Supplementary Online Material

Appendix 1: Summary of literature on LTC provision by robots (published since 2016)

Authors	Focal context	Explicitly examines impact of consumers' vulnerabi-lity experiences on robot (non)accep-tance	Type of Robot	Robot Characteristics		Inclusive Service Design levels			Method and Stimuli	Results/Findings	Theoretical under-pinnings
				Level of AI Capabilities*	Examples of Specific Attribute Focus	Customer –Centric Concept	Customer-Centric Systems	Customer -Centric Interactions			
This paper	Consumers with disabilities	√	User envisioned	All	See manuscript	√	X	√		See manuscript	
Papadopoul os et al. 2021	Elderly care home residents in the UK, India and Japan	X	CARESSES intelligent interaction robot	M,T	NA	X	X	X	Experiment with 33 participants	Findings cautiously supports the value of culturally competent socially assistive robots in improving the psychological wellbeing of older adults residing in care settings	NA
Ármannsdó ttir et al 2020	Professionals involved with development of robot exoskeletons	X	Lower-limb robot exoskeleton s	M		X	X	X	Survey of 191 interdisciplinary experts	Experts agree on the importance of taking a user-centered approach when developing exoskeletons; however, there is a lack of standardized frameworks for appropriate testing methods and design approaches.	NA
Henkel et al. 2020	Vulnerable consumers (elderly and young) in a Covid Pandemic	X	Market ready/ future social robot continuum	All	NA	√	X	√	Conceptual	A typology of market ready social care robots (entertainer, social enabler, meteor, friend), a conceptual model of robotic services for vulnerable during social isolation caused by COVID and research agenda.	Social robotics, medical, social psychology, service

Authors	Focal context	Explicitly examines impact of consumers' vulnerability experiences on robot (non)acceptance	Type of Robot	Robot Characteristics		Inclusive Service Design levels			Method and Stimuli	Results/Findings	Theoretical under-pinnings
				Level of AI Capabilities**	Examples of Specific Attribute Focus	Customer –Centric Concept	Customer-Centric Systems	Customer -Centric Interactions			
Melkas et al. 2020	Institutional: adult elderly users and care workers	X	Market ready socially assistive robot controlled by person through tablet (Zora)	M	Functional and Social	√	X	X	Semi participatory observation (27 sessions) where the robot was introduced to users, 5 focus groups with users, interviews with care workers (n=35)	Care-robots can offer multi-faceted rehabilitation functions that impact on interactions, physical activity, emotional and sensory experiences, dignity and self-esteem of users and also influence the care personnel they work with. It is important to understand the positive and negative impacts on users and care providers.	NA
Tan and Taeihagh 2020	Non-institutional & institutional LTC for adults: practitioners, policy makers, managers, academics	X	Broad, type(s) not specified	M	NA	X	X	X	Singapore case study involving key informant interviews (n=25) and secondary data analysis	Delineate 9 technological risks and ethical issues associated with deployment of robots and AI in LTC (safety, primary and data security, liability, effects on incumbent workforce, autonomy and independence, social connectedness and human interactions, objectification and infantilization, deception and anthropomorphism, social (justice)	NA
Bradwell et al. (2019)	Elderly supported living complex residents	X	8 interactive robot toys	M	Life-like, speech, apperance	√	X	X	Focus groups with 17 older people and 18 roboticists	Consumers and robot designers perceptions of a suitable care robot differ significantly	NA

Authors	Focal context	Explicitly examines impact of consumers' vulnerability experiences on robot (non)acceptance	Type of Robot	Robot Characteristics		Inclusive Service Design levels			Method and Stimuli	Results/Findings	Theoretical under-pinnings
				Level of AI Capabilities**	Examples of Specific Attribute Focus	Customer –Centric Concept	Customer-Centric Systems	Customer -Centric Interactions			
Caic et al. 2019	Adult elderly care services	X (not specifically)	Market Ready and Future Social Care Robots	M,T,F	Functional, Social, Emotional	√	X	√	Conceptual	A conceptual framework for understanding the value co-creation/destruction potential of care robots and theoretical propositions regarding value propositions leveraging affective and cognitive resources, individual core values and users evaluations of robots co-creation/destruction potential.	Social cognition, personal values and value co-creation
Deutsch et al. 2019	Noninstitutional: elderly adult care services for cognitively intact older adults living in own homes	X	6 types of market ready robots	M	Functional, behavioural and appearance	√	X	X	Qualitative in depth interviews (n=30). Videos of 6 types robots	Insight on successful aging experience (which can last for several decades). Evaluate attitudes and emotional reactions to 6 robots. Participants perceived that robots threatened their independence and control of own life, feared being replaced, however are willing to adopt robots if their preferences and concerns are addressed.	NA
Erebak and Turgut 2019	Institutional: caregivers reflecting on provided services for elderly in care homes.	X	Market ready humanoid AILA and HRP-4C robots)	M, T	Appearnce (human likeness)	X	X	X	Experiment with caregivers (n=102) presented with an image of 1 of 2 robot types	Levels of anthropomorphism did not influence caregivers' trust. Trust had a positive influence on intention to work with robots and preferences for automation levels.	Not explicitly theory-focused, draws upon trust

Authors	Focal context	Explicitly examines impact of consumers' vulnerability experiences on robot (non)acceptance	Type of Robot	Robot Characteristics		Inclusive Service Design levels			Method and Stimuli	Results/Findings	Theoretical under-pinnings
				Level of AI Capabilities**	Examples of Specific Attribute Focus	Customer –Centric Concept	Customer-Centric Systems	Customer -Centric Interactions			
Longoni et al. 2019	Institutional: medical care, participants of a variety of ages	X	Market ready diagnostic, treatment & surgery robot	M	NA	√	X	X	9 experimental studies with different stimuli & large sample size	Consumers perceive greater utility from human specialists than from robots used to diagnose health conditions (a Babylon Chatbot used by the UK NHS) or perform surgery, even if the AI's performance is superior to human.	Uniqueness neglect theory
Caic et al. 2018	Institutional: adult elderly participants living in a care home	X (not specifically)	Market ready and future assistive and social interactive robots	M (possibly thinking)	Functional, Social	√	X	X	Qualitative in depth interviews supported by contextual value network mapping with participants being provided with visualisations of robot functions.	Identify 6 roles for socially assistive robots linked to safeguarding, social contact and cognitive support functions and factors that co-destruct and co-create value when adopting robots in elderly care (negative: less human contact, creating the potential for more social isolation, loss of privacy and control, anxiety regarding dependence; positive: maintained dignity; social engagement, unburdening of caregivers; communication).	Value co-creation and co-destruction
Tuisku et al. 2019	Institutional: elderly care homes	X	Market ready socially assistive robot (controlled by person through tablet) Zora	M	NA	X	X	X	Case study (public comments on news reports in media) and interviews/focus groups with caregivers, managers and physiotherapy students	Public comments were mainly negative, but the commenters had little information on robots. Caregivers and managers were more positive and highlighted possibilities for increased independence, consistency and accuracy. However there were concerns regarding a loss of human care, robots taking jobs, technology failure.	NA

Authors	Focal context	Explicitly examines impact of consumers' vulnerability experiences on robot (non)acceptance	Type of Robot	Robot Characteristics		Inclusive Service Design levels			Method and Stimuli	Results/Findings	Theoretical under-pinnings
				Level of AI Capabilities**	Examples of Specific Attribute Focus	Customer –Centric Concept	Customer-Centric Systems	Customer -Centric Interactions			
Wang et al. 2017	Non-institutional: adult elderly care services, older adults with Alzheimer's living at home	X (not specifically)	Market Ready Tele-operated assistive robot "Ed"	M	Functional, social	√	X	X	10 users observed by care-givers in a stimulated home environment. Interviews analysed using thematic analysis	While captivated with the novelty of the idea of robotic assistance and envisaging opportunities for robots to assist them in daily activities, participants did not want a robot for various reasons – psychological readiness, preference for human assistance, challenges with learning new skills.	NA

M = Mechanical, T = Thinking, F = Feeling

Appendix 2: Further detail of utilized methodologies and overview of methodological protocols for Studies 1-3

Study 1 – Community Philosophy **(CP)**. Also referred to as public philosophy (see Fulford, Lockrobin, and Smith 2020), CP is a method of democratic co-inquiry evolved on the foundations of Philosophy for Children (Lipman 1988). The premise of Philosophy for Children is to encourage critical thinking, autonomy and dialogue with the outcome of intellectual empowerment in learning environments (Vansieleghem 2005). Extending this premise to other settings, CP is a grassroots communities' movement for open and collaborative philosophical thinking on issues of common concern (Bramall 2020). This approach is akin to dialogical enquiry practices in co-research methodologies (Frank 2005), with an important distinction of primary focus on community life. Following this principle, Study 1 protocol involved the facilitator assuming the role of co-inquirer with the participants, prompting articulation and discussion of participants' perspectives on care and a future with robots, including care robots, with broad questions and dialogical tasks. Specifically, questions and activities in CP workshop were as follows:

- Picture in our mind's eye a professional care interaction. And it might be one that you've had, that you've experienced yourself, or it might be an imagined one. You might want to draw it, if you've got anything to hand and you can do that.

- What functions or in what situations do you see robots being useful? Is there something that would be better for a robot to do than a human?

- What do you, personally, as care users, value most in terms of care provision?

- In pairs (allocated into breakout rooms), argue for two minutes, uninterrupted, for or against the statement: 'Humans should be able to replace human care provision with robotic care provision'.

Study 2 – LEGO® *Serious Play*® **(LSP)**. LSP is a methodology for facilitating communication and problem-solving (Rasmussen 2006), through which metaphorical explanations elicit concepts from participants' imagination (Simon, Neuhofer, and Egger 2020). Utilized across various settings, including organizational, creativity, education and

hospitality research (McCusker 2014; Primus and Sonnenburg 2018; Wengel, McIntosh, and Cockburn-Wootten 2016), it comprises cycles of building, sharing and reflecting, facilitated by series of questions set to elicit contexts focal to a study. Specialized LSP kits comprising figures, bricks and other elements of different colors and shapes, are utilized in building tasks, to create a play state in which authentic participant voices can "emerge and be heard" (McCusker 2020, p.148). In this study, building tasks focused on eliciting metaphorical expressions of the experience of being cared for and qualities of a useful care robot. While this would typically be carried out in a physically shared space, due to the workshop's online format participants were provided with kits in advance via mail, to carry out the building and sharing tasks via video conferencing. The facilitator guided elaboration of the meanings constructed in each building task, which were recorded and screenshared by co-facilitator utilizing a Miro online whiteboard, to enable the sharing and reflection integral to LSP. Building tasks listed below were followed by each participant discussing the models they've built:

- Build a model that represents your idea of a perfect day

- Use your hands to think through the concepts of 'easy' and 'effortless'. And build a model that helps you describe what these mean to you

- Build a model representing characteristics of a robot that would make it an ideal thing for you. Add to the model at least one additional characteristic, to represent more of this ideal experience of being cared for

- Build a model representing general principles for robots

Study 3 – Design Thinking **(DT)**. Described as a process for eliciting unforeseen innovations supported by a bundle of methodological tools inspired by design, DT is built on a strategic premise of extending beyond the boundaries of industrial design to create innovative consumer offerings (Brown 2015, 2008). Since its inception, DT gained widespread acceptance across industries (Carlgren, Elmquist, and Rauth 2016; Rauth, Carlgren, and Elmquist 2015). Seidel and Fixson (2013) outline three stages comprising the DT process, although highlighting that differences in applications and terminologies exist: *needfinding* (gaining deep contextualized insights into users' perspectives and experiences);

brainstorming (a group search for new solutions that may not be possible in individual ideation); and *prototyping* (development of a preliminary model as means of stimulating 'thinking when building'). Given this study's focus on eliciting consumer conceptions of a robot in the context of care, the workshop incorporated elements of needfinding and brainstorming, to facilitate participants' ideation and articulation of the characteristics of such a robot. As a starting point for ideation, facilitators introduced a fictional character 'Jamie' who reflected some of the impacts resulting from living with disabilities self-reported by participants (e.g. partially-restricted body mobility and hearing impairment). Participants were guided to brainstorm robotic solutions to help the character navigate life tasks, in exercises utilizing post-it notes on a Mural online whiteboard. The subsequent verbalizing of their reasoning encouraged them to draw, unprompted, on their own experiences.

Tasks across needfinding and brainstorming components were as follows:

- [Think and describe] What is Jamie's typical morning? What set of tasks does he go about to get ready for the day? What is he thinking/feeling/doing? How we can improve Jamie's morning routine?

- Take turns to tell a story to each other about Jamie's experience with his new gadget [term participants used following the ideation task to refer to robots, apps, and other technologies].

- [From everyone's stories] create one master storyboard that encapsulates the best aspects [of the gadget]

- [Let's] have a run through some of these [ideas on the storyboard] to give us the next steps, what do we [designers] actually need to go and figure out to take this idea to the next stage?

References listed in Appendix 2

Bramall, Steve (2020), "Understanding philosophy in communities: The space, people, politics and philosophy of Community Philosophy," In: Fulford, Amanda, Grace Lockrobin, and Richard Smith (eds.), *Philosophy and Community: Theories, Practices and Possibilities*, Bloomsbury Academic.

Brown, Tim (2008), "Design Thinking," *Harvard Business Review*, (June), 85-92.

Frank, Arthur W. (2005), "What Is Dialogical Research, and Why Should We Do It?" Keynote Address: Sixth International Advances in Qualitative Methods Conference. *Qualitative Health Research*, *15*(7), 964-974.

Fulford, Amanda, Grace Lockrobin, and Richard Smith (2020), *Philosophy and Community: Theories, Practices and Possibilities*, Bloomsbury Academic.

Lipman, Matthew (1988), "Critical Thinking – What Can It Be?" *Educational Leadership*, 46(1), 38-43.

Primus, Dirk J., and Stephan Sonnenburg (2018), "Flow Experience in Design Thinking and Practical Synergies with Lego Serious Play," *Creativity Research Journal*, *30*(1), 104-112.

Rasmussen, R. (2006), "When You Build in the World, You Build in Your Mind," *Management Review*, 17(3), 56–63.

Rauth, Ingo, Lisa Carlgren, and Maria Elmquist (2015), "Making It Happen: Legitimizing Design Thinking in Large Organizations," *Design Management Journal*, *9*(1), 47-60.

Seidel, Victor P. and Sebastian K. Fixson (2013), "Adopting Design Thinking in Novice Multidisciplinary Teams: The Application and Limits of Design Methods and Reflexive Practices," *Journal of Product Innovation Management*, *30*(S1), 19-33.

Simon, Olga, Barbara Neuhofer, and Roman Egger (2020), "Human-robot interaction: Conceptualising trust in frontline teams through LEGO® Serious Play," *Tourism Management Perspective*, *35*, 100692, https://doi.org/10.1016/j.tmp.2020.100692.

Appendix 3: Participant characteristics for Studies 1-3

Participant No	Study participated in*	Age group	Gender
1	1	41-50	Female
2	1	31-40	Male
3	1	51-60	Female
4	1	51-60	Male
5	1	71-80	Female
6	1	41-50	Female
7	1	31-40	Male
8	1	41-50	Male
9	2	31-40	Female
10	2	21-30	Female
11	2	51-60	Male
12	2	51-60	Male
13	2	31-40	Male
14	2	51-60	Female
15	3	31-40	Male
16	3	51-60	Male
17	3	71-80	Female
18	3	41-50	Male
19	3	51-60	Male
20	3	71-80	Female

* Study 1: Community Philosophy, Study 2: LEGO® Serious Play® , Study 3: Design Thinking.
Note: we do not report ethnicity and type of impairment by participant following ethical requirements, since in combination they may pose risks to participants' anonymity. Age presentation by group follows the same rationale.

Appendix 4: Data structure framework*

2nd order theme	1st order concepts	
Aggregate dimension: Conception of care		
Core values	Emotions (genuine compassion) not simply instrumental actions: affective empathy Putting others first: moral empathy	Helpful responsivity: behavioral empathy
Only produced through human interaction	Importance of human contact Only humans give required kindness	Done with love
Experience of being cared for	Feels personal	Different components in harmony
Vulnerability potential in consuming human-facilitated LTC	Stretched resources Impact on relationships due to pressures on (human) carers	Love doesn't guarantee good care Genuine caring cannot be taught
Vulnerability potential in needing to consume care	Accepting need for care is acknowledging you need help	Requesting care can dehumanize
Aggregate dimension: Conception of robots in LTC servicescape		
Mechanical AI Capabilities**	Work continuously and consistently *Alleviate burden of (self/life) management*	Efficient and precise *Help with physical tasks*
Thinking AI Capabilities**	Monitor me to warn me when I might need care: cognitive empathy Make difficult decisions Learn about me and offer or arrange care I specifically need: behavioral empathy Adapt to needs and changing circumstances of the user	*A big brain looking out for me and helping me to not need care* Remove human bias Intuitive and available but not intrusive
Feeling AI Capabilities	Give a sense of companionship and support by 'surface-acting out' care: behavioral empathy But, robots cannot care	
Functional attributes	Fast Strong Voice responsive Reliable	Multi-sensory Simple to use Mobile across environments Environmentally friendly
Socio-Experiential attributes**	Integrating in technological support ecosystem Non-human, but human relatable Extending current technology capabilities to enrich experiences	Non-threatening Fun *Promoting my independence*
Transactional-relational adaptability attributes	Something just serving my practical needs Something between machine and sentient being	Something I can have a relationship with
Pathogenic vulnerability potential from robot as a resource	Distrust in robots' decision-making logics Concerns about unwanted robot actions	Doubts in abilities to adapt and respond to emergencies
Pathogenic vulnerability potential within robot-integrated LTC design	Prospect of replacing humans Concerns about losing control and autonomy	
Accommodation, inclusion and accessibility concerns	User co-created Financially accessible	Culturally accessible

The 2nd order themes informed development of conceptualization (Figure 1). Themes are reflected in Figure 1 in condensed wording, for conciseness

**In-vivo codes in italics indicate expressions of capabilities envisaged to minimize or postpone the need for care*

Appendix 5: Extended data structure framework that includes exemplar quotes for 1st order concepts

Aggregate dimension: Conception of care		
2nd order theme	1st order concept	Exemplar quotes
Core values	Emotions (genuine compassion) not simply instrumental actions: affective empathy	"I think it's about the genuine compassion of a human being shown towards another. And that genuineness is about - I'm paid to do a job, to like wipe your face. So I wipe your face. Does that actually show that you care? That act of wiping my face doesn't necessarily mean that you care about me. It's an act. So it's that genuineness of the compassion, that somebody is doing that so softly or gently or meaningfully, that comes across in the warmth, in the emotions of that individual. Rather than it just being 'I'm just wiping down a surface." (Participant 1, Study 1)
	Helpful responsivity: behavioral empathy	"Like keeping appointments and not changing them, answering letters, that sort of thing." (Participant 5, Study 1)

"we'd all like to have it available in a click of our fingers, there for you and available. I think, again, lockdown and COVID, most people rely on it. Even if it's just giving you that push at the end of the phone or on a video call because you're not seeing them in-person" (Participant 8, Study 1) |
	Putting others first: moral empathy	The difference between giving good care, where it's very beneficial to the individual that you're giving it to, and bad care where it obviously isn't. And you're not putting them first before yourself, if that makes sense. […] I don't want to simplify it by just saying good or bad care, but morality in that you know, in your heart, that it's right, and you should do your utmost to present it as being so. (Participant 2, Study 1)
Only produced through human interaction	Importance of human contact	"I do also think that my own personal circumstances, by living alone, having somebody just check up on me. And gives me the sense of, it's something that a robot can't give, that kind of, you know, social interaction, stimulation, having a conversation about something - complete - not anything to do about my care, maybe, but just having a conversation really helps my mental wellbeing, as well as my physical wellbeing." (Participant 1, Study 1)
	Only humans give required kindness	"My father - who unfortunately has Alzheimer's - has a professional carer come in and it's obviously something he does as a vocation, not just for the money. And you can see a sense of kindness from even just a smile or a touch that, against what people were saying about a

		robot being able to give kindness, I don't think that's possible. Because I think kindness stems from with inside a human being towards another human being. And I think without, being rude, I think expecting kindness from a robot is probably like expecting love from a blow-up doll. To me, that is the analogy. " (Participant 4, Study 1)
	Done with love	"I feel that care and consideration, no matter who you're caring for requires love to be able to do the job properly, whether that's love of your job or love of the person you're caring for. So, I think I get better care from those I love, and I've noticed, other people I know who have disabilities who get care as well, they also get better care from either people who love them, or love their job to care for others." (Participant 13, Study 2)
Experience of being cared for	Feels personal	"…when I'm cared for completely, I'm in my own cocoon, I'm the centre of focus […] I'm sort of pampered to an extent, but that's what I am when I'm cared for." (Participant 17, Study 2)
	Different components in harmony	"…like being able to get your meds on time, having emotional support from a partner…so, yeah, basically all these different things that need to come together in harmony to complete the big picture, … then it will create this really great environment." (Participant 10, Study 2)
Vulnerability potential in consuming human-facilitated LTC	Stretched resources	"…it [integration of robots in LTC] will save some money off the NHS because there's limited nurses now, isn't there?" (Participant 17, Study 3)
	Genuine caring cannot be taught	"actions can be learnt or taught but emotions can't. And I think probably the one thing is, you need to be genuinely caring with empathy. And you can't teach it, you either have it or you don't. It's like love can't be taught, it's an emotion you have or you don't have. So, I mean, if you talk about giving assistance - carrying out tasks, communication, thoughtfulness, understanding - they can all be taught or learnt. […] courtesy and humanity can be taught, but I don't think emotions can be." (Participant 8, Study 1)
	Love doesn't guarantee good care	"…the thing about love is, it can bring out the very best in you. It can make you do things you never kind of would have thought possible. But on the other end of the spectrum, it can bring out your - it can bring out the worst in you. It can bring out your insecurities, it can bring out things which may be deemed toxic." (Participant 2, Study 1)
	Impact on relationships due to pressures on (human) carers	"I also feel that it can have the opposite effect as well, where care's concerned, in that it can be a negative towards relationships as well, for those that care for you. Even though they love you and have to care for you, it can have an impact on relationships in a bad way as well. So, love can have a positive effect where care's concerned, but it can also be, there's a

		little demon there as well just to show that it's not straightforward." (Participant 13, Study 2) "We spoke a lot about kindness and how good humans are, but there is a lot of abuse in these jobs, of being a carer, particularly, because they're quite low paid."(Participant 6, Study 1)
Vulnerability potential in needing to consume care	Accepting need for care is acknowledging you need help	"I am too stubborn sometimes, and I do try and do too much, myself, and I probably will continue to be like that, potentially to the detriment of my own illness. I don't really know. And it's that question of whether we really should be asking for more help than we are doing, and whether - I keep, from my point of view, whether I should be asking for more help than I do do. There's probably more help out there than I tap into, and really, it's a stubbornness and a pride thing, potentially. And also, I don't mean to speak about anybody here, but mine's a hidden disability, and it's that, kind of, acknowledging that you are disabled, and that you're not as able-bodied as potentially somebody who hasn't got an illness. And I think all of that, for me, is what I've experienced since I've become ill." (Participant 13, Study 2) "…what [fellow participant] said about the stubbornness, and not maybe being necessarily willing to accept that you need that help, I think that's kind of where that stemmed from. (Participant 10, Study 2)
	Requesting care can dehumanize	"…the sort of clinical side of it, that you are a number. In the NHS, you have an NHS number, you are essentially a number and if you don't push things yourself, you kind of get lost in that. […] someone there, just processing appointments for etc, they're not considering that you're in pain, they're not considering that you can't get up that day or you can't walk that day or you've been crying because you - whatever example. They don't consider that because you are just a number at that point." (Participant 7, Study 1)

Aggregate dimension: Conception of robots as a LTC servicescape resource		
2nd order theme	**1st order concept**	**Exemplar quotes**
Mechanical AI Capabilities	Efficient and precise	"They might be more efficient in diagnosis. I know I've been misdiagnosed in the past, and they might be more efficient in terms of that's how you were using it." (Participant 7, Study 1)
	Work continuously and consistently	"And also the fact that sometimes carers come and go, so you could well have an interaction and get a relationship […] with one person, but the next minute, you've got somebody else coming in the door. You may not have the consistency. So a good idea would be around like the consistency of knowing where you stand with your robot. It's not like they're going to cancel on you. They're always there. They're reliable, I suppose, in that respect. Yes, they may malfunction, but then human beings can get sick too and not turn up. So it's like it may be seen even as a second kind of, you know, well if the person doesn't turn up, it's OK because I can still get by because I can use a robot for that, if you see what I mean." (Participant 1, Study 1) "I imagine, obviously, as well, that then because that machine could work continually as opposed to having like shifts and things like that, with people coming in and different people, so that machine could run ad infinitum." (Participant 7, Study 1)
	Help with physical tasks	"this is just for physical things, like helping with cooking and stuff like that, so it's just hands basically, to help do a bit of cleaning, lifting, that sort of thing … it's just a robotic hand doing things that you can't physically." (Participant 9, Study 1) "I've got cerebral palsy and I've got limited use of my right hand, so when you're talking about tying up your shoelaces using one hand, yeah, it's something that I literally do every morning, for instance, find a pair of trainers or something like that when you've got to tie the shoelaces." (Participant 19, Study 3)
	Alleviate the burden of (self/life) management	"…help me organise everything and work things out and take the mental pressure off a little bit, if that makes sense. […] a really important one, because if it's doing certain tasks for me, effortlessly, or taking away that load from me, then that will enable me to do things that I might not necessarily have been able to do, because I was directing my energy elsewhere. Or, it reduces my stress levels, so my condition isn't as bad, and that kind of thing. So, it's really enabling me to do things that I might not have been able to do." (Participant 10,

		Study 2)
		"…that's kind of the reality of a lot of my days where I'm constantly thinking about either what I've eaten or what I've drank, you know, when I've taken my medication and what that actually means. […] when you buy some food, it tells you, you know, how much salt it's got in, how much fat it's got in, how many calories are in it. For me, it's how long is it going to take from me consuming this, how long is it going to take to basically go through my system, that I've got to plan to stop again." (Participant 18, Study 3)
Thinking AI Capabilities	Monitor me to identify and warn me when I might need care: cognitive empathy	"looking for a solution to sort of manage the symptoms, try and predict when the symptoms are going to be and what the outcome needs to be to manage those symptoms. […] That a lot of stress and anxiety is knowing somethings going to happen, but not being able to predict them, and using the app to sort of almost tell you when somethings going to happen. So, it naturally brings down the anxiety and stress levels of knowing somethings going to happen. It's like, I suppose for me, it's like if you know you're going to be sick, the feeling of knowing you're going to be sick is actually worse than being sick itself." (Participant 18, Study 3)
	A big brain looking out for me and helping me to not need care	"I see it very much from the perspective of it's observance. It sees what's going on, it's aware, when I'm in this environment, or even remotely, what's going on, and can advise me in advance, can pre-warn, first and foremost, can do things at home for me that potentially could become a problem as time passes, but I don't want it to become something I physically rely on in any sense, if it's at all possible." (Participant 11, Study 2) "I loved everybody's idea of this brain that learns what it is that I want to be able to see, and how I can get more independent, and I've got the wheels to make everything happen for me a little bit faster, which will be great, so I've put my wheels back on. So, I've got this big brain, and then I've got all my eyes on a 360 degree angle, up high, and another little eye there, and a bit of glitter…" (Participant 14, Study 2)
	Remove human bias	"They [a robot] wouldn't have any background of like disease or disease in their families, so they would have any sort of personal emotions that are attached to care in terms of like someone might have had cancer or someone might have had whatever. So they haven't got any of that personal thing." (Participant 7, Study 1)
	Make difficult decisions	"…[robots] they're probably going to be more black and white, which means they'll be more determined to sort of make the right decisions, maybe to make difficult decisions that

		maybe a human wouldn't feel comfortable with. Or carrying on care, for example, when there was very limited like reason to do so, but a human might make an emotional decision to carry on. Whereas the robot might say, 'no, this is the point where we stop with this care' and that sort of thing." (Participant 7, Study 1)
	Learn about me and offer or arrange for care I specifically need: behavioral empathy	"…so it's gauging, learning from you and saying, 'Actually, your mood's low,' or something, and it can give you ... So, the communications both ways is really important for me. […] so that's coming back to, it's actually AI and modifying its behaviour as it sees you. […] the multifunction is that […] it's helping me as much as I need to ." (Participant 7, Study 1) "in emergencies it will actually communicate with the ambulance, whoever, to actually ask for help" (Participant 12, Study 2)
	Adapt to needs and changing circumstances of the user	"…so, I was saying earlier that simplicity would be good, but simplicity in the way that you would use it, so the user interface or whatever, it's simple to set up. But actually, people's needs are complex, so it would need to have quite a complex functionality, and a lot of - in many people's cases, I guess. And then this one was kind of meant to represent, like, flexibility, because people's needs will often change. You don't always need the same thing all the time, and conditions change." (Participant 10, Study 2)
	Intuitive and available but not intrusive	"…it would need to be a bit intuitive to my needs." (Participant 14, Study 2) "…basically when I don't need it, [I want my robot] be whipped back in its box. […] I felt quite sad on my robot for saying that, but I think it's kind of […] about it not being too intrusive." (Participant 13, Study 2)
Feeling Intelligence	Give a sense of companionship and support through 'surface-acting out' care: behavioral empathy	"I do live alone and having somebody knowing that I would quite like a cup of tea. Could someone get me a cup of tea? No one gets me a cup of tea. Do you know what I mean? And it's like they know that, first thing in the morning, I always have a cup of tea, but I have to always make that cup of tea. So it's just that kind of, you know, those small things that just add that extra value - the time you get and the sense of like companion - not a companionship with a robot, but it's just a helping hand. Because when you're alone, everything you have to do is yourself, every single thing. […] it would have some kind of - 'I hope you're well' or 'is that OK?' or something that demonstrates some kind of compassion - some kind of care. […] And maybe, partly, it is lip service, but secondly, it's more actions as well, isn't it? 'Is that okay?' 'Yes, thank you', or 'no, it's not'. And then you've got that interaction with the robot that actually shows its compassion." (Participant

		1, Study 1)
	But, robots cannot care	"…the empathy/ sympathy side wouldn't be there. Because it's the emotional attachment that you have with a human that you would necessarily have with the AI. […] the humorous and the comedy element of a human. You just would not get that with a robot unless you had to programme it and then it wouldn't be natural." (Participant 3, Study 1) "…the only time I could see possibly using a robot instead of a human is if somebody was actually in a vegetative state. And, therefore, the fact there wasn't a human being there would not make a difference. But for me, I think you're taking the soul out the whole thing. I think 'soul' is the important word. […] kindness from a human being when you see it, you can actually see it from the smile […] from the hug, but even just a slight touch of - that makes all the difference. […] I think it's just the presence of somebody can. And it may be that they have a smell that you associate with that person, but I think it's their presence, the way they are towards you, by how they look at you, how they - as I said - smile at you. All those things." (Participant 8, Study 1)
Functional attributes	Fast	"…make everything happen for me a little bit faster." (Participant 14, Study 2)
	Strong	"…something like very physical, which obviously a human couldn't do. So I don't know, maybe it's lifting a bookcase or something very heavy, something like that. I just think, simply, a robot could do significantly better than a human without having any - what's the word? Without exerting too much pressure or getting tired, or things like that." (Participant 2, Study 1)
	Multi-sensory	"So, you have whatever the device is, whatever the robot is, it has the ability to see, so it's that visual, to hear, which is significant, and smell as well. So I suppose I'm thinking there about things like fire risk. Now, how possible that is, I have no idea, but it's based on the senses, and in that sense, it responds based on what it considers is necessary, what its senses tell it, so to speak." (Participant 11, Study 2)
	Simple to use	"…it's probably going to need to do quite a few things, so it's going to have to be really simple to use, like a really simple interface or whatever. […] so, I was saying earlier that simplicity would be good, but simplicity in the way that you would use it, so the user interface or whatever, it's simple to set up." (Participant 10, Study 2)
	Voice responsive	"I think communications is really important […] So, for people with visual impairments, and also people who haven't got the time or the energy to go and press buttons, it's voice activated." (Participant 12, Study 2)

		Mobile across environments	"It would need some sort of limbs - articulated limbs - to be able to get up and down stairs. At the moment, I've been thinking about it just operating on one level, but if you needed care at home and you live in a house rather than a bungalow or an apartment, you'd need this thing to be able to ascend and descend a staircase...just generally, it's no good if it can only operate on one level." (Participant 8, Study 1) "…mobility was one thing which has been mentioned. The other thing for me, it would need to be quite small, not too obtrusive, not taking up too much space, being able to take it with me." (Participant 14, Study 2)
		Reliable	"... the user interface, whatever it is, it must work, it mustn't break down, it mustn't need to be rebooted every 20 minutes. It's got to work, and so it goes back as well to what [fellow participant] was saying, which was fascinating, about not understanding the dialect. If that's the case, what's the point? So, it's just got to be - that has always been my concern. It's not a concern, but my reservation around AI, because AI will be flawed in the most simple of ways, like not understanding what's being said, and so on." (Participant 11, Study 2)
		Environmentally friendly	"…so the ideal carer robot would be environmentally friendly. It wouldn't actually be damaging to the planet, because it'll have to carry on beyond me." (Participant 12, Study 2)
Socio-Experiential attributes		Fun	"I want it to be fun […] I don't want it to just be functional, I wanted to make it fun, so it can do many things which the normal people wouldn't think about. That's what I'd be looking for" (Participant 12, Study 2)
		Promote my independence	"I don't want to be reliant on another human being, I don't want people to take pity on me as a disabled person. I don't want people to, you know, feel that they have to come and visit me because I'm disabled or that I'm actually a burden to someone else. So I am fiercely independent in that respect. So I think if a robot was there to help me, I would be less reliant on others - do you see what I mean?" (Participant 1, Study 1)
		Non-threatening	"So even if that robot had kind of softer edges, curved edges and it didn't look like a - I would imagine, if you were getting care and it just looked like a scanner, you know, or it looked like, you know, them heart monitor things, that they look like a big square, it wouldn't seem caring. But if it was curved, if it had some sort of like nice ergonomic design […] And if it seems softer, then I think it would be less imposing." (Participant 7, Study 1)
		Non-human, but human relatable	"I'm thinking of, it looks kind of human in the sense that it has things like limbs and it kind of has a voice that you communicate with on a certain level. But enough to distinguish it

		where you know that it is, first and foremost, a robotronic thing." (Participant 2, Study 1)
	Extending current technology capabilities to enrich experiences	"…when you're abroad and you're travelling and you want to sign up to a tour, I found that I've got some disabled friends as well, who have got issues with their legs. They often discard themselves from these types of tours, the walking tours specifically. Even driving tours could be added to this as well but, if you just immerse yourself into Google maps and rather than following the directional navigational aspect of Google maps, the voice would change to telling you the history of a certain location. So, rather than it saying turn left, you're approaching a building, or a site or a monument, and it will start playing back the history of that said building. And that's where this kind of thought process came from because you could already exploit the technology out there to build this, but it's not available anywhere, if that makes sense." (Participant 15, Study 3)
	Integrating in technological support ecosystem	"I think we're kind of heading in this direction with obviously the ecosystem, […] I just think there's more appliances and more devices around the home that could plug into this kind of ecosystem. So, your coffee machine, your fridge, even like a dispenser for your medication, stuff like that, just to cater for those of us that are less able." (Participant 15, Study 3)
Transactional-relational adaptability attributes	Something just serving my practical needs	"So I think if I wanted some machinery, I'd want it to serve what I needed to do. So it'd be practical, it would be doing jobs for me as opposed to emotional responses." (Participant 7, Study 1)
	Something between machine and sentient being	"I think it doesn't need to be like a being, a sentient being at all. I don't think - no, that's not important for me, no. […] I obviously don't want it - I wouldn't want it to be kind of like my best friend - that's a really - I don't want it to - it wouldn't take away from any relationships in my life, or be providing me with the sort of relationships that I would usually get from a human, but I think, yeah, it doesn't have to just be like a machine." (Participant 10, Study 2)
	Something I can have a relationship with	I actually believe that there's a relationship with my robot, that it's got artificial intelligence, and it learns about me and adapts. […] It is like a person to me. I would spend a lot of time with it. […] Yeah, so it doesn't dominate my life, but it's an integral part of it, and I want to be happy with it. (Participant 14, Study 2)
Pathogenic vulnerability potential from robot as a resource	Distrust in robots' decision-making logics	"If we humanise it, a robot would go, 'well, this is going to cost £60,000 to keep this person alive for five weeks and that's not efficient'. And that's brutal, isn't it? And a human would never make that decision, would they? But maybe a robot would. That's horrific." (Participant 7, Study 1)

	Doubts in abilities to adapt and respond to emergencies	"So a robot is programmed to do certain functions. Now, if I needed an additional function or something extra, then would that robot still be able to perform that function on that particular day? I may not be technically-minded, so I might not be able to use that robot in the most efficient way. So it might be set up by somebody else and then just perform a programme of actions. But that programme of actions might not be what I need that day and I might not have the capability or capacity to be able to actually change that programme of actions. So that personalised care goes out the window, so it's not personalised at all. It also could be dangerous because it could make that person a cup of tea, but I might have Parkinson's that day or shake that day and end up spilling it all over me. And then there isn't that first aid care either. So the person that's - if there's an accident, then the robot wouldn't be able to respond to that accident, where if it was a human being passing me something, they would be able to get a cloth, they'd be able to get cold water, they would be able to call - like to actually remedy that situation. Whereas a robot may not be able to do that. I don't say 'will not', but I said 'may not' be able to do that." (Participant 1, Study 1)
	Concerns about unwanted robot actions	"I still am not very happy with the one that's predicting your needs because that made me think of things like Amazon that tries to sell me things that I've just bought. Recommendations for things that I might like, which are always wrong. Now, maybe if this robot was better at it than the things that do it now, then maybe that would be OK. […] I mean it's really annoying, having something on your computer telling you you want something that you don't want." (Participant 5, Study 1)
Pathogenic vulnerability potential within robot-integrated LTC servicescape	Prospect of replacing humans	"...If somebody's got that soul between two people, that can make a difference between somebody getting better and not." (Participant 4, Study 1) "I was thinking to take a huge strain off the NHS in terms of the demand, particularly with the COVID now, like a lot of people being on ventilators. But it's a thing where I'm kind of debating whether I should say good in the sense that, you know, you don't have to go to this huge hurdle of trying to recruit so many 'x', the people that used to work in the NHS, where you could just use robots." (Participant 2, Study 1)

	Concerns about losing control and autonomy	"…when I kind of think about that, it's a little bit too kind of Minority Report where it's like, if they know exactly what you're going to do before you do it, it's a bit like you, yourself, don't have any control." (Participant 2, Study 1) "I think with my own condition, because it's progressive, I've found you reach certain points where you cross into another part of the disability, and looking at the AI that would go with this, and the robotics of it, to step into that world and then progress through that world, I want to be in control of it, not somebody else remotely, whether that be, whoever that be. I mean, I want to be in control of my own illness, and it's as simple as that. [...] the autonomy of it. Who controls who? Is it controlled remotely? Will it run from a separate server? Will it need third party interventions, or does the user retain overall control?" (Participant 11, Study 2) "I don't want the robots taking over, and I think it's important still that the person who owns the robot, for want of a better word, is the boss, and that they shouldn't become - I don't know - they shouldn't just take over. […] it should be, whatever is done here with the robots, it should be very transparent. […] People should - who might not be of right mind, should still really know what's going on as best as possible..." (Participant 13, Study 2)
Accommodation, inclusivity and accessibility concerns	User co-created	"if every step of the way through the robotics process, you could have normal people, normal users maybe testing it out, testing if it works for them, and different disabilities. If they all get to try it, and see if it works, and if it doesn't, what needs improving, that sort of thing." (Participant 9, Study 2) "And the closer we get to that sort of AI, maybe I'm just thinking ahead, way ahead, but it's what [fellow participant] just said just kind of struck me. […] not so much the personalisation, more on the input into the design, but I think it could be ongoing as well, as maybe adaptations need to be made, you have a say in that, and that kind of thing. (Participant 11, Study 2)
	Financially accessible	"…it should be accessible to all, no matter any demographic, age, or anything like that, so this is almost like a conveyor belt of robots that basically are issued to anybody no matter, like I said, your background, your affluence, or anything like that." (Participant 13, Study 2)
	Culturally accessible	"[fellow participant: I will just say that we have a lot of problems here with Alexa and things like that, because it doesn't understand our accent.] When you say understands various accents, therefore I assume you're going to make it for all the languages in the world? […] Yeah, if it's equality and diversity." (Participant 12, Study 2)