

Co-Designing Technologies With Care

Long-Jing Hsu
Indiana University Bloomington
Bloomington, IN, USA

David J. Crandall
Indiana University Bloomington
Bloomington, IN, USA

Chia-Fang Chung
University of California, Santa Cruz
Santa Cruz, CA, USA

Selma Šabanović
Indiana University Bloomington
Bloomington, IN, USA

Abstract

Co-design research involving older adults has explored various effective methods for their engagement, including challenging stereotypes, building trust through meaningful interactions, fostering social connections within communities, and promoting mutual learning. However, existing research may not always take a holistic approach to co-designing with older adults. In this position paper, we present a Hierarchy of Care in HCI Design Research framework, which structures co-design through a care-centered perspective. This framework begins with research as care and progresses through individual well-being, relational well-being, and learning experiences. By adopting the hierarchy of Care in HCI Design Research, researchers can create more inclusive, meaningful, and effective co-design practices that benefit older adults and the research.

Keywords

Co-design, care, older adults, care partners

ACM Reference Format:

Long-Jing Hsu, Chia-Fang Chung, David J. Crandall, and Selma Šabanović. 2018. Co-Designing Technologies With Care. In *Proceedings of Make sure to enter the correct conference title from your rights confirmation email (Conference acronym 'XX)*. ACM, New York, NY, USA, 7 pages. <https://doi.org/XXXXXX.XXXXXXX>

1 Introduction

Co-design, a form of participatory design that actively involves end-users in the research and design process [16, 32], is a well-established approach in Human-Computer Interaction (HCI). Co-design includes diverse design-thinking processes, where individuals collaborate and reflect on shared practices and experiences through “joint inquiry and imagination [34].” By engaging end-users in the process, the research team benefits from their practical experiences that could enhance idea generation, leading to more effective decision-making in design. In particular, with increasing interest in technology for older adults, there is an increase in the involvement of older adults in co-design [11].

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

Conference acronym 'XX, Woodstock, NY

© 2018 Copyright held by the owner/author(s). Publication rights licensed to ACM.
ACM ISBN 978-1-4503-XXXX-X/2018/06
<https://doi.org/XXXXXX.XXXXXXX>

Compared to designing with younger adult user groups, co-designing with older adults presents distinct challenges. Researchers often serve as advocates for older adults, yet understanding stakeholder perspectives and lived experiences can be complex [36]. In particular, designers who are young adults may find it challenging to understand older adults' experiences because they have not yet personally encountered them [30].

Furthermore, older adults may experience physical and cognitive limitations that make it challenging to apply common co-design approaches, such as storyboarding and rapid iteration. For example, age-related changes in hearing and eyesight, such as presbycusis (age-related hearing loss) and reduced ability to focus on small objects [25], can make certain design tasks, like storyboarding, more difficult. The natural aging process also affects cognitive function. Structural changes in the brain, including the shrinking of the hippocampus and medial temporal lobes, contribute to explicit memory issues and increased distractibility [21, p.41, 59]. Decline in working memory performance [20] and processing speed [9] make it more challenging for older adults to generate ideas quickly or to respond as rapidly as younger participants in brainstorming sessions. Moreover, new technologies, such as robots, can be difficult to grasp, as older adults did not grow up with them.

Other challenges in working with older adults include relationship and trust-building, which are essential components of the co-design process but can take time to establish [36]. Trust can be particularly difficult for older adults due to past traumatic experiences and the perceived risk of vulnerability [33], which may be further influenced by their longer life experiences.

Working with older adults who have additional complexities, such as those living with dementia, introduces further challenges. Individuals with dementia may experience behavioral and psychological symptoms that can make participatory design difficult. Cognitive stimulation therapy is often used to support individuals with dementia, but their symptoms may complicate direct participation in co-design. Unconstrained brainstorming can be particularly challenging, as individuals in the early or moderate stages of dementia may struggle to conceptualize and navigate the design space [10].

Furthermore, many older adults are unfamiliar with design methodologies and may struggle to know where to begin when given open-ended prompts, especially if they do not have a background in design [36]. Compared to younger adults, older adults often face limitations that require more careful consideration and adaptation in co-design processes. Reflecting on the challenges faced by older adults requires further refinement and careful consideration when approaching research with awareness and accountability in

co-design. Given the aforementioned challenges, we aim to discuss *what are the necessary research practices to promote responsible participation with older adults and to prioritize meaningful collaboration?*

2 Related Work

To understand the necessary research practice, we begin by describing the history of co-design in HCI as well as existing reflexive approaches for co-design with older adults.

2.1 History of HCI and Co-Design

Co-design, or participatory design, is a fundamental process in HCI that has evolved in step with the field's history. After the first wave of HCI centered around users interacting with desktop computers while drawing from cognitive science and human factors [8, 29], the role of co-design became more evident with the second wave's Scandinavian participatory design practices [29, p.12]. During this time, the HCI community emphasized collaborative work, situated activities, and participatory design workshops [29], which valued including end-users in the design process. The concept of co-design or participatory design was built in the third wave, as HCI moved beyond work environments, incorporating computers and technologies into homes and everyday life across diverse contexts and communities. The shift in the third wave encouraged a more reflexive approach to design, moving "from human factors to human actors" [7], with co-design engaging the human actors as direct participants in design. More specifically, the HCI design community discussed how these human actors are not acting in isolation but are interacting with the technology affected by the domestic, cultural, and social settings around them [8].

Co-design has been widely employed to enhance responsiveness, foster communication, and improve policy processes and outcomes [6]. Co-design serves as a bridge between researchers and participants, enabling collaborative engagement in design activities [17]. Co-design can be viewed as a democratic approach [17]. Participants negotiate roles and interests to drive meaningful change. Participation in co-design should not only capture users' perspectives but also facilitate mutual learning between users and designers, empowering individuals to shape their own experiences [16].

Scholars have explored ways to further integrate discussions of values in design and the future while maintaining a strong commitment to democratic principles [15], such as from the feminist perspective. In HCI, feminist perspectives helped increase the discussion of co-design. Feminist principles have influenced product and industrial design, shaping methodologies that help interaction designers and researchers incorporate feminist approaches into user research across different contexts and situations [3]. The feminist perspective calls for a reflexive approach to emphasize awareness, accountability, and objectivity regarding the diverse stakeholders involved in technology design [3] throughout the research and design process [5, 38]. The diversity also includes the marginalized voice, but also the inclusivity and ethical design practices [4]. Guided by a feminist perspective, co-design in HCI values inclusivity and reflexivity; however, there is no single answer to how one should be inclusive in the co-design process, as inclusivity is highly

dependent on the situated context, which can vary depending on different populations, such as older adults.

2.2 Existing Approaches for Co-design with Older Adults

Facing the challenges of older adults in co-design, along with the trend of feminist utopianism in the participatory design approach [4], a growing body of research explores methods for conducting co-design with older adults with being more inclusive and reflexive.

Reflecting on inclusivity and reflexivity, recent research calls for challenging stereotypical views of aging [23], shifting away from the perception that aging is inherently linked to loneliness or that older adults have limited capabilities. Rather than viewing older adults as incapable, they are recognized as active participants in their own lives, using technology to address the challenges of aging and engaging in co-design that extends beyond physical and cognitive limitations. This perspective aligns with the concept of active aging introduced by the World Health Organization at the Second United Nations World Assembly on Aging in Madrid, Spain, in 2002, titled *Active Aging: A Policy Framework* [26]. This framework emphasizes participation in society, viewing older adults as independent and healthy individuals who can volunteer, care for children and grandchildren, and maintain social connectedness [14, 40]. It explores how older adults interact with technology to address their needs and constraints. Similarly, prior design research challenges the notion that older adults using powered wheelchairs are inherently limited. Instead, older adults may view their wheelchairs as integral to their identity, providing them with independence and opportunities for social engagement [31].

Having a more open mindset can help address challenges related to physical and cognitive limitations. Rather than focusing on these limitations, researchers can identify older adults with expertise in specific fields, allowing them to contribute meaningfully to the co-design process. For example, older adults who are creative writing hobbyists can actively participate in workshop design [1]. Some studies have involved student designers in co-design, leveraging their expertise to help elaborate on ideas [30] and support older adults in overcoming certain limitations. Similarly, in another study, facilitators created live maps instead of having participants work independently to support engagement [2]. Other research has introduced flexibility into the design process, such as allowing participants to complete homework tasks, like taking photos, at their own pace.

As building trust can be a challenge, researchers and designers emphasize prioritizing relationship- and trust-building while maintaining rapport [11] and ensuring they understand the lived experiences and daily realities of participants [23]. This foundational understanding helps shape the flow and meaning of everyday life. To build relationships, researchers have emphasized community engagement for older adults. For example, studies have explored ways to increase digital literacy among older adults through participatory observation, fostering social interaction, facilitating group learning activities, and incorporating community contexts and group dynamics. Co-design workshops, along with detailed observations and staff interviews, have been used to investigate strategies for enhancing community life for older adults [39]. This process involves

reworking design elements, refining practices, and fostering trust and connection to support meaningful participation [23]. Similarly, Kitwood's values in empathic design highlight the importance of fostering relationships between designers and users to enhance awareness of user needs [22]. In building trust, researchers have to adjust to older adults' physical and cognitive abilities.

Researchers have also highlighted the importance of mutual learning, as it enables older adults to better understand new technologies and design processes, particularly when they have limited prior knowledge or face physical and cognitive challenges. Mutual learning involves an exchange between facilitators and co-designers. It sometimes requires facilitators to build technological literacy and provide support [2], while participants contribute their lived experiences. Researchers could allocate time for support and training, whether in an online digital setting, [11]. Alternatively, researchers can adopt a long-term approach by incorporating multiple design activities [27] or employing situated participatory design [35], engaging with in-situ robot interaction. All of these can help older adults gain literacy.

Overall, previous research has emphasized the importance of adopting a non-judgmental perspective on aging, prioritizing relationship-building, and fostering reflection and positionality in participatory design. However, no single element alone is sufficient to achieve full reflexivity and comfort in design research. For example, engaging with the community may not be enough if participants do not feel comfortable in the research process or lack literacy with the co-design technology, preventing mutual learning or meaningful participation. Researchers often need to piece together insights from multiple articles, it can be challenging for young researchers to determine what is needed. Providing guidance could help young researchers entering the field learn how to effectively co-design with older adults.

3 Position

Here, we propose a research framework grounded in a perspective of care, following a hierarchy of care in design research, as a convergence of the previously mentioned methods. This begins with the fundamental principle of viewing *research as care*, fostering a mindset that shapes how researchers perceive participants—both from the researcher's and participants' perspectives. Once one is more open-minded to view research as care, researchers can take action by looking at *participants' well-being*, particularly when working with diverse groups of older adults. The next level focuses on *relational well-being*, considering group dynamics and interactions during the co-design. Finally, the framework emphasizes *learning experiences*, ensuring that older adults gain meaningful insights from their participation (see Fig. 1). By applying these principles, young researchers can more easily grasp essential research practices that foster responsible participation and meaningful collaboration with older adults in co-design. Below, I outline the details of each element, drawing from my previously published and work-in-progress research.

3.1 Developing Research as Care Mindset

Co-design requires a more reflexive approach to truly understand older adults, including attentiveness to the voices within research

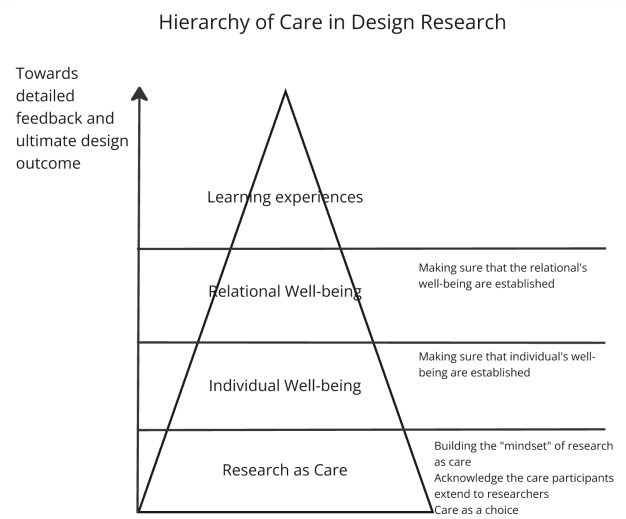


Figure 1: Hierarchy of Care in Design Research

and the researcher's positionality [13]. Previous research on feminism has focused on one's own position—shaped by personal experiences and power dynamics—ethical practice in co-design involves exercising moral responsibility, cultivating relationships, and being transparent about the researcher's role [5]. However, awareness of one's positionality alone is insufficient. For example, simply identifying as a young researcher focusing on gerontology does not provide a complete understanding of older adults' lived experiences. Their challenges, including physical and cognitive limitations, require more than acknowledging positionality; they require a deeper effort to see the world from their perspective and understand their backgrounds. This leads to the question:

How can we better understand each other to improve positionality in research?

To improve positionality and foster mutual understanding, we encourage researchers to actively engage with participants in a manner that is ethical, empathetic, and responsive. According to Tronto's ethics of care framework [37], the first step in meaningful engagement is caring about—recognizing and identifying care needs [37]. When researchers genuinely care about participants, they are more open-minded and receptive to their perspectives. This approach involves:

- (1) Viewing participants as individuals – Recognizing participants as individuals rather than simply categorizing them as “older adults” or assuming limitations based on age.
- (2) Acknowledging the reciprocity of research – Understanding that older adults are active participants who also care about research, fostering mutual respect and engagement.

By adopting an empathetic and open-minded approach—recognizing participants as individuals and understanding how they reciprocate research—researchers can shift their perspectives, challenge their own stereotypical views of aging, and foster deeper reflection on

their positionality. Developing this mindset allows for greater reciprocal care, eventually leading to more meaningful and inclusive research practices.

3.2 Caring for Individual Well-being

As having a research-as-care mindset, having intentionality in research as care is also important. Designing research in a way that fosters deeper understanding and guides meaningful action, particularly when considering the complexities of the design process, it is essential to put these principles into action. Given the older adults' physical and cognitive limitations that older adults may experience, achieving well-being can be challenging. However, by approaching care from a well-being perspective, researchers can better understand care from the standpoint of care receivers. This includes honoring individual preferences, recognizing the importance of context (particularism), and understanding lived experiences [37]. However,

How can we design co-design workshops to ensure participants feel they are in a suitable and supportive environment that promotes their well-being?

One method to do so is through building co-design practices through Eden's Well-Being Framework [18], inspired by the well-being framework from the Eden Alternative. These elements of well-being build upon one another [12, 28]:

- (1) Co-design for identity: Engaging participants in familiar and simple activities
- (2) Co-design for connectedness: Encouraging repeated interactions with the researcher and the robot
- (3) Co-design for security: Creating a safe space, fostering peer support, and ensuring informed assent
- (4) Co-design for autonomy: Supporting participants in growing as user experts
- (5) Co-design for meaning, growth, and joy: Inspiring participants through the researcher's reflective practice

This framework provides a structured approach to fostering well-being in co-design, ensuring that older adults feel valued, supported, and engaged.

3.3 Caring for Group Dynamics

As the co-design calls for situated activities within the co-design group, power dynamics when researchers facilitate activities can also play a significant role [30]. Each individual within the design team has a role in the collaborative process and contributes to communication and decision-making [30]. Even in participatory approaches, stakeholders exist within the research setting, shaping interactions and outcomes. For example, dynamics between a care partner and an older adult recipient, with or without chronic limitations, may present challenges if one person assumes a more dominant role than the other. Therefore, it is essential to consider and care for group dynamics when conducting research. We then raise the question:

How can we design co-design workshops to accommodate the relational dynamics between different stakeholders or participants within the research setting?

We propose the following methods:

- (1) Understanding relationship dynamics before co-design – Identifying pre-existing relationships and power structures that may influence the process.
- (2) Being self-aware of the researcher's influence – Observing and actively responding to relationship dynamics to foster meaningful interactions.
- (3) Being mindful of the impact of research method choices – Reflecting on how methodological decisions shape group interactions and adapting accordingly.
- (4) Rethinking the research process as an act of care – Prioritizing inclusivity, empathy, and responsiveness in research facilitation.

By incorporating these principles, co-design workshops can create an environment that supports collaboration, mutual respect, and meaningful engagement among all stakeholders.

3.4 Caring About Learning Experiences

After individual well-being, another essential aspect of co-design is education, as previous research emphasizes mutual learning. Participants gain insights by working alongside researchers, but challenges may arise in effectively engaging stakeholders to improve their understanding of different perspectives and experiences. For example, suppose the older adult participants have not used a robot before. How do the researchers explain the robot to educate the older adult about the robot before making design suggestions during co-design? Without this foundational knowledge, unrealistic expectations may develop, eventually impacting the co-design process [36]. Thus, we question:

How can we design co-design workshops to educate participants about the different components of design before they provide constructive feedback?

One effective approach to achieving this is through an iterative process, similar to a longitudinal panel, where participants engage with the research over time. This involves:

- (1) Repeated interactions in the panel so that researchers can teach the older adults over time and allow for iterative design.
- (2) Making sure that the participants have opportunities to interact with the technology to gain hands-on experience.
- (3) Assigned homework that integrates co-design elements into their daily lives to enhance the understanding of how the technology could be placed in the context of people's homes.

Through this ongoing engagement, participants develop a deeper understanding of the design process and the technology, enhancing their literacy in design elements. As a result, the participants could provide more meaningful and informed feedback.

Drawing from Nelson and Stolterman's research [24], participants demonstrated the ability to internalize facts about robots and design, gain confidence in undertaking design activities, develop the capability to generate feedback and attain competence in making informed judgments [19]. Furthermore, they built the courage to take risks, established connections between design and real-world applications, and cultivated their unique character as designers.

4 Conclusion

Co-design, a form of participatory design, has evolved within the HCI community to enhance responsiveness, communication, and integration into design, increasingly incorporating a situated feminist perspective. Existing research has emphasized shifting away from stereotypical views of aging toward recognizing older adults as active participants through deeper engagement, fostering freedom, empowerment, and trust-building. Yet, most of the work was focused on individual elements that could be further implemented in the care. A structured approach requires an essential understanding of the *hierarchy of care in HCI research*. This begins with viewing research as care, deliberately thinking about older adults as participants and how they reciprocate to the research. It then progresses through individual well-being, relational well-being, and learning experiences—all of which contribute to achieving meaningful outcomes. By using this step-by-step approach, we can empower participants to shape their own experiences but also to prioritize joint inquiry and imagination, fostering deeper engagement in co-design and leading to better design outcomes.

Acknowledgments

Thank you to all the students, researchers, and participants for their valuable life experiences and collaboration. Grammarly and ChatGPT were used to check grammar. All words and thoughts are original to the authors.

References

- [1] Aloha Hufana Ambe, Margot Brereton, Alessandro Soro, Laurie Buys, and Paul Roe. 2019. The adventures of older authors: Exploring futures through co-design fictions. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–16.
- [2] Sofia Backåberg, Susanna Strandberg, Georgina Freeman, Larry Katz, Homa Rafiei Milajerdi, Barry Wylant, Lora Oehlberg, and Mirjam Ekstedt. 2024. Facilitating co-design among older adults in a digital setting: Methodological challenges and opportunities. *CoDesign* (2024), 1–18.
- [3] Shaowen Bardzell. 2010. Feminist HCI: Taking stock and outlining an agenda for design. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 1301–1310.
- [4] Shaowen Bardzell. 2018. Utopias of participation: Feminism, design, and the futures. *ACM Transactions on Computer-Human Interaction (TOCHI)* 25, 1 (2018), 1–24.
- [5] Shaowen Bardzell and Jeffrey Bardzell. 2011. Towards a feminist HCI methodology: Social science, feminism, and HCI. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 675–684.
- [6] Emma Blomkamp. 2018. The promise of co-design for public policy. In *Routledge Handbook of Policy Design*. Routledge, 59–73.
- [7] Susanne Bødker. 2006. When second wave HCI meets third wave challenges. In *Proceedings of the 4th Nordic conference on Human-computer interaction: changing roles*. 1–8.
- [8] Susanne Bødker. 2015. Third-wave HCI, 10 years later—participation and sharing. *interactions* 22, 5 (2015), 24–31.
- [9] James H Cole, Riccardo E Marioni, Sarah E Harris, and Ian J Deary. 2019. Brain age and other bodily ‘ages’: Implications for neuropsychiatry. *Molecular psychiatry* 24, 2 (2019), 266–281.
- [10] Dagoberto Cruz-Sandoval, Monica Tentori, and Jesus Favela. 2024. A framework to design engaging interactions in socially assistive robots to mitigate dementia-related symptoms. *ACM Transactions on Human-Robot Interaction* 14, 1 (2024), 1–25.
- [11] Andrew Darley and Aine Carroll. 2022. Conducting co-design with older people in a digital setting: Methodological reflections and recommendations. *International Journal of Integrated Care* 22, 4 (2022).
- [12] Dementia Action Alliance and The Eden Alternative. 2020. *Raising the bar: Creating a better society in which to live with dementia*. <https://www.edenalt-evolve.org/courses/raising-the-bar-practice-guide-for-nursing-home-communities>
- [13] Abigail Durrant and David Kirk. 2018. On ethical responsiveness: Being answerable to others as an HCI researcher. *Interacting with Computers* 30, 2 (2018), 99–115.
- [14] United Nations Economic Commission for Europe. 2015. AAI Active Ageing Index. <https://statswiki.unece.org/display/AAI/I.+AAI+in+brief>
- [15] Judith Gregory. 2003. Scandinavian approaches to participatory design. *International Journal of Engineering Education* 19, 1 (2003), 62–74.
- [16] Kim Halskov and Nicolai Brodersen Hansen. 2015. The diversity of participatory design research practice at PDC 2002–2012. *International Journal of Human-Computer Studies* 74 (2015), 81–92.
- [17] Christina N Harrington, Katya Borgos-Rodriguez, and Anne Marie Piper. 2019. Engaging low-income African American older adults in health discussions through community-based design workshops. In *Proceedings of the 2019 chi conference on human factors in computing systems*. 1–15.
- [18] Long-Jing Hsu, Janice K Bays, Katherine M Tsui, and Selma Sabanovic. 2023. Co-designing social robots with people living with dementia: Fostering identity, connectedness, security, and autonomy. In *Proceedings of the 2023 ACM Designing Interactive Systems Conference*. 2672–2688.
- [19] Long-Jing Hsu, Philip B Stafford, Weslie Khoo, Manasi Swaminathan, Kyrie Jig Amon, Hiroki Sato, Katherine M Tsui, David J Crandall, and Selma Sabanovic. 2024. "Give it Time:" Longitudinal Panels Scaffold Older Adults' Learning and Robot Co-Design. In *Proceedings of the 2024 ACM/IEEE International Conference on Human-Robot Interaction*. 283–292.
- [20] Giuliana Klencklen, Pamela Banta Lavenex, Catherine Brandner, and Pierre Lavenex. 2017. Working memory decline in normal aging: Memory load and representational demands affect performance. *Learning and Motivation* 60 (2017), 10–22.
- [21] Daniel J Levitin. 2020. *Successful aging: A neuroscientist explores the power and potential of our lives*. Penguin.
- [22] Stephen Lindsay, Katie Brittain, Daniel Jackson, Cassim Ladha, Karim Ladha, and Patrick Olivier. 2012. Empathy, participatory design and people with dementia. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. 521–530.
- [23] Helen Manchester and Alice Willatt. 2024. Towards care-full co-design with older adults: A feminist posthuman praxis. *Journal of Aging Studies* 70 (2024), 101250.
- [24] Harold G Nelson and Erik Stolterman. 2014. *The design way: Intentional change in an unpredictable world*. MIT press.
- [25] NIH. 2007. 8 Areas of Age-Related Change. <https://magazine.medlineplus.gov/pdf/winter2007.pdf>
- [26] World Health Organization. 2002. Active ageing: A policy framework. <https://extranet.who.int/agefriendlyworld/wp-content/uploads/2014/06/WHO-Active-Ageing-Framework.pdf>
- [27] Anastasia K Ostrowski, Cynthia Breazeal, and Hae Won Park. 2021. Long-term co-design guidelines: Empowering older adults as co-designers of social robots. In *2021 30th IEEE International Conference on Robot & Human Interactive Communication (RO-MAN)*. IEEE, 1165–1172.
- [28] G Allen Power. 2014. *Dementia beyond disease: Enhancing well-being*. Health Professions Press, Incorporated.
- [29] Yvonne Rogers. 2012. *HCI theory: Classical, modern, and contemporary*. Vol. 14. Morgan & Claypool Publishers.
- [30] Dawn K Sakaguchi-Tang, Jay L Cunningham, Wendy Roldan, Jason Yip, and Julie A Kientz. 2021. Co-design with older adults: Examining and reflecting on collaboration with aging communities. *Proceedings of the ACM on Human-Computer Interaction* 5, CSCW2 (2021), 1–28.
- [31] Katie Seaborn, Peter Pennefather, and Deborah I Fels. 2016. "Learn what we're going through": Attitudes of older powered chair users towards mixed reality games that involve power mobility. *Universal Access in the Information Society* 15 (2016), 699–711.
- [32] Peter Slattery, Alexander K Saeri, and Peter Bragge. 2020. Research co-design in health: A rapid overview of reviews. *Health research policy and systems* 18 (2020), 1–13.
- [33] Tiina Soukiala and Ilkka Pietilä. 2024. Elements of trust and trust-building in gerontological social work. The social worker's perspective. *Nordic Social Work Research* 14, 4 (2024), 684–696.
- [34] Marc Steen. 2013. Co-design as a process of joint inquiry and imagination. *Design issues* 29, 2 (2013), 16–28.
- [35] Laura Stegner, Emmanuel Senft, and Bilge Mutlu. 2023. Situated participatory design: A method for in situ design of robotic interaction with older adults. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. 1–15.
- [36] Jennifer Sumner, Lin Siew Chong, Anjali Bundeale, and Yee Wei Lim. 2021. Co-designing technology for aging in place: A systematic review. *The Gerontologist* 61, 7 (2021), e395–e409.
- [37] Joan C Tronto. 1998. An ethic of care. *Generations: Journal of the American society on Aging* 22, 3 (1998), 15–20.
- [38] Katie Winkle, Donald McMillan, Maria Arnelid, Katherine Harrison, Madeline Balaam, Ericka Johnson, and Iolanda Leite. 2023. Feminist human-robot interaction: Disentangling power, principles and practice for better, more ethical HRI. In *Proceedings of the 2023 ACM/IEEE International Conference on Human-Robot Interaction*. 72–82.

- [39] Yushan Xing, Ryan M Kelly, Melissa J Rogerson, Jenny Waycott, and Kashifa Aslam. 2024. Designing for inclusive experiences: Investigating opportunities for supporting older adults in community-based social programs. In *Proceedings of the CHI Conference on Human Factors in Computing Systems*. 1–20.
- [40] Asghar Zaidi, Katrin Gasior, Eszter Zolyomi, Andrea Schmidt, Ricardo Rodrigues, and Bernd Marin. 2017. Measuring active and healthy ageing in Europe. *Journal of European Social Policy* 27, 2 (2017), 138–157.

Received 20 February 2007; revised 12 March 2009; accepted 5 June 2009