delivered still matters in how different non-clinical sites successfully employ telehealth [17,19]. For instance, areas in dire need of equitable healthcare access may in fact lack the infrastructure to support the optimal use of telehealth technologies. Or a patient unfamiliar with digital technologies may not have a caregiver to assist using a new telehealth application.

Hence, there is reason to suspect healthcare delivery outside clinical sites may increase the burden on patients and caretakers if they lack the technology means or other support to receive adequate care [7]. Taken together, the changing sites of clinical practice has implications how and where telehealth technologies are deployed.

3 OPPORTUNITIES AND CHALLENGES FOR TELEHEALTH COACHING

While telehealth technology has changed since its inception dating back to the 20th century [3], the premise of telehealth reflects early models of healthcare delivery where physicians traveled to patients’ homes. New models of telehealth have since shifted from earlier models that focus exclusively on delivering medicine at a distance to also encompass supporting individual wellness to improve health outcomes. One of the important themes across telehealth interventions is the use of virtual coaching to help people make decisions about health-related behavior change and sustain healthy behaviors over time [23]. Moreover, coaching models used in contexts outside healthcare has also led to positive outcomes such as improved well-being and hope [9]. For example, an intervention to increase step counts showed people with the virtual coach maintained step counts, were satisfied with interacting with the coach, and described being more motivated to be active [21]. In another example, a diabetes intervention of people in rural communities, participants reported higher self-efficacy in the coaching condition [24]. These findings show that coaching can have benefits to and beyond health outcomes, affect measures of well-being and quality of life.

However, other telehealth researchers are optimistically cautious given numerous accounts of failed or difficult implementation efforts with other healthcare technologies [12,22]. Because patients and healthcare providers are not collocated when using telehealth, both actors lack the element of human touch – an important aspect of healthcare and patient experience. This change in clinical practice may shape how patients and clinicians perceive how care via telehealth is comparable to face-to-face interactions. With these considerations in mind, we outline three themes regarding telehealth coaching interventions for older adults’ health and wellness.

3.1 Community-based telehealth approach.

Considering potential challenges healthcare providers may encounter when using telehealth offers opportunities to engage community stakeholders to support overburdened providers. Community programs such as Meals on Wheels and other volunteer-based programs provide regular visits to homebound older adults. MacLeod and colleagues note the success of these programs in improving the health and quality of life of older adults [13]. Moreover, many local communities offer senior centers that plan social activities and events for older adults in their communities. Such community resources offer additional opportunities for socially isolated older adults to engage with others. While research suggests evidence maintaining relationships and positive social interactions improves wellbeing for aging adults [18], many healthcare providers are unaware to recommend or unable to provide these resources for their older adult patients.

Given these pragmatic concerns, we propose including local community organizations that already provide services and resources for older adults as an extended site of care through the use of telehealth services. For instance, telehealth technology could enable Meals on Wheels volunteers to receive alerts in advance about individuals who may benefit from additional wellness check-in visits. Telehealth services could also enable local organizations such as senior community centers to become sites for healthcare access, especially for older adults living in areas who may lack healthcare access due to geographical barriers.

Such opportunities raise questions such as:

1. How can telehealth and other CSHW technologies work together as a system to provide health and wellness support to older adults?
2. How can CSHW technologies, such as telehealth coaching, be incorporated into community stakeholders' best practices?

3.2 Moving beyond a singular technology approach

The technology modality in which telehealth coaching services are delivered is an important factor when considering differences in accessibility, acceptance, and learning curves in operating different technology platforms. These potential limitations could affect a patient's willingness and effectiveness utilizing telehealth. In the case of older adults, there is evidence of a positive experience with the use of speech-based directional tools in terms of ease of use and willingness to communicate with the system [6]. For example, the use of Interactive Voice Response (IVR) systems in rural low-resource areas in India provide evidence of success in usability of voice-based telehealth resources and community-level impact concerning health management [10]. Particularly, when designing for the older adult population speech-based technologies have been shown to be a useful and efficient modality due to ease of use and design [11].

Hence, considering additional telehealth technology modalities beyond tablet or computer technologies presents questions such as:

1. Which telehealth modalities are best suited for older adults' needs?
2. What types of telehealth coaching might older adults across different demographics require?

3.3 Older adults and sensemaking with health technology

Information and communication technology (ICT) use has increased among older adults in the last two decades [1] and has been associated with improved positive well-being outcomes for older adults [4]. Specifically, findings from

recent research which examined 17 individual difference predictors of ICT use among older adults suggest that the need for cognition, perceived mastery, and optimism positively predicted ICT use [5]. Such findings may suggest that individual differences among older adults should be considered when determining telehealth modalities

For example, some older adults perceive the benefits of using a variety in-home technology to gather health information and monitor their health progress, such as automatic refill IVR systems or blood pressure cuffs that communicate information back to their physicians [15]. Yet, challenges remain concerning how older adults can collect reliable information and whether they trust health information they receive. Hence, this raises questions such as:

1. Are certain interfaces more effective at increasing health literacy among older adults?
2. Beyond cohort differences, are there differences in how older adults want health information delivered?

4 FUTURE WORK

To examine the aforementioned questions posed for examining telehealth coaching for older adults, future research in this domain should consider a community-based participatory research approach. One of the particular advantages this research approach directly involved community members (i.e., older adults, caregivers) and organizational stakeholders (i.e., seniors centers, local community hospitals) to better understand health and wellness concerns from their perspectives. Given the complexities unique to local communities (e.g., access to adequate broadband, demographics, available public resources), it is pertinent to understand how these factors might affect how community organizations can employ telehealth services and become extended sites of care.

Moreover, a wealth of research examining technology implementation in organizations (e.g., [2, 8]) has shown value examining changes longitudinally effects of the technology implementation may not be immediate. Specifically, this may include multi-wave surveys and interviews about the experiences of older adults, their caregivers and organizational staff in using telehealth coaching services.

5 CONCLUSION

Once considered unconventional, telehealth is now becoming an increasingly accepted form of care delivery. In particular, older adults can benefit from telehealth: eliminating unnecessary, costly clinician visits, allowing physicians to detect early warning signs related to chronic conditions, and relieving transportation burdens for

caregivers. However, telehealth also presents unfamiliar patient-provider interactions not designed for older adults, particularly those living in communities without equitable Internet access or technology skills. While telehealth provides opportunities to address barriers to healthcare access for a rapidly aging American population, little work has been done to understand how to develop telehealth technologies suitable for older adults' diverse needs. We propose a more nuanced approach to understanding these barriers and potential solutions that consider a community-centric and technological systems perspective.

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