

# VALUE SENSING ROBOTS: THE OLDER LGBTIQ+ COMMUNITY

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## ABSTRACT

LGBTIQ+ older adults (Lesbian-Gay-Bisexual-Transgender-Intersex-Queer+others) are an under-researched community experiencing high rates of loneliness. The value sensitive design and use of social care robots provides an innovative advance toward equity for older LGBTIQ+ adults at risk of loneliness. Focusing on the LGBTIQ+ older adult and social care robot case study, values in motion design and value sensing robots are presented as solutions to the missing account of good care in value sensitive design. This constructivist study found that *LGBTIQ+ connectivity and community, social connectedness, and no special attention in care* are identified as key instrumental values for the older LGBTIQ+ community regarding social care robots.

**KEYWORDS:** Healthcare robotics, community, LGBTIQ+ ageing, value sensitive design.

## 1. INTRODUCTION

Value sensitive design (VSD) is a popular method for investigating stakeholder values and designing systems to account for those values (Friedman & Hendry, 2019). Recent VSD works (e.g., Jacobs & Huldtgren, 2018; Manders-Huits, 2011), attempt to move the methodology towards normative ethics, aiming to establish a standardised design decision framework to create technologies. In contrast, VSD pioneers were careful not to suggest that *values are either entirely normative nor descriptive*. Each value is conceptualised within its respective field and no list of values is comprehensive (Friedman & Hendry, 2019).

Similarly, good care practice is neither entirely normative nor descriptive. What each person and community needs and values in care matters (Abma, Molewijk, & Widdershoven, 2009). Descriptive principles of care hold instrumental value for individuals, and they should be considered in VSD. At the same time, there are normative principles in care expressed through applied ethics that are intrinsically good and valuable, including safety and wellbeing, as identified by duty of care, professional ethics, and law (Teipel et al., 2016).

Social care robots (SCRs) play a role in social support or care by enabling, assisting in, or replacing social interactions. For good robot-delivered care, SCRs need to ensure both normative intrinsic values and descriptive instrumental values found in real care practices. Moreover, just as good care is determinative in practice (Beauchamp, 2004), SCRs must account for changing and emerging values in care. *Value sensing robots* (i.e., robots which attempt to learn user values and adapt behaviour to suit those values) may work towards this using the VSD-adapted design

approach values in motion design (VMD) (Poulsen & Burmeister, 2019; Poulsen, Burmeister, & Kreps, 2018).

The purpose of the study presented here is to put the concepts of value sensing robots, as well as VMD, into practice with a particular community with its own set of values and value interpretations. The older LGBTIQ+ community was selected for this purpose given that they are under-researched (Fredriksen-Goldsen, Kim, Barkan, Muraco, & Hoy-Ellis, 2013) and experiencing high rates of loneliness (Fredriksen-Goldsen, 2016; Hughes, 2016) which might be alleviated with SCRs. Additionally, highlighting under-surveyed LGBTIQ+ older population values alerts potential discriminatory implications of robots, which do not consider vulnerable, marginalized, silent aging populations (Poulsen, Fosch-Villaronga & Søråa, 2020). LGBTIQ+ older adults were interviewed to create knowledge about the older LGBTIQ+ community's values. At the same time, the literature was used to conceptualize the normative goods in this care context. With this information, exemplary LGBTIQ-friendly SCRs were designed. The pilot data of this study are presented here. Care with robots has been discussed in the engineering, philosophical, and design literature, but little of that discussion has so far addressed good care. It is here that this article makes its contribution.

The following sections review the literature, beginning with value sensitive design. Then the broader context of this pilot study is described, after which comes the methodology employed in this study. Next, the findings are presented and discussed, followed by a description of potential further studies.

## **2. LITERATURE REVIEW**

### **2.1. Value sensitive design**

Technology is not value neutral (Friedman & Hendry, 2019; Legassick & Harding, 2017); technologies and systems have an impact on stakeholder values. While 'value' typically refers to the economic worth of an object, in recent VSD theory, values are described as "what is important to people in their lives, with a focus on ethics and morality" (Friedman & Hendry, 2019, p. 24). One popular method to account for stakeholder values in technology design is VSD which aims to promote positive value impacts by design (Friedman & Hendry, 2019). In the literature, VSD has been widely applied to the design of information systems (IS) (Friedman & Hendry, 2019; Manders-Huits, 2011; van Wynsberghe, 2016).

Umbrello and De Bellis (2018) explain that VSD is a unique design approach because it is proactive in such a way that it encourages predicting emerging values and realizing solutions in designs. Another advantage of VSD is that it invites a multidisciplinary approach to better address the diverse complexities of design with the involvement of philosophers, ethicists, social scientists, behavioural scientists, computer scientists, and designers (Friedman & Hendry, 2019). VSD realises values and incorporates them into design via its tripartite methodology consisting of conceptual, empirical, and technical investigations.

Friedman and Hendry (2019) elaborate on the three VSD investigations as follows. Conceptual investigations define the IS users and other stakeholders, identify the values of all stakeholders who interact with the IS, and conceptually examine how those values are positively and negatively impacted by the IS design. An empirical investigation aims to create further knowledge about those values concerning the IS, through empirical means. Finally, the technical

investigation involves designing a new IS to support the values of users as they have been understood empirically, or it involves analysing how users interact with an existing IS.

Manders-Huits (2011) suggests that VSD is too descriptive in its conceptualisation of values and that value trade-off decisions in VSD need to be grounded in normative ethical theory. Similarly, Jacobs and Huldtgren (2018) argue that for VSD practitioners to be able to legitimize value trade-offs during the design process, their approach should be grounded in ethical theory. This trend contrasts with the traditional approach to VSD which holds the plurality of values, i.e. values are neither entirely normative nor descriptive.

## 2.2. Good care

Given the continued use of VSD in the healthcare IS space (Maathuis, Niezen, Buitenweg, Bongers, & van Nieuwenhuizen, 2019; Schoenhofer, van Wynsberghe, & Boykin, 2019), concern for the provision of good care emerges. As VSD studies continue to move in the direction of normative ethics and values, the importance of descriptive ethics and values in good care is not being accounted for in the realisation of healthcare technologies created using VSD.

Like values, good care practice is neither entirely normative nor descriptive. What each person and community wants in care matters, that is, care is also person-centred (Lloyd, 2005; Tronto, 1993), culturally competent (Farber, 2019; Purnell & Fenkl, 2019), and determinative in practice (Beauchamp, 2004) or concrete situations (Abma et al., 2009). Descriptive goods expressed by individuals and groups hold instrumental value in good care practice, and they should be considered in VSD. At the same time, there are normative principles in care expressed through applied ethics that are intrinsically good and valuable, including safety and wellbeing, as identified by duty of care, professional ethics and codes, and healthcare law. Not only are some normative principles required by professional standards and law, but they are reasoned to be valuable in applied ethics in healthcare. This dichotomy of care values (i.e., the need to ensure normative intrinsic values and descriptive instrumental values at the same time) is not represented in the recent VSD literature which attempts to move the methodology to a normative grounding, thus missing the essence of VSD, as well as missing what matters in good care.

One of the greatest influences on an individual's values is each person's cultural background (Burmeister, 2013; Huang, Teo, Sánchez-Prieto, García-Peñalvo, & Olmos-Migueláñez, 2019; Sunny, Patrick, & Rob, 2019). Thus, values should be examined through a culturally sensitive lens. In good human-delivered care, understanding what individuals instrumentally value in care requires an emphasis on cultural competence (Farber, 2019; Purnell & Fenkl, 2019), person-centred care (Kamrul, Malin, & Ramsden, 2014; Santana et al., 2018), and context (Abma et al., 2009; Beauchamp, 2004). If healthcare technologies, such as care robots, are to provide good care they also need to, in part, demonstrate these key competencies by design and in-situ.

## 2.3. Care robots

Globally, there is a need for healthcare IS intervention in aged care due to the growing number of older adults and lack of caregivers in this sector (Burmeister, 2016; Burmeister & Kreps, 2018; Draper & Sorell, 2017; Garner, Powell, & Carr, 2016). In the 2019 Revision of the World Population Prospects, the United Nations (2019) predict that the global population will continue

to grow older throughout the century. The data suggests that in 2050 the worldwide percentage of persons aged 65+ will reach 15.9%, up from 8.2% in 2015 and 9.3% in 2020 (United Nations, 2019). Furthermore, the United Nations (2019) shows that life expectancy at birth is continuing to rise. In 2015 the life expectancy at birth was 70.9 (years old), rising to 72.3 in 2020, and continuing upward to 76.8 by 2050.

Compounding the problem is the decreasing amount of caregiver support internationally. Poor government funding, high job requirements, and low pay has created a lack of uptake in aged caregiver jobs internationally, including in the United Kingdom (The Lancet, 2014), the United States (Flaherty & Bartels, 2019), and Australia (Cope, Jones, & Hendricks, 2016). Health Workforce Australia (2012) predict that there will be a shortage of 100,000 nurses across all Australian healthcare by 2025. The scarcity of aged caregivers impacts older adults residing in remote and rural areas of Australia especially (Ervin, Reid, Moran, Opie, & Haines, 2019).

Care robots present an opportunity to supplement the shortage of caregivers and assist the growing older population (Miyachi, Iga, & Furuhashi, 2017; van Wynsberghe, 2013; Wright, 2018). The International Organization for Standardization, in ISO 13482:2014, define a *personal care robot*, as a service robot (one which is programmable, autonomous, and performs useful tasks for humans or equipment excluding industrial automation applications) that performs actions contributing directly towards improvement in the quality of life of humans, excluding medical applications (ISO, 2014). In aged care, robots are taking on functional roles as physical assistants (Niemelä & Melkas, 2019), personal service assistants (Martinez-Martin & del Pobil, 2018), physical rehabilitators (Fosch-Villaronga & Özcan, 2019), and health monitors (Michaud et al., 2007).

*Social care robots* are being made useful in valuable roles such as social support or companionship (Birks, Bodak, Barlas, Harwood, & Pether, 2016), emotional support with affective communication (Khosla, Chu, Kachouie, Yamada, & Yamaguchi, 2012), and social connection with telepresence systems (Moyle, Jones, & Sung, 2020). Informed by existing definitions of robots (ISO, 2012), personal care robots (ISO, 2014), and assistive social robots (Kachouie, Sedighadeli, Khosla, & Chu, 2014), the novel definition of a SCR is as follows:

A robot which operates in a caring role to assist in care, enable self-care, or replace a caregiver; interacts with care recipients on some sociable dimension, intentional or not; performs actions contributing directly towards improvement in the quality of social life of care recipients and fostering human-human connection; is programmable and has a degree of autonomy for moving within (or reacting too) its environment when performing useful tasks for humans (both caregivers and care recipients) without human operation.

On the role of SCRs in alleviating loneliness in aged care, several studies show the effectiveness of care robots in a social role. In a recent review, three studies show that SCRs, as companions for older adults, reduced experiences of loneliness (Abdi, Al-Hindawi, Ng, & Vizcaychipi, 2018). Another study in New Zealand reported that Paro, the companion robot, significantly decreased loneliness among older adults in a nursing home (Robinson, Macdonald, Kerse, & Broadbent, 2013). A different study used telepresence as a long-term tool to alleviate the sense of loneliness experienced by older adults (Cesta, Cortellessa, Orlandini, & Tiberio, 2016). The authors concluded that the psychosocial impact on the quality of life and loneliness was positive. Video-

conferencing technologies have shown to alleviate loneliness experienced by older adults in other studies (Tsai & Tsai, 2011; Tsai, Tsai, Wang, Chang, & Chu, 2010).

Broadly, across aged care, studies show that care robots are helping to improve emotional state, reduce challenging behaviours, and improve social interactions (Birks et al., 2016); engage elderly in social activities and break down intergeneration technology barriers, (Khosla et al., 2012); improve quality of life (Broadbent, Jayawardena, Kerse, Stafford, & Macdonald, 2011); improve wellbeing (Kachouie et al., 2014); reduce caregiver workload and promote self-care, positive emotions, engagement, relationships, and meaning achievement (Kachouie et al., 2014); and successfully mediate conversation (Birks et al., 2016).

No other study has addressed the need to balance and concurrently respect intrinsic and instrumental values in the design and operation of care robots; this study does so with a particular case study – LGBTIQ+ older adults.

#### 2.4. The older LGBTIQ+ community case study

LGBTIQ+ older adults experience higher rates of loneliness compared to the general older adult population within Australia (Hughes, 2016) and internationally (Fredriksen-Goldsen, 2016). In a study consisting of 312 LGBTIQ+ older adults, Hughes (2016) found that the social isolation of this population directly contributes to the high rates of loneliness reported.

As an alternative to current social supports for alleviating loneliness in the LGBTIQ+ aged care space, such as outreach services<sup>1, 2</sup> and LGBTIQ-friendly aged care facilities<sup>3, 4</sup>, this study explores the use of SCRs. However, before SCRs can be realised a VSD investigation is required. The healthcare needs and values of the older LGBTIQ+ community are under-surveyed (Fredriksen-Goldsen et al., 2013) and their values concerning technology are unexplored entirely. Thus, a VSD investigation is needed to discover this community's values otherwise the descriptive, instrumentally valuable side of good care would be overlooked in SCR design.

Each community has a value framework, consisting of particular value priorities, orientations, and interpretations (Burchum, 2002; Crawley, Marshall, Lo, & Koenig, 2002); the older LGBTIQ+ community is no different (Waling & Roffee, 2017). Tenenbaum (2011) describes the older LGBTIQ+ community as one with unique values, concerns, needs, and critical and experiential interests in aged care. In the search for cultural sensitivity, many LGBTIQ+ older adults seek out services which are LGBTIQ-friendly and healthcare professionals who are sensitive to their needs and values (Jann, Edmiston, & Ehrenfeld, 2015). The difficulty of finding a doctor who is competent in, and sensitive to, LGBTIQ+ needs and values leads to this group being “significantly more likely to delay or avoid necessary medical care compared with heterosexuals” (29% versus 17%, respectively) (Khalili, Leung, & Diamant, 2015). On the values of LGBTIQ+ older adults, the value of family is often interpreted as a *chosen family* consisting of close friends, rather than relatives (Cannon, Shukla, & Vanderbilt, 2017). Furthermore, intersex older adults define the value of *non-judgemental care* concerning their intersex status as it impacts their physical,

<sup>1</sup> See <http://www.switchboard.org.au/out-about/>

<sup>2</sup> See <http://www.umbrellacommunitycare.com.au/services/at-home-care/community-visitor-scheme/>

<sup>3</sup> See <https://arcare.com.au/qld-aged-care/parkwood-aged-care/>

<sup>4</sup> See <https://www.lintonestate.com.au/vision-linton-estate/>

hormonal, or genetic differences (Latham & Barrett, 2015). This knowledge should translate into SCR design and behaviour in-situ.

To perform the VSD investigation, an innovative VSD approach - *values in motion design* - was developed to account for good care with *value sensing robots*.

### 2.5. Values in motion design

VMD was realised to address the limitations with value sensing robots (Poulsen & Burmeister, 2019). It accounts for the pluralistic and evolving nature of values through the design of value sensing robots which make explicit value-driven decisions to govern actions. These decisions are shaped to the values of the user in-situ, when it is safe to do so, and only within a framework of intrinsic values implicitly embedded into the design. As a starting point in VMD, designers aim to develop a basic care robot framework based on intrinsic values found in applied ethics. Thereafter, designers attempt to capture instrumental, community-based values and develop a set of initial robotic behaviours to respect those instrumental values. A value-driven decision-making process should be implemented to allow the care robot to adapt to the values of the user and shape these initial behaviours to the instrumental values of the user during run-time to provide person-centred care.

To be capable of good care, care robots must uphold both applied ethics and descriptive ethics. VMD was developed to aid HRI practitioners in realising care robots capable of good care. The principles of VMD are as follows:

A distinction should be made between intrinsic and instrumental care values. This distinction is grounded in applied ethics (e.g., values emerging from professional ethics and codes, healthcare law, robot design standards, and duty of care) and descriptive ethics (e.g., values emerging from determinative in practice, person-centred, culturally competent care), respectively. Care robots must be ethically designed and ethically minded; designers should only make intrinsic value decisions, and value sensing robots are to make instrumental value decisions in relationship with the user.

Following VMD, one performs the VSD investigations, but additionally distinguishes between intrinsic and instrumental care values by examining applied and descriptive ethics. Thereafter, the intrinsic values should to be embedded in the care robot design and the instrumental values should to be realised as dynamic robot actions and programmed into the robot for it to decide what actions are right for each user in-situ using the principle of value sensing.

## 3. METHODOLOGY

To test VMD, an interpretivist, constructivist pilot study was conducted with five LGBTIQ+ older adults (three gay men, one gay gender-fluid person, and one lesbian non-binary person). Through semi-structured interviews, participants were questioned about the LGBTIQ+ experience of ageing, aged care, social isolation, and loneliness, as well as the older LGBTIQ+ community's values. These interviews were transcribed and analysed using content analysis. Ethics approval from the university and from participating LGBTIQ+ organisations, from which participants were recruited for this and the larger study, was obtained. This pilot study is a part of a larger project.

4. FINDINGS

Using content analysis, the values of LGBTIQ+ older adults interviewed were derived (see Figure 1). Figure 1 shows how LGBTIQ+ older adults prioritise values, illustrating the number of persons who cited a value and the number of times a value was referenced during all the interviews. *LGBTIQ+ connectivity and community, social connectedness, and no special attention in care* were frequently mentioned by all participants, suggesting that these are important values. Whereas *safety, diverse friendships and community, and love and attention* were cited less frequently and by fewer participants.

Table 1 shows examples of how LGBTIQ+ older adults interpret values compared to the literature. Several participants noted the value of *appreciating difference*, suggesting a key interpretation of *inclusivity* which appreciates difference rather than simply includes different people and views. *Freedom of expression* was conceptualised by all participants as *LGBTIQ+ openness*, indicating the importance of free expression of LGBTIQ+ pride (e.g., slang, symbols, and events) in the wider community.

Figure 1. The older LGBTIQ+ community’s values found in five pilot study interviews. Only those values which were referenced by three or more persons have been included.

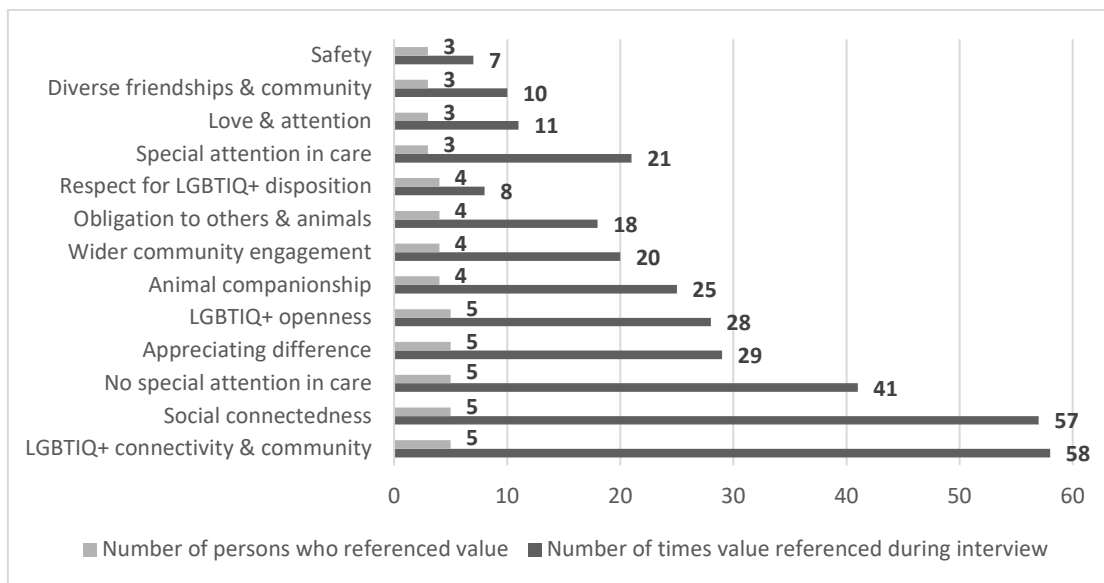


Table 1. Exemplary pilot study values compared to values found in the literature.

LGBTIQ+ older adult value interpretations	Equivalent values found in the literature
Appreciating difference	Inclusivity
LGBTIQ+ connectivity & community	Community
Diverse friendships & community	Cultural diversity
LGBTIQ+ openness	Freedom of expression
No special attention in care	Equality
Obligation to others & animals	Being needed
Special attention in care	Equity
Respect for LGBTIQ+ disposition	Respect

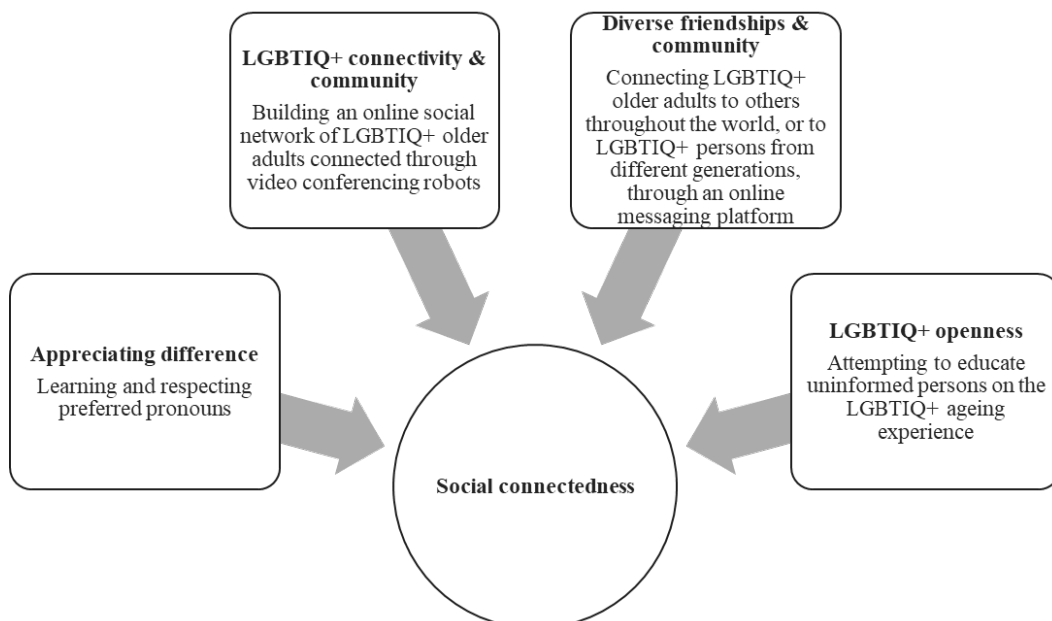
## 5. DISCUSSION

The values identified in this study can be used to configure an initial framework of instrumental, community-based values for value sensing SCRs intended for the older LGBTIQ+ community. Thereafter, using adaptive functions, the SCR can reprioritise those values and learn new ones in-situ with the user to provide person-centred care. To explain value sensing adaptive functions, by analogy, consider the current care robot Elli-Q<sup>5</sup> which examines an image, recognises the objects in an image, and provides a verbal translation of what is featured in the image. Value sensing could examine, recognise, and translate user values in a similar way.

For example, an LGBTIQ+ older adult who uses an SCR is sitting with another person, but they are no longer conversing. The SCR should be able to understand what user values are being impacted. Is the user desiring social connectedness, but they have exhausted conversation topics? Are the user and the other person struggling to socially connect due to cultural differences? Does the user enjoy the silence and feel adequately socially connected?

Knowing what user values are being impacted, and why, helps the SCR hone its delivery of care. If the SCR understands that running out of conversation negatively impacts the value of *social connectedness*, then it will be able to support the user to better exercise this value in the future. For instance, the SCR could suggest conversation topics. However, even with this social support, perhaps the LGBTIQ+ older adult is still not feeling socially connected (e.g., giving short answers or often looking away) because the SCR is suggesting conversation topics which are not relatable for the LGBTIQ+ older adult (e.g., family or children). Arising from the results shown in Table 1, observing that LGBTIQ+ older adults interpret respect as *respect for LGBTIQ+ disposition*, the SCR is negatively impacting this value. A value sensing robot should understand the values and value interpretations of different communities and individuals to provide person-centred care.

Figure 2. Designing SCR components with the older LGBTIQ+ community's value interpretations in mind, each working to ensure the normative intrinsic value social connectedness.



<sup>5</sup> See <https://elliq.com/>



Figure 2 further demonstrates how social connectedness might be achieved with the value interpretations of LGBTIQ+ older adults in mind. In run-time, value sensing robots could shift these values to better suit the values of individual LGBTIQ+ older adults. For instance, consider a video conferencing robot which plays a role in social care by hosting video calls across an online LGBTIQ+ social network. If the user does not utilise the existing functions designed to ensure *LGBTIQ+ connectivity and community*, then it might instead shift this value (and subsequent behaviours) to schedule cafe meetups with other local LGBTIQ+ older adults connected to the online social network.

## 6. CONCLUSION

The older LGBTIQ+ community hold key instrumental values regarding SCRs, including *LGBTIQ+ connectivity and community*, *social connectedness*, and *no special attention in care*. Value sensing SCRs need to adapt to the values of LGBTIQ+ older adults in a *person-centred care mode* to help overcome the loneliness that is presently widespread in this community. With adaptive functionality, SCRs can be designed to make dynamic, value-driven decisions in-situ to customise the level of care down to the person-centred level within duty of care limits.

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