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# "That's me at my best": perspectives of older adults on involvement in technology research

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## ABSTRACT

Creating assistive technology for older adults requires a deep understanding of their needs, values and preferences. Human-centred approaches can be used to engage older adults in technology research to help ensure that end solutions are ethically aligned, relevant and responsive to their priorities. However, the value of cocreation is not universally acknowledged. Older adults continue to receive negative stereotyping and are limited from engaging in research. With the growing demand for assistive technologies that effectively meet end-user needs, it is important that we deepen our knowledge about engagement and promote inclusion of older adults in technology research. To learn more, we asked members of a research advisory group for assistive technologies, specifically social robots, to tell us about their experiences of engagement and the impact it has on their lives, to speculate whether participation in research may promote human flourishing. Our findings reveal that engagement is more than knowledge exchange: it is a multifaceted, dynamic process that creates rich and meaningful experiences for older adults. Experiences of engagement dovetail with interpretations of flourishing and improved well-being, which include outcomes related to empowerment, autonomy and connectedness to self and others. Older adults also report finding purpose and satisfaction in knowing that their contributions to research may be used to develop technologies that can benefit others. This work amplifies the voice of lived experiences to deepen our understanding of the impacts of participation and prompts us to reimagine how older adults may be meaningfully engaged in technology research.

## BACKGROUND

Modern technology enables us to live longer and thrive. Assistive technologies can support older adults to maintain functional independence, manage health conditions and improve quality of life. Social robots (also socially assistive robots) are innovative devices capable of interacting with a user through verbal and non-verbal cues and responding autonomously to their environment. They may take the form of a humanoid, pet-like or avatar-based device to occupy a physical space. It is this embodied, socially situated characteristic that uniquely distinguishes them from similarly interactive technologies like Siri (Apple Inc 2024) or Alexa (Amazon.com, Inc 2024). Social robots are not care-bots that assist with manual healthcare tasks like patient handling, toileting and feeding (Wright 2023). Social robots are primarily interactive, and, with the rise of artificial intelligence, are becoming

increasingly sophisticated in their capacity to generate personalised, socially adept responses (Karami *et al* 2024; Tang *et al* 2023), positioning them as complex effectors of human-machine relations. Social robots demonstrate tremendous potential to support older adults to live well by providing companionship, offering cognitive stimulation and monitoring health, to name but a few of their many applications (Lin 2022; Petersen *et al* 2016; Pu *et al* 2019; Robinson *et al* 2019).

Developing social robots, and other similarly emerging technologies for older adults requires a rich understanding of end-user needs, values and preferences. Collaborative, human-centred methods may be used by researchers to engage with older adults to ensure that solutions are ethically aligned, relevant and responsive to their priorities (Robillard and Kabacińska 2020). However, despite the availability of strategies that promote engagement in research, the value of cocreation is not universally acknowledged; Older adults continue to face ageism and are limited from participating in research due to a complex web of both individual and system-wide factors (Fardeau *et al* 2023; Mannheim *et al* 2022). A recent scoping review on the design of digital technologies for older adults identified that studies often employ exclusion criteria for older adults, including upper age limits, unfamiliarity with technology, cognitive decline or other physical or psychological reasons (Mannheim *et al* 2022). This manifestation of ageism is at odds with initiatives that promote partnership with patients or people with lived experience in research, known as patient and public involvement, or patient-oriented research. In technology research and development, several well-established collaborative approaches exist including participatory design methods, community-based action research, co-creation and user-centred design (Grigorovich *et al* 2022; Robillard and Kabacińska 2020). The common goal of these approaches is to actively engage with end-users of these technologies so that the products developed reflect the needs and preferences of the user and not those of the experts who are researching and designing them (Grigorovich *et al* 2022).

Collaborative methods of engagement are found to have research- and participant- focused benefits. In the research and design of social robots for older adults, such methods can be used as a medium to generate design specific insights and improve knowledge of contextually meaningful robot applications. They also provide a structure upon which researchers and participants can build relationships (Lee *et al* 2017). For participants, evidence shows



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that engaging in meaningful activities— those that promote purpose and life satisfaction— is associated with reduced mortality risk (Cohen *et al* 2016; Martín-María *et al* 2017). Related activities such as civic participation or donating to societal causes, by time, money or skills, have also been shown to activate regions in the brain associated with reward and social attachments (Moll *et al* 2006). Participating in social robot studies through joint inquiry and collaborative codesign can result in older adults feeling empowered and more socially connected (Lee *et al* 2017; Ostrowski *et al* 2021; Ostrowski *et al* 2021). However despite these many benefits, the use of collaborative methods that engage with older adults in social robot research remains limited (Ostrowski *et al* 2021), and there is a risk that researchers may further entrench negative stereotypes around ageing and devalue the unique contributions of older adults when there is a focus on having to adapt traditional research methods to overcome barriers to engagement (Ostrowski *et al* 2021).

As we rapidly advance towards an unprecedented future where humans are deeply merged with technology, there is a pressing need to reconceptualise how research is conducted (Prescott *et al* 2018). Future thinking and speculative design strategies (Dunne and Raby 2013) may be used as methods to engage older adults in the imagination and construction of shared agendas and collective action towards the development and deployment of ethically designed devices (Vargas *et al* 2022). As such, we believe that older adults are critical agents in the development of emerging technologies and that their role as collaborators in research warrants deeper exploration.

Throughout this work, we adopt the phrase ‘older adults’ to support readability but do so with a degree of redundancy, recognising that it leans towards homogeneity and poorly reflects the wide diversity of individuals who are among the oldest members of our population and have a broad range of backgrounds, skills and interests. We respect that an individual has a right to agency and choice as to whether or not to take part in research, and acknowledge that older adult participants in technology research may experience burden (Kabacińska *et al* 2020). However, we also appreciate that living a longer life opens a myriad of opportunities for the pursuit of activities (including leisure or work), social engagement and contributing to communities, which provide rich experiences and many personal benefits.

Our propensity towards growth and wellness through activity engagement in activities may be understood by drawing on the field of positive psychology. Self-determination theory posits that humans have an innate psychological need to experience competence, autonomy and relatedness to others, which when satisfied, facilitates wellness and human flourishing (Ryan *et al* 2019). Flourishing is a broad concept that encompasses physical and psychological health and existential well-being (Fardeau *et al* 2023). It finds its roots in Aristotelian ‘eudaimonia’ and describes the potential for an individual to thrive in doing, being and becoming, fully functioning with meaning, authenticity and purposefulness (Waterman *et al* 2010).

In this work, we explore what it is like for older adults to take part in social robot research activities and speculate whether the experience of engagement might facilitate human flourishing.

### Aim and objectives

This work aims to extend the knowledge of collaborative methods in technology research and reveal the potential for meaningful engagement to facilitate older adult flourishing. Our research objectives are to:

1. Explore the experiences and impacts of engagement from the perspective of older adults who are actively involved in social robot research.
2. Identify the qualities of engagement that contribute to the flourishing of older adult participants.
3. Consider the social, cultural and ethical factors around engagement in social robot research.

## METHODS

### The League— patient and public involvement statement

Research projects carried out by our lab that investigate social robot technologies for older adults are conducted in consultation with an older adult advisory group known as the Lived Experience Expert Group (LEEG) or the League. The League comprises eight older adults aged over 55, some of whom have self-disclosed lived experiences of dementia, either personally or in a caring capacity. Of those who have chosen to share their demographic information (n=5/8), we report that four have European backgrounds and one member is of East Asian heritage. Two members identify as male, three identify as women, and most members fall within the age range of 65–74 years old. During our projects, consultation with League members helps ensure that our research is sensitively designed and aligned to the needs of end users of social robot technologies. League members are regularly involved in research activities such as piloting focus groups, participating in workshops or providing feedback on methods and study documents. Members are offered a yearly honorarium as a way of showing our gratitude and respectfully acknowledging their valuable contributions. In this present study, we invited League members to share their first-hand accounts of engaging in technology research with us. This study falls within the scope of the Leagues’ capacity to advise and consult, which is not subject to institutional ethics review.

Two primary modes of engagement were used to gather responses from League members: an online questionnaire and a semistructured interview. Participation was optional and League members were free to participate in either the questionnaire, the interview or both.

### Questionnaire

A brief online questionnaire posing questions about engagement and flourishing was distributed to League members. The questionnaire introduced the concepts under investigation in this work and provided members with an opportunity to share feedback anonymously. The questionnaire was delivered using Qualtrics software (Qualtrics 2024) and comprised of six questions such as, “What does engagement in research mean to you?” and, “What qualities or characteristics are needed for you to experience flourishing when engaging in research?”. To support a range of individual needs and communication styles, League members were encouraged to capture and share their responses using the medium they felt most comfortable with, such as narrative text, musical depictions, poetry or visual art.

### Interviews

Following the questionnaires, researchers then met one-on-one with members who indicated their willingness to take part in a single 90-minute interview, either in-person or online, at the individuals’ choosing. Interviews followed a semistructured guide that posed questions around collaborative research, personal histories and how older adults conceptualise social robotics, experiences and motivations for being engaged in technology research and the impact of participation. Interviews were

audio recorded, and field notes were captured to support analysis. Audio recordings were transcribed using Microsoft Office 365 (Microsoft 2024) audio-to-text transcription software.

### Approaches

In alignment with Strengers *et al* 2022 and others (Ostrowski *et al* 2021; Roe *et al* 2022; Stephens 2017), this work adopts a positive lens to ageing, which views older adults as ‘resourceful, inquisitive and creative’ (Strengers *et al* 2022). We recognise that much age-tech research focuses on finding solutions to problems and we challenge these deficits-based, stigmatising views about the ageing process and natural functional decline.

We consider technology to be a motivating agent that drives individuals to participate or disengage from research. We focus less on the particularities of application and design and view technology within a wider context that considers multiple, interdependent determinants of engagement, including relevant societal and cultural factors. As such, we adopt a socio-technical approach (Bostrom and Heinen 1977) and acknowledge that engagement with technology and technology research cannot be studied in isolation and is fundamentally shaped by human values and experiences.

### Analysis

An Integrative Phenomenological Approach (IPA) was used to analyse the narratives of League members. We chose this approach as it places individuals at the centre of enquiry and seeks to understand how people make sense of their lived experiences in the context of their personal and sociocultural worlds (Spiers and Smith 2019). IPA allows for in-depth analysis of individual perspectives that can uncover the common essences of human experience across a small sample size (Squires 2023). Transcribed recordings of the interviews were analysed inductively using a two-step process to support the emergence of themes. First we identified descriptive themes from the transcripts, such as individual worldviews, sentiments and use of metaphors. We then clustered these into superordinate themes that were used to check for convergence and divergences across the sample. We supplemented our analysis with field notes taken during the interview process and when reading the transcripts. Finally, we used reflexivity to acknowledge our subjectivity, assumptions or biases when interpreting the data, and an independent researcher supervised the process.

## RESULTS

Here, we present the combined results from five questionnaires and six interviews carried out between March 2024 and May 2024. Four thematic categories are presented: (1) sentiments about technology and technology research, (2) motivations for engagement, (3) biopsychosocial impacts of engagement and (4) flourishing. Illustrative quotes support the findings.

### Sentiments about technology and technology research

League members (LM) shared an array of feelings about technology and their experiences of being engaged in research, ranging from pessimism to caution and extending to optimism.

#### Pessimism

Pessimism centred around fears of the unknown and the potential for technology to have a significant detrimental impact on humanity. As one member commented: “we’re kind of on a precipice (...) there’s only so many ideas we can cope with (...) how are we going to cope with the robots and tech in our lives? We’re

in for a bit of a shock”, and further asserted: “we absolutely need to be alert, very, very alert because it’s happening very quickly” (LM\_02). For others, these sentiments were less intense: “I don’t feel pessimistic, it’s just worrying because I feel like it’s beyond my comprehension” (LM\_04).

#### Caution

League members also expressed caution towards technology: “With the technology to assist seniors of all shapes, whether they have a disability or not doesn’t matter. As much as it opens the door to helping them, it also opens the door to maleficence” (LM\_01). Another mentioned: “We think of tech as our saviour [but] we need to be highly alert to the changes that it’s going to make to our world” (LM\_02). Regarding social robot technologies specifically, members were cautious about the unknown consequences of novel devices: “we’re creating a new being in our life, and we have no idea what the repercussions are going to be” (LM\_05). The recording and storage of personal data, as well as the unknown impacts of users forming attachments with their robot devices, were also expressed concerns. As one member commented: “if somebody’s getting a social robot primarily because they’re lonely, then they are going to be forming emotional bonds with this entity (...) what does that do?” (LM\_04).

#### Optimism

In contrast, positive valence towards technology was also frequently expressed. Many League members shared optimism about the potential for technologies to improve the quality of life for older adults. While some expressed these sentiments using short phrases such as: “it’s fascinating” (LM\_04) and “I find technology thrilling” (LM\_02) others offered descriptive accounts and grounded their opinions in first-hand accounts of being witness to technology having a positive impact. For example, one member recalled a simple piece of assistive technology, a text-to-speech reader, having “changed their [neighbours’] life” (LM\_01), and another described having used a remote-operated telepresence robot to connect with people in long-term care: “I ended up having a lovely conversation, [the resident] laughed and laughed. It was as if I was there head to toe and that’s what blew me away” (LM\_06).

#### Pragmatism

An overarching attitude of pragmatism was evident across all responses. League members commonly discussed the need to approach technology and technology research with a balanced awareness of potential risks and benefits and to avoid the lure of hype surrounding technology innovations. One League member described this as “measured optimism” and emphasised the need to “just be realistic” (LM\_06) when it comes to the functional application of assistive technologies for older adults. This matter-of-fact sensibility about how we might best approach future technologies was further endorsed by one League member who spoke of the ongoing need to develop knowledge and policies around technologies: “You can’t stop the world from turning, OK? The world will turn. Technology will advance. Technology will be used in any number of ways, for positive and, or negative outcomes”, and later added: “there’s tons of potential, and as the potential increases, the need for safeguards is also at play” (LM\_01).

#### Motivations for engagement

League members expressed a range of motivations for engaging in research. Included among them was the desire to learn: “it’s

a curiosity about something I know so little about” (LM\_05), the feeling of being inspired: “there’s potential for things that have never been seen before, and never been done before, and that is profoundly exciting” (LM\_01), and the desire to enact autonomous decisions when choosing to engage in activities that hold personal meaning and purpose: “I love to engage in research. It’s a way I can contribute to the advancement of science, medicine, humanities, etc. without being involved on a daily basis. It’s a small way I can make a difference” (LM\_04).

### Supporting others through technology

Being motivated to support the development and deployment of technologies that benefit humanity was central to discussions. When asked about what first attracted them to become involved in social robot research, one member responded: “It was when I saw first-hand the benefits of a very simple robot, the cat (...) that device became not just a companion, but a therapy tool” (LM\_01). Another member noted that their motivation stemmed from learning about social robots being used in elderly care: “that struck me quite clearly that here was an opportunity for robots to start really making a difference.” They continued expressing that: “I started to develop more interest in them because of their benefit towards people behaviours, especially when they were unwell (...) I’d love to see the opportunity and the potential of social robots in people’s homes crystalize. My sense is that we are not there yet” (LM\_03).

### Personal relationships with technology

League members offered reflections on how their relationship with technology influences their motivation for engagement in research. Members recounted how they had been exposed to the evolution of technology over multiple decades and cycles of innovation and experienced its impact across different areas of their lives. For example, one member reflected on the effect the first fax machines made on their working role: “a benchmark in my career was 1980–1981 when in the design office, the first economical fax machine was available. It changed the world. A fax machine. Someone could put a document in and then came out the other end. That was a game changer like you can’t even imagine. Nowadays you go, jeez, why would anybody do that?” (LM\_01). The same member later went on to describe the “mind-blowing” potential of emerging neurotechnologies noting that: “the evolution of technology is blurring ability, disability, accessibility” and that research is at the leading edge of the new discoveries” (LM\_01). Others, however, discussed the challenges of having to adopt new technologies that misalign with personal or professional values. For example, one member recalled being challenged when having to adopt a standardised computer system in a clinical role: “with a handwritten health form assessment, you could scan, and you could get a sense of who the person was. You didn’t have to ask interminable questions. [It] was replaced by coded form of zeros ones and twos, and that didn’t fit who the client was” (LM\_05).

During the interviews, League members often drew on cultural references to frame their perspectives about the potential impacts that advancing technologies could have on humanity. From the world of film and TV, League members cited the xenophobic Dalek machines from *Doctor Who?* (Nation 1964), humans’ wrestle with technology depicted in *2001: A Space Odyssey* (Clarke *et al* 1968) and the omnipotent character ‘Q’ from *Star Trek* (Roddenberry 1987). One League member postulated: “Will software technology get to a point where we are now living in the science fiction world? Technically, we are.

Everything that we collectively saw on that show, in the 1990s is sequentially coming true” (LM\_01)- they later noted to have also named their robotic cat ‘Q’.

Other references were historically and politically framed and examined the potential for technology to be used with malicious intent. One member recalled growing up in the 50s in the years following the atomic bomb, noting: “We talked about the end of the world” (LM\_02) and described the current state of the world in 2024 as a “war zone”. Another spoke more broadly of a desire to know more about advancing technologies and support the use of technologies for the benefit of the common good:

At this stage in my life, now that I’m an old person (...), I’m kind of doing what my job is as an old person, which is to worry, to worry about the future that I see things beating ahead and it feels a little bit out of control to me and I can’t get a good grasp on it anymore (...) I do feel it kind of rapidly pulling away from my ability to understand what’s going on. And, of course, I worry. I worry about how young people are going to deal with this or what is this world is going to look like for them. (...) I think we all recognize it’s been a blessing and a curse, you know, I mean, I think it is unbelievable what we can do these days with just a phone. But I think it’s coming at a cost. I think it’s coming at a human cost, and that worries me. I think that’s probably the part that worries me the most about the technological advances is that it’s it feels like it’s coming at a fairly high human cost, loss of jobs, loss of relationship, inability to communicate (LM\_04).

An urgency to support the use of technology for positive outcomes and the benefit of the common good was further expressed by another who stated: “We’ve got the people, we’ve got the technology, and we just need the will [and] we really need ethics. When you’re coming up with something, you’ve got to think like you can’t just be isolated in the tech world (...) In better hands, tech could be a wonderful thing” (LM\_02).

### Altruism

The desire to contribute to the greater good and generously give back was consistent across all responses. One member spoke of the value of being in a position where they had opportunities to advocate for older adults who are less able to do so, noting: “My outlook is always global. It’s not about me. It’s not. It’s not my ability to do with technology, but always in my mind, you know, I will have my mother, who also had Alzheimer’s [and] the broader community. Will it work for the broader community?” (LM\_06). League members also expressed value in having opportunities to contribute to the accumulation of scientific knowledge: “Every small contribution helps science and healthcare move forward” (LM\_04), and “Engagement is about sharing personal experiences that will assist researchers to develop treatments to benefit others” (LM\_01).

We also note that League members demonstrated altruism during the interviews and offered generous extensions of their time to the research team: “I’m around if there’s anything that I can assist with” (LM\_06), and “If ever you think to yourself, I’m a bit stuck, you can drop me a note, and I will try to give you an answer” (LM\_03).

### Staying engaged

Motivations that led to initial involvement in the research were described by League members as having not diminished but become intensified by the act of engagement itself and sustained their engagement over time. As one example, one League member recalled their first involvement with a research team, describing the moment when they approached a researcher after recognising that the voice of older adults was missing from a

presentation given about assistive technology: “After the presentation, I went up to him, and I said, ‘Who are you talking to? Are you in fact engaging with them [older adults]?’” (LM\_06). The League member began working alongside the researcher immediately following this interaction and has since become increasingly empowered and autonomous in research, claiming multiple roles in various teams across seven different projects.

An attitude of resilience was noted among members’ responses. For example, members described their engagement in prior health research studies, where their experiences had been invasive and focused solely on bodily functions. One member noted: “It was just- you are a body? Yeah, with blood flowing through your veins. So, you’ll do. And we’ll take some of that blood, and we’re gonna do certain kinds of testing on it” (LM\_04). Members demonstrated that such experiences have not prevented participation in research, as evidenced by their continued engagement with the League. Moreover, one member stated that they were motivated to “keep hammering away at it [research]” (LM\_06) so that older adults can overcome barriers to implementing assistive technologies. We also report that members demonstrated resilience when engaging in the present study, as many overcame technical challenges or personal difficulties in order to take part.

## Impacts of engagement

### Embodied

League members tended to attribute physical experiences of engagement with cognitive stimulation and activation of reward pathways. For example, when describing the experience of learning about new technologies one member noted: “I just love learning about things that I know very little about something, so I’m keeping my brain active” (LM\_05), and “I believe [learning] is one of the ingredients of living well as long as one can” (LM\_03). Another discussed how engaging with researchers helps to stimulate their cognitive processes: “It contributes a great deal to my personal ability to keep thinking because you know we could have spent half hour, and I could have told you a few things then we’re done. But having access to what you’re exploring, what you’re thinking about, it’s a completely different level of intellectual engagement than just relaying experience. It’s beneficial to me in the sense that I get to think abstractly” (LM\_01).

### Social

Connectedness to self and others through new and sustained interactions was frequently discussed as a key outcome of engagement. Engagement activities offer new ways to connect with their friends and families, as described by one member who noted: “I’m very glad that my wife is coming because she doesn’t have a lot of interest in my activities. But the fact that she’s new to something like this, and, you know, that we can discuss it together and discuss it with other friends who are in the sort of similar situation as ourselves” (LM\_05). Others spoke of having the opportunity to meet new people and the importance of making connections in their stage of life: “As you leave the workforce, your world takes on a different shape, right? (...) Your social engagements, your personal engagements, have a much smaller bubble and the opportunity to see what [the research team] is up to, to discuss things and say that sounds interesting, you know that’s, that’s very helpful” (LM\_01).

One League member shared a photo that captured them at an age-tech conference alongside other older adults who they had formed friendships with through research. In describing this

experience, they noted to have found the: “Joy of doing that [working with older adults]. It’s not just the age that differentiates them; it’s the life experience. It’s the cultural background and their abilities and their disabilities, and all of those are just a fabulous tapestry to work with”. The same member later identified that: “coaching older adults to use technology to pursue their interests and connect with loved ones” (LM\_03) provided them with a sense of flourishing.

Feeling connected to a greater cause and the value of being part of an active research team were also frequently discussed. League members reported there to be a need for researchers to provide ongoing feedback as it allows members to know that their contributions are useful. Having a sense of purpose and feeling of respect achieved through sustained connection with the research team instilled in them a motivation for continued participation. One participant noted a desire for “simply knowing that, well, whatever we were contributing, however minor, that even the contribution was so useful. And even then, [that] you have a continuing long-range purpose”. And continued noting: “I think being useful (...) it’s much better than say money or something, it’s not a motivator” (LM\_02). Another reflected this positive sentiment, stating that: “Knowing what [the research team] is up to is valuable” and suggested that researchers offer small-scale regular updates such as “a newsflash that popped out every couple of months...little pieces like that look like a fun thing” (LM\_01).

### Connection to self

Increased connection to self was also regularly noted by League members, particularly with respect to awareness of individual roles and identities. As one example, LM\_04 reflected on the fact that engagement in research has been an opportunity to rediscover a passion for science, which they regretfully set aside after choosing a different career path: “I really really feel that I should have gone into medicine, and it was a missed opportunity (...) What can I do to still be involved with medicine in some ways? Research is one of those things” (LM\_04). Another reflected on how engagement is tied to their sense of self, expressing: “That’s me at my best” (LM\_03) when describing their role in recent research activities.

### Fulfilment and fortune

League members spoke of experiencing emotional fulfilment and appreciation for spirituality. Satisfaction, luck and fortune were regularly mentioned by members: “It’s satisfying to contribute to the collecting and accumulation of human knowledge” (LM\_02). Others shared their appreciation for having opportunities to witness people living with dementia express joy when using a social robot: “I have been so fortunate to be in that unique position (...) how fabulous research is when you see the outcomes, whether positive or negative, but luckily enough, I’ve seen a lot of positives (...) It really is good for the soul” (LM\_06).

### Flourishing

Finally, we explored the concept of flourishing with League members, asking them for their own interpretations and to describe how it might manifest in their lives. While each member offered a unique and individualised definition, common characteristics included social connectedness, cooperation with others, participating in meaningful activities and making full use of resources and opportunities. Reflection, introspection and creative expression were also noted as important factors that contribute to a sense of flourishing. This was encapsulated by

one league member who stated: “Flourishing means discovering your potential and being lucky enough to be able to express it” (LM\_02).

When asked to describe what flourishing could mean in the context of research engagement specifically, the definitions included the additional characteristic of altruism. Giving back by contributing to the greater good was seen as important to flourishing. One member noted: “Doing a good thing to help research contributes to my feeling of flourishing” (LM\_04), and another asserted: “The sense of potential positive impact on society can make me flourish” (LM\_03). Hopes expressed about participating in future research activities also highlighted the importance of altruism in bringing about flourishing: “[to see] the next generation of social robots emerging over the horizon of possibilities and helping give feedback so they can advance into their right place in the world. WOW!” (LM\_03).

Finally, League members identified four key components of engagement that are needed to experience flourishing when engaging in research: (1) effective knowledge exchange with the research team, (2) support with learning new concepts, (3) peer-to-peer connections/buddy systems and (4) in-person activities: “The more you know about the research you’re participating in, the more likely you’ll develop a feeling of flourishing by participating (...) human contact helps this” (LM\_04).

## DISCUSSION

We set out to explore the experiences of older adults who engage in technology research and uncover whether engagement may contribute to a sense of human flourishing. Here we discuss our findings from questionnaires and interviews with members of a research advisory group for social robot technologies and reveal insights that may inform how engagement is conceptualised and conducted.

Our analysis reveals that for older adults, engagement in technology research is not simply an exercise in knowledge exchange but a rich and dynamic experience that has many meaningful outcomes. The experience of engagement has a unique set of qualities and characteristics that manifest differently for each individual. While seeking to avoid reductionism and respect individual experiences, we highlight the following commonalities that were evident across older adults’ responses. Engagement has an impact across physical, psychological, spiritual and social domains, including but not limited to cognitive stimulation, emotional resilience, reflection, gratitude, mastery of skills and connectedness to both self and others. The experiences shared by League members reveal how engagement has served as a conduit to personal and social connectedness. Participation offered opportunities for sense-making through reflection and a shared understanding of technologies that were seen to promote personal development and well-being. A recent systematic review and thematic analysis of experiences in research revealed that, for most, engagement has a positive impact on the lives of participants, and for some, it became a part of their core identity (Lauzon-Schnittka *et al* 2022), which echoes the narratives presented in this work. Prosocial behaviours featured heavily across all responses. In particular, it was found that taking part in the development of assistive technologies that may be beneficial to older adults, and contributing to the accumulation of scientific knowledge, is seen as a way of giving back to the greater good. It was also regularly reported that members do not expect any greater return for their input than simply knowing that their contributions were useful. Generous offers of time were shared by all of our League members, including some who extended an

open offer of support to researchers, above and beyond regular project engagement. It is widely known that practising altruism, compassion and empathy enhances well-being and is central to healthy communities (The Greater Good Science Center 2024). In this way, older adults who practice prosocial behaviours when engaged in research will likely reap the same benefits.

Outcomes of engagement may also be directly transposed onto definitions of flourishing provided by League members themselves. Definitions of what it means to flourish were characterised by having essential qualities that include altruism, cooperation with others, participation in purposeful activities and introspection. These outcomes dovetail with the five components of the Positive Emotion, Engagement, Relationships, Meaning and Accomplishment well-being and flourishing model (Seligman 2011) and theory of self-determination (Ryan *et al* 2019). While noting the risk of deducing and delegitimising personal experiences by applying standardised frameworks, we argue that our findings suggest that engagement in technology research can offer opportunities for older adults’ well-being and flourishing.

In keeping with the process of IPA, which encourages researchers to address assumptions and biases, here we offer an acknowledgement of our positionality and the structural and historical power imbalances that exist in research domains. We appreciate that our relationships with League members are well-established, having matured over several years of collaboration and recognise that the lack of anonymity in our data collection may influence our findings. While this is a limitation of the study, we also recognise that such pre-established levels of rapport lend themselves to rich dialogue and the sharing of information. Team members also bring to this study expertise in fields of patient experience, assistive technology, neuroscience, neuroethics and occupational therapy, which frame interpretations of our findings.

A unique aspect of this work is that it adopts an interdisciplinary, wide-lens approach that facilitates a multidimensional exploration of the phenomena of engaging in research. Using a socio-technical approach (Bostrom and Heinen 1977) allows for exploration of the intersections between health, technology and society which helps to build an integrative, holistic understanding of what it may be like for older adults to be involved in technology research. As such, our work shares diverse viewpoints that may resonate with people across the technology research ecosystem. Our findings underscore the importance of including the longitudinal perspective of older adults in the development process and acknowledging their unique epistemological position from which they view modern technologies like social robotics, having borne witness to multiple cycles of innovation and felt the impact that technology can have on human functioning and society at large. This historical perspective was revealed in League narratives that traced the advent of fax machines to state-of-the-art modern-day neurotechnologies, revealing complex temporal and situational understandings about technological innovations. Perspectives about robot technologies specifically were discussed in relation to cultural narratives and were informed by increasing exposure to robot devices that continue to unfold. Some noted that they had initially conceptualised robots as being used only for industrial purposes or being part of a distant, often dystopian technological future. To now be living in a society in which their friends, loved ones or themselves could be supported by social robots was, to some, a stark realisation of how far technology has evolved and is encroaching into human domains, prompting philosophical musings about our deepening relationship with technology. The

blurring of boundaries between reality and fiction, human and machine, echoes Prescott and Robillard (2021), who provocatively ask: “Are Friends Electric?” and draws parallels with Kantar and Bynum 2021 “Flourishing ethics for the digital age” which proposes a new ethical paradigm wherein ethical conditions that support flourishing extend across both human and digital entities. (For more scholarly discussion on public perceptions of robots and what the future of humanity might look like living alongside these devices, we point the reader to work by Naneva *et al* 2020; Szollosy 2018.)

This stark dialectical tension was most clear when League members spoke of their optimism and hope for technology’s potential to support older adults’ quality of life while simultaneously voicing their scepticism and concerns about potential misuse in acts of malevolence and risks facing individual users, society and the natural world. Specifically, League members spoke with great optimism and excitement about the possibility of technologies to be used for good in supporting older adults to live well and improving their quality of life, an area that is being widely explored in the context of dementia care (Fardeau *et al* 2023; Martin *et al* 2024). In contrast, League members also expressed a sense of anxiety about the fragility of humanity, particularly when citing advancements in technological weaponry like the atomic bomb. This ambivalence was common across discussions, revealing a shared and complex viewpoint that appeared to fuel a sense of urgency, or mission, that motivated League members to want to contribute to research and support the development of assistive technologies that strike a balance between minimising potential risks and promoting innovation.

These findings are sympathetic to inclusive methods of human-centred design and patient-oriented research. Human-centred design is lauded for its ability to produce products that are infused with the insights of end-users and can be used to engage older adults in the development process to help ensure that technologies are ethically designed and capable of addressing their needs, behaviours and emotions (Robillard and Kabacińska 2020). Human-centred design also considers the broader socio-cultural implications of the technological solutions being produced, which offers a multidimensional understanding (Philips 2024). As such, older adults are vital contributors to this design process as they offer valuable perspectives that support the creation of assistive technologies that effectively meet their needs, wants and values. In earlier studies, we found that older adults want to use social robots that are sensitively designed and functionally capable of providing responses that are attuned to meeting their emotional and psychological needs (Dosso *et al* 2022, 2023; Kabacińska *et al* 2023). Achieving such precise technological refinement requires older adults to be actively involved in productive dialogue and knowledge exchange at every step of the design process. However, it appears that, at present, many older adults face barriers to engagement and are restricted from participating in research activities (Mannheim *et al* 2022). The impact of ageism has wide-reaching consequences for technology development and adoption (Mannheim and Köttl 2024), and while important progress is being made to tackle this (by the likes of Grigorovich *et al* (2022) and others (Kabacińska *et al* 2020; Ostrowski *et al* 2021) who call for greater involvement of older adults and raise awareness of how to address barriers to inclusion) more work is needed from the research community to challenge the persistent retrograde perspectives of older adults that are enmeshed with ideas of functional decline and dependence, which ultimately leads to fewer opportunities for older adults to be meaningfully engaged. There is an urgency therefore

to address structural ageism in traditional methods and advocate for the use of approaches that balance the right to meaningful engagement with the requirements for ethical research (Robillard and Feng 2017).

Finally, we offer our reflections as researchers engaging with League members during this present study. We identify that engagement helps us to avoid taking a myopic view of collaborative research, which tends to focus on generating research data and have instead come to appreciate the many nuances and implications of engagement for our older adult participants. Taking time to meet with League members and enquire about personal experiences helped to foster ongoing relationships and deepen our appreciation of individual contributions. This has prompted us to consider how we might best support League members to fulfil their potential in research roles that align with their skills and interests and expand our reach to maximise the diversity of perspectives at the table.

Engagement has also helped us to identify our own biases and recognise that, relative to older adults, we hold limited views about technology that have been acquired over a shorter time-frame. Acknowledging this limitation instils a humble appreciation for the unique positionality of older adults. We believe this awareness will guide us in our pursuit of meaningful and respectful collaborative relationships.

In constructing this manuscript, we deliberately chose to amplify the voices of older adults’ lived experiences by using multiple illustrative quotes, as we believe it may serve to demystify what engagement in social robot research could entail and be an encouragement for older adults who are curious about becoming involved. Additionally, we hope that the perspectives shared here prompt researchers to think beyond any data-driven objectives for involving older adults in research and mindfully consider the value that can be derived from the process of engagement itself.

## CONCLUSION

This study unpacks the phenomenology of older adult engagement in technology research. Drawing on the narratives of members of a research advisory group, we reveal how older adults have unique epistemological perspectives that contribute to their motivations for engagement and fill gaps in our limited understanding of technology as researchers. Our results oppose prevailing stereotypes about ageing, which are continuing to restrict older adults from participating in research and point to a need for an ongoing discourse that critically examines and raises awareness of the multiple facets of engagement from a range of perspectives. We call for a reimagining of how research and design of assistive technologies are conducted to improve accessibility and inclusivity, in hopes of spurring researchers to continue challenging traditional research hierarchies and stigma that excludes older adults’ participation in favour of ethical and mutually beneficial collaborative relationships. We also put forward that research engagement can simultaneously serve as a site from which older adult well-being is promoted and rich research data gleaned.

Our exploratory study showcases the voices of lived experiences which we hope will support meaningful and ethical engagement of older adults in technology research in which they find opportunities to flourish through participation.

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