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Forum

Moving Toward the Promise of Participatory Engagement of Older Adults in Gerotechnology

Alisa Grigorovich, PhD,[1,2] Pia Kontos, PhD,[1] Amanda Jenkins, PhD,[2] and Susan Kirkland, PhD[2,3,*]

[1]KITE-Toronto Rehabilitation Institute, University Health Network, Toronto, Ontario, Canada. [2]Department of Community Health and Epidemiology, Dalhousie University, Halifax, Nova Scotia, Canada. [3]Division of Geriatric Medicine, Department of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada.

*Address correspondence to: Susan Kirkland, PhD, Department of Community Health and Epidemiology, Dalhousie University, Room 425, 5790 University Ave, Halifax, NS B3H 1V7, Canada. E-mail: susan.kirkland@dal.ca

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Abstract

Limited uptake and use of developed technologies by older adults have prompted interest in participatory design and related approaches in the gerotechnology field. Despite this, recent systematic reviews suggest that researchers continue to passively engage older adults in research projects, often only providing advice or feedback in the early or later phases of research. A key barrier to more meaningful and active engagement of older adults is a lack of understanding as to how participatory design differs from other participatory approaches, and in particular, participatory action research. We address this gap in understanding by exploring the theoretical similarities and differences of participatory design and participatory action research, including their scope, goals, and the nature of the involvement of older adults in each. We conclude with key barriers that are critical to address in order to achieve greater involvement of older adults in gerotechnology and to broaden and enrich the goals of this field.

Keywords: Aging, Participatory action research, Participatory design, Sociogerotechnology, Technology

Over the past decade, there has been a notable increase in interest, study, and investment in the development and commercialization of technologies to support healthy aging and age-friendly services and cities (Fischer et al., 2020; Grigorovich et al., 2019). However, despite this increase, there remains limited adoption and use of developed technologies by older adults, as well as high rates of their abandonment (Grigorovich et al., 2019; Mannheim et al., 2019). A dominant rationale for the lack of adoption is that developed gerotechnologies reflect the needs and preferences of designers and researchers rather than those of older adults, the experiential stakeholders or end-users. Greater focus on the needs and preferences of older adults and their participation in the design and development process is thus advocated by researchers and funders for increasing this population's interest in and adoption of gerotechnologies (Fischer et al., 2020). These developments have triggered a proliferation of research studies with older adults using various approaches such as *codesign*, *user-centered design* (UCD), or *participatory design* (PD; Mannheim et al., 2019; Merkel & Kucharski, 2018).

This increased interest within gerotechnology in the participation of older adults is part of a broader movement to bring about greater public participation in scientific knowledge production to enhance its societal impact (Grigorovich et al., 2019). This has required a fundamental shift in the organization and governance of research and innovation systems and the adoption of cross-sectoral and

cross-disciplinary research approaches that involve experiential stakeholders. A common example of this in the health field is *patient-oriented research* (POR), also known as "patient and public involvement and engagement," that aims to improve care, service delivery, and health outcomes by focusing on patient-identified priorities (Manafo et al., 2018). POR is an approach that can include the use of various research methods. POR covers a continuum of patient involvement in research ranging from passive participation where informants provide feedback in one phase of the research (e.g., needs assessment, dissemination), to active forms of participation as equal decision makers across all phases of the research process.

The involvement of older adults in gerotechnology research similarly ranges from an informant to a decision maker and involves the use of various approaches, with the most common examples being UCD and PD (Mannheim et al., 2019; Merkel & Kucharski, 2018). While UCD and PD are sometimes described as being variants of each other, they are rooted in different geographic and ideological traditions and can be distinguished by their broader objectives in involving older adults (or other experiential stakeholders). While both approaches facilitate understanding of the needs and preferences of "users" of technologies, they differ in their objective for user involvement. In UCD research, users are involved to gather information from them, while in PD they are involved so that they can participate in the design of technologies (Hi Chun et al., 2015). The difference between these two approaches can thus be summarized as the difference between "designing FOR users" and "designing WITH users" (Balcerzak et al., 2017, p. 2). As such, despite their seeming similarities only PD can be considered to be participatory in nature (Merkel & Kucharski, 2018).

PD is often described as being consistent with or as derived from a particular type of participatory research—participatory action research (PAR; Spinuzzi, 2005). PAR is a critically oriented research approach focused on social justice in which experiential stakeholders participate as equal partners (or co-researchers) with decision-making power in all aspects and phases of the research (Blair & Minkler, 2009). Yet, contrary to a key tenet of PAR that experiential stakeholders are involved as equal research partners, a recent review of PD in gerotechnology suggests that such involvement of older adults is rare (Merkel & Kucharski, 2018). The authors note that a full level of involvement (i.e., from project inception to dissemination) is more desirable in terms of democratizing the design of technologies given that this is a "normative presumption of [PD]," and yet they suggest that it is not always possible due to barriers such as budget restrictions (Merkel & Kucharski, 2018, p. e23). Additional barriers have been identified by others, including, for example, older adults' lack of skills in design methodologies, low levels of digital literacy, functional challenges, and the time and effort required to address these barriers (Sumner et al., 2020). Understanding these material barriers is certainly important for developing strategies to enable fuller involvement of older adults in PD. Yet, the focus on material barriers and PD in gerotechnology has left unaddressed important differences between this approach and PAR, most notably, the overarching goals of each approach. This gap in understanding contributes to the limited involvement of older adults in gerotechnology, and what individual projects can accomplish in terms of addressing the social problems associated with aging—precisely what the field of gerotechnology seeks to ameliorate.

Our purpose here is to address this gap in knowledge by explicating points of intersection and disconnect between PAR and PD, given these are participatory approaches that have been applied in the gerotechnology field and that share a common interest in enabling the active involvement of older adults in the research process. In doing so we are not suggesting that either one of these approaches is always the most suitable choice for all gerotechnology research projects. Instead, our goal is to facilitate understanding of each of these approaches and to thereby support a more purposeful choice when considering the objectives of the research. First, we briefly describe each approach, situating them within their respective methodological traditions, and illustrating each one with an applied example from gerotechnology. With these examples, we explore theoretical similarities and differences between PAR and PD by discussing their scope and goals, and how older adults are involved in each. These examples were chosen for their representativeness in terms of their application of the principles and techniques of each approach, as well as their involvement of older adults in the research process (Merkel & Kucharski, 2018). Finally, we conclude with key structural barriers to the full involvement of older adults in gerotechnology projects regardless of the particular research approach.

What Is PAR?

Action research emphasizes the dual pursuit of understanding (the research) and improvement (the action) that is grounded in partnerships with communities (Kindon et al., 2007; Reason & Bradbury, 2011). PAR is a specific subset of action research that is emancipatory and focuses on effecting structural change by shifting the balance of power from academic and scientific stakeholders, to communities who experience structural oppression (e.g., systematic inequity, mistreatment, and discrimination that is based on one's membership in a social group and is produced through laws, customs, practices, and cultural norms; Young, 2014). Community members are thus engaged as equal research partners rather than research subjects or participants (Reason & Bradbury, 2011). PAR is rooted in a change-oriented commitment to social justice (Grant et al., 2015; Reason & Bradbury, 2011) and grounded in the particular philosophical foundation of critical theory (e.g., Marxism, feminism, Paulo Freire's pedagogy of the

oppressed). PAR emphasizes the importance of bidirectional learning and knowledge production that is grounded in, and driven by, the experiences and interests of the communities who are involved in all stages and aspects of the research and change process from problem identification to communicating its results. By actively participating in the research, community stakeholders not only gain new skills and competencies but also contribute their lay knowledge and expertise, all of which increase their sense of control, involvement in decision making, and critical awareness (Reason & Bradbury, 2011). Rather than simply encouraging active participation, researchers must intentionally make participation accessible by engaging communities in discussion regarding how they would like to participate and addressing barriers to participation, including time constraints, financial barriers, language barriers, as well as fear or lack of confidence (Grant et al., 2015). While community stakeholders do not have to take part in all research activities, they should be supported in participating in any activities as they wish and be involved in decision making, reflection, and dialogue across all phases of the research. Through their active participation in the research community, stakeholders become empowered to effect social change (e.g., challenge and transform oppressive social values, attitudes, and culture) as well as support others in their communities. Such transformation can range from consciousness raising to changes in practices, and policies.

While there are no specific data gathering methods that define PAR, there is an emphasis on multiple sources of knowledge as well as open-ended or flexible cycles of planning, action, reflection, and evaluation (Kindon et al., 2007). Rather than relying on preformed hypotheses, or predetermined outcomes, PAR has an open-ended research design that depends on "creative surprises" (Whyte, 1989, p. 383) or new ideas that arise unexpectedly during the research process that may require revision of the research goal and objectives. PAR always begins with establishing relationships with community members to build trust and respect so that academic and community members of the research team can collaboratively identify issues of local importance and decide on a research "problem" (or focus for the research), methods, and the type of action or change that they would like to accomplish with the research. The success of PAR depends on the quality of these relationships and also on the research process itself that must importantly support co-construction of knowledge, skill building, and sense of control or ownership over the knowledge gained so that it is taken forward into action. As such, PAR is a challenging and time-consuming methodology that requires deliberate relation-, education-, and capacity-building for both researchers and community stakeholders (Grant et al., 2015) and may not be appropriate for all types of initiatives, particularly research that is narrow in scope and is targeted toward a predefined goal (e.g., evaluating a developed technology).

Example of PAR in Gerotechnology

Exercising Senior Citizenship in an Ageist Society (Trentham & Neysmith, 2018) was a PAR study that focused on a Canadian organization that is led by older adults and is focused on advocating for more adequate provision of home care services. The study was co-developed by two researchers, one of whom was a board member of the organization, and six older adults who were members of the organization; they collaboratively developed the study and secured research funding. The purpose of the study was to understand the experiences of older adult members of the organization doing advocacy, barriers they faced and their resistance to these barriers, as well as strategies and opportunities that supported their efforts. As the organization was an action-oriented advocacy group, the older adults wanted the research project to inform rather than disrupt their advocacy efforts, and this in turn directed the focus of research activities. Over the 2-year duration of the research, everyone involved in the research participated in monthly meetings that served as the primary venue for information gathering, action planning, reflection on the objectives of the research, and analysis. As the project progressed, and the older adults reflected on their advocacy work, the impact of ageism as a primary structural barrier to their advocacy (e.g., achieving the more adequate provision of home care) was identified and became a primary research focus. As a result, their interest in exploring how to use web-based technologies such as blogs and social media for advocacy and resistance also grew. To support this interest, they collectively developed training workshops and offered individual coaching for everyone on the team to learn how to use these technologies, which were also open to other older adults in the community. They began to use these technologies for advocacy, including increasing the online presence of their organization, developing a blog to engage other older adults, and creating and circulating digital stories. Moreover, rather than uncritically adopting these web-based technologies, as part of their learning how to use these, they also reflected on their utility and relevance for achieving social change. While this research included a focus on technology as an outcome or solution to an identified problem (e.g., resisting ageism as a barrier to advocacy), this emerged out of the PAR research process and older adults' reflection on how being excluded from online spaces influenced their ability to achieve social change. Their interest in using technology was thus directly tied to their own knowledge and experiences, as well as to the research process of PAR that prompted them to reflect on their digital exclusion and how this prevented them from engaging in advocacy online.

What Is PD?

PD is an approach to engaging the intended users in the design and development of technologies (Simonsen

& Robertson, 2012). While the contemporary application of this approach is not characterized by a particular theoretical tradition, the origins of this approach are European, primarily Scandinavian, industrial democracy movements of the 1970s and 1980s that aimed to resist the deskilling and loss of autonomy by workers that resulted from the introduction of information technology into workplaces (Simonsen & Robertson, 2012). PD projects aimed to empower workers and develop their technical and organizational competencies by supporting them to participate in, and contribute to, the design of new technologies in situ. In these projects, designers formed partnerships with institutions such as trade unions, which not only allowed them to gain access to workers, but also to institutional structures that could be used to communicate the results of a single project across multiple workplaces. Since then, PD has been broadened to include the design and development of other technologies across various contexts and the involvement of not only the intended future end-users but also other relevant experiential stakeholders, such as managers and health professionals.

PD is broadly characterized by an emphasis on enabling experiential stakeholders to have influence over the design of technologies for their use (also called codesign) through the coconstruction of the problem formulation, conceptualization of design, and the development and evaluation of possible design solutions (Bratteteig et al., 2012). Key components of this approach include an iterative design and development process, collaborative development of project goals and criteria with experiential stakeholders, and implementation of changes based on their experiences and their feedback of using technologies (Bratteteig et al., 2012). The role of the designer (or researcher) within PD projects is to facilitate, rather than to direct the design and development process, with the ideal of achieving "mutual learning" (Bratteteig et al., 2012, p. 124), whereby everyone involved in the design process learn about each other's ways of reasoning and develop mutual respect and trust (Bratteteig et al., 2012; Spinuzzi, 2005). The goal of mutual learning in PD is based on the understanding that designers and experiential stakeholders have different types of expertise, and that both of these types of expertise are necessary for the development of a technology that will be widely used. Designers are thought to know the most about technical issues and design processes, while the experiential stakeholders are the domain and use context experts (i.e., the activities and practices into which the new technology will be introduced). In order for designers to learn about the domain and activities of experiential stakeholders, they need to familiarize themselves with their activities and practices in situ. In terms of specific activities, PD projects typically involve facilitating experiential stakeholders in conceptualizing design choices and selecting and evaluating these choices in real or applied situations (Bratteteig & Wagner, 2016).

Participation in PD is thus very broadly defined and practiced, and projects vary considerably with respect to how and why experiential stakeholders such as older adults are engaged (Simonsen & Robertson, 2012). For example, in some projects, the participation of these stakeholders is very passive and limited to providing information to designers about their everyday experiences and/or evaluating an already developed technology. In other studies, experiential stakeholders participate more actively and have decision-making power over the scope of the design process and the features/functions/appearance of the developed technology. This latter form of active participation is considered to be empowering for experiential stakeholders not only because they can make decisions about the purpose and design of new technologies, but also because in the process of being engaged their interests in the design outcome are acknowledged and supported. They take an active part in not only identifying how technologies can be used to meet their needs, but also in evaluating and selecting specific technology components, designing and prototyping technologies, and evaluating their implementation.

Example of PD in Gerotechnology

A robot of my own (Šabanović et al., 2015) was a study that involved the use of PD to explore the development of social assistance robots as a therapeutic intervention for older adults living with depression and co-occurring physical illness in the community. The impetus for this study was the researchers' interest in the potential of socially assistive robots for supporting mental health and quality of life for older adults by preventing their "feelings of loneliness" and delaying or preventing their decline and need for institutional care (Šabanović et al., 2015, p. 105). The researchers chose to use PD in recognition of the social and ethical challenges involved in the use of robotic technologies in home settings and their interest in patient-centered approaches to care. They recruited five older adults living with major clinical depression and physical illness (e.g., hypertension, diabetes) as well as five care staff from an outpatient treatment center in rural Indiana. They conducted interviews and design workshops with the older adults to explore their everyday life, supports and challenges, and their perceptions about social robots. In the first workshop, participants watched and critiqued videos and live demonstrations of already available social robots (e.g., PARO, Care-O-Bot) and explored the feel and functions of these robots. The purpose of this workshop was for the researchers to explore participants' perceptions and experiences regarding existing social robots, as well as their ideas about what they could use such technologies for in the future. The focus of the second workshop was to engage the older adults in reflection about the ways that existing social robots could be used and/or further developed to support needs associated with aging and/or depression. To support older adults' reflection, the researchers drew

the robots in scenarios as the older adults described them and how they could support them, and they also used these drawings to prompt further reflection on the robots' appearance and functions.

Comparing and Contrasting PAR and PD in Gerotechnology

While PAR and PD in gerotechnology share a common interest in facilitating the engagement of older adults in gerotechnology research, they do so across different scales and for different purposes. PAR is far greater in scale and purpose than PD in its emphasis on structural transformation and empowerment of older adults, as well as critical self-reflection and identification of the problem by all participants. An analysis of structural oppression, and how this shapes both older adults' life experiences and opportunities, including their participation in research, would thus be the primary starting point for a PAR project and would then be translated into specific actions for addressing this within the project and beyond. Within PAR there is also a more explicit focus on the active sharing of power between experiential stakeholders and researchers with the involvement of these stakeholders as equal partners in the research who have direct influence over the entire research process including data collection methods and outcomes, which may or may not include the design and evaluation of technology. Moreover, power sharing in PAR is also intentional in that resources must be invested to enable everyone involved to participate actively in the research, which in the context of gerotechnology research would include providing training for older adults to enhance their digital literacy and research skills. Operationalization of PAR in gerotechnology would further involve a broader focus for action than the development of a specific type of technology and critical reflection on the role and relevance of technologies for assisting or solving social problems associated with aging.

For example, in the senior advocacy PAR study described above, the impetus for engaging older adults in the research was the researchers' desire to support their advocacy efforts in challenging oppression and to collectively identify potential solutions for further social change. Older adults were involved in all aspects of the research, such as conceptualizing the research objectives and influencing the trajectory and focus of research activities, including the turn to exploring social media technology. The interest in effecting change on a broad social level is an important distinguishing feature of PAR; as we saw with the PAR study, a broader structural concern was identified first—ageism—and the interest in social media emerged because the older adults themselves identified an interest in exploring the potential usefulness of this technology to address this concern. To support their exploration of this technology in the context of the research project and beyond, project resources were invested in developing opportunities to allow older adults to learn how to use this technology and to involve all participants in critical reflection on the limits and benefits of this technology for achieving social change. While the use of PAR in gerotechnology remains rare, there are other examples of participatory projects that are similarly broad in scope and actively involve older adults in advisory and decision-making roles throughout the research process in this field. A notable example is the Older Adults' Active Involvement in Ageing & Technology Research and Development OA-INVOLVE project (Kirkland, 2020), which aims to develop models of best practice for engaging older adults in gerotechnology research projects. Similar to the advocacy study, the OA-INVOLVE study is broad in scope and purpose in that it aims to achieve broad social change in older adults' research experiences and opportunities, rather than focusing on individual outcomes or one type of technology. OA-INVOLVE also actively supports older adults to participate as coresearchers by having a distributed governance model that includes an Older Adult Research Partner Group as well as by providing opportunities for older adult researchers to build their research and digital literacy skills in conducting data collection and analysis as part of the study (OA-INVOLVE, 2020).

In contrast, the scope and purpose of PD studies are much narrower—the development of technologies to address a prespecified problem, with little explicit interest in addressing power asymmetries that may preclude participatory interactions and learning processes (Bannon et al., 2018; Bødker & Kyng, 2018). This in turn is reflected in how and why researchers seek to involve older adults in this type of research. In particular, despite an interest in "mutual learning" and cocreation between researchers and older adults, most PD studies only achieve the participation of older adults in the more passive forms of consultation and feedback, thus falling short of shifting the traditional relationship between the researcher and the participants of the research. For the most part, PD research in gerotechnology refers to the use of qualitative data collection methods such as interviews and focus groups in which experiential feedback is sought from older adults (Ishigami-Doyle et al., 2017; Merkel & Kucharski, 2018). While this is more participatory than the use of quantitative methods such as surveys, this narrow application of PD in gerotechnology offers limited opportunity for genuine participation of older adults and their empowerment, which is precisely the value of this approach (Simonsen & Robertson, 2012).

In restricting the scope and focus of PD research in the development of new technologies to solve a predetermined problem associated with aging, researchers and designers also largely direct meanings and interpretations that are possible. In particular, they do not allow for a reflexive and continuous process of discovery between the researchers and the participants, as well as between the participants themselves. In reference to PD research, Cozza et al. (2020)

have described this as the difference between "engineering an atmosphere" that supports the inclusion of older adults and creating an "engineered atmosphere" that narrowly focuses the research on a prespecified outcome, thereby suppressing genuine participation (p. 271). For example, in the social robots PD study, older adults were engaged after the project was conceptualized and for a discrete and prespecified purpose—to provide ideas for the future development of a social robot that was assumed to offer a solution to the social isolation faced by older adults living with mental and physical challenges. Social isolation was further restricted to "feelings of loneliness" (Šabanović et al., 2015, p. 2) and thus reduced to an individual problem amenable to a technological solution that overlooks its structural causes (e.g., poverty, spatial segregation, discrimination; Weldrick & Grenier, 2018). This reductionism is not unique to this PD study and has been identified as a common feature of many PD studies both within and outside of gerotechnology. This reductionism has been attributed to the valuation of market-driven logics over participatory and democratic principles (Bannon et al., 2018; Bødker & Kyng, 2018; Cozza et al., 2020). Within gerotechnology, such reductionism is also reinforced by the biomedicalization of aging and the overarching "interventionist logic" in which new technologies are perceived as solutions to aging *problems* (Peine & Neven, 2018, p. 15). This logic underpins most research in gerotechnology that tends to focus on easily measurable and quantifiable aspects of aging associated with individual impairment, thereby reinforcing problematic assumptions about older adults as passive recipients of technologies (Cozza et al., 2019; Grigorovich & Kontos, 2020; Peine & Neven, 2018).

Studies framed within an interventionist logic offer limited potential for the empowerment of older adults as this type of research does not involve critical reflection on how technologies themselves may constrain and enable the actions of older people, both within the study and beyond. This is consistent with a critique of PD studies more broadly that they neglect power and conflict. Attending to these aspects of participation is critical not only for the empowerment of experiential stakeholders but also for achieving the normative principle of PD—mutual learning (Bannon et al., 2018; Bødker & Kyng, 2018). This was evident in the social robots PD study with researchers' lack of attention to the social and material conditions that may prevent older adults from being more actively involved in the research. For example, while the researchers noted an interest in facilitating hands-on engagement of older adults in the technological aspects of the design of social robots, they did not explicitly support this by addressing barriers to their engagement. Consequently, when older adults expressed that they did not want to develop programs for robots and perceived working with a computer as "difficult," the researchers concluded that they "were not ready for hands-on work with robots" (Šabanović et al., 2015, p. 110), rather than exploring why older adults were reticent about doing this and/or finding ways to increase their comfort and skill in this area. This is despite that technological literacy is a known barrier to the involvement of older adults in gerotechnology research (Sumner et al., 2020). In neglecting to address these barriers, PD studies can inadvertently reinforce the negative stereotype of older adults as being incapable or uninterested in technology and its development. This is not unique to PD studies, but rather is a feature of the field of technology research more broadly, specifically the tendency to "render ageing as a 'problem' that can be managed by technologies" (Vines et al., 2015, p. 3).

Conclusions

There is a gap in the understanding of the meaning and scope of different types of participatory approaches in gerotechnology that contributes to the limited involvement of older adults in gerotechnology projects. The objective of our analysis is to address this gap in order to enable a more purposeful choice of research approach in gerotechnology projects. While PD can be an effective approach to addressing the needs and preferences of older adults in the development of technologies for their use, PAR is more appropriate when the goal of the research is more broadly to challenge the oppression of older adults and to engage older adults as equal research partners to collectively identify solutions for social change. However, clarifying the conceptual distinctions regarding PAR and PD is not enough to enable fuller involvement of older adults in gerotechnology, given the existence of significant structural barriers to such involvement. The first of these is the limited funding opportunities for research on the social and cultural aspects of technologies and the prioritization of research seeking to commercialize technologies within national and international funding schemes for gerotechnology (van Lente et al., 2017). Similar to the national and international funding of scientific research more broadly, current funding opportunities tend to prioritize hypothesis-driven approaches to research that promise to yield instrumental and market-driven outcomes (e.g., academic publications, evaluations of developed technology). This makes it extremely challenging to describe and justify more flexible and open-ended research processes that are required for critical forms of research (Rossiter & Robertson, 2014) such as PAR in which experiential stakeholders have a major role in defining research questions and methods. Additionally, the short timeframes of most major funding opportunities, as well as a lack of funding for noninstrumental participatory activities ranging from building relationships between experiential stakeholders and public and research organizations to facilitating their training in research methods, are further challenges (Cook, 2012). Without dedicated funding and other resources to support activities of this kind, older adults

are restricted to participating in earlier phases of the research as unpaid volunteers, which reinforces their marginalization and consignment to a tokenistic role (Cook, 2012). Lack of sufficient financial resources and time have consistently been identified as key barriers to building the research competencies and digital literacy of older adults that are crucial for their meaningful involvement in gerotechnology research (Merkel & Kucharski, 2018; Sumner et al., 2020). Other significant structural barriers to participatory research with older adults include gaps in education and training of researchers and designers with respect to how to engage in collaborative knowledge production with experiential stakeholders (Wada et al., 2020) as well as the widespread prevalence of ageism, which includes researchers' and designers' stereotypes about older adults' limited capabilities and interest in getting involved in gerotechnology research (Fischer et al., 2020; Vines et al., 2015). Addressing these structural barriers will be critical if we are truly committed to greater public participation and accountability in science and to engaging older adults and other experiential stakeholders in scientific knowledge production.

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Conflict of Interest

None declared.

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