BMC Geriatrics

RESEARCH

Open Access

Development of an ethical framework for the use of social robots in the care of individuals with major neurocognitive disorders: a qualitative study

Caitlin Ware[2,3], Anne-Sophie Rigaud[1,2,3*], Lauriane Blavette[1,2], Souad Damnée[1,2], Sebastien Dacunha[1,2,3], Hermine Lenoir[1,2], Matthieu Piccoli[1,2], Victoria Cristancho-Lacroix[3] and Maribel Pino[1,2,3]

Abstract

Background Despite the growing use of social robots in geriatric care, there is a lack of standardized ethical guidelines to inform and guide professionals in their implementation.

Objective This study has two main objectives: 1) to understand how professionals conducting social robot interventions (SRIs) perceive and approach the ethical issues linked to the use of social robots with older adults, and 2) to establish ethical guidelines to help professionals carry out SRIs with older adults with major neurocognitive disorders.

Methods For this descriptive qualitative study, we conducted interviews with 20 healthcare professionals working in geriatric facilities. The interviews were recorded and transcribed, and an inductive content analysis was performed to identify certain themes and recommendations concerning the use of social robots with older adults with major neurocognitive disorders.

Results Six main themes emerged from the analysis of the interviews: deciding on and preparing the robot's integration into an institutional setting, preparing a robotic intervention, introducing the robot to older adults, obtaining consent or assent, conducting a robotic-mediated intervention, and observing the effects of social robot use.

Conclusion The use of social robots should be guided by the same ethical guidelines followed in all therapeutic interventions; however, healthcare professionals express a need for special training and preparation for SRIs in geriatric settings. We have drafted several preliminary recommendations for carrying out SRIs with older adults with major neurocognitive disorders. Future research should focus on standardizing guidelines and creating an accessible format for training.

Trial Registration IRB N°: 00012021–110.

Keywords Ethics, Social robots, Older adults, Major neurocognitive disorders, Qualitative research

*Correspondence:
Anne-Sophie Rigaud
anne-sophie.rigaud@aphp.fr
Full list of author information is available at the end of the article

© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.

Introduction

The aging of the global population is leading to an increased prevalence of chronic and disabling diseases, consequently creating greater needs for long-term care and adequate care services [1]. To better address these needs, various healthcare interventions using innovative technologies, such as social robot interventions (SRIs), have been developed [2, 3]. Social robots come in different forms of embodiment and design [4]. For example, they can be human-like, incorporating human characteristics, such as the robot NAO, or animal-like, resembling a pet or cuddly toy, such as the robot PARO, which looks like a baby harp seal. The main feature of social robots is their ability to interact with humans through speech, gestures, or emotional behavior.

In recent years, the number and types of social robots used in geriatrics has increased [2, 3, 5, 6]. SRIs have also been confirmed to be feasible and acceptable to older adults with major neurocognitive disorders (*i.e.*, dementia), informal caregivers, and care staff [7]. These interventions fall within the scope of psychosocial interventions, i.e., non-pharmacological interventions aimed at improving the quality of life, cognitive skills, mood, or behavior of older adults with dementia through a wide range of activities [8]. The scientific literature on SRIs for dementia care has focused primarily on their impact, demonstrating positive effects on older adults' well-being, mood, and social interactions [3, 6, 9, 10]. For example, SRIs using PARO have been shown to reduce stress, negative emotions, and behavioral symptoms, as well as improve social interactions and the quality-of-care experience [11]. Some studies have shown that the NAO robot can facilitate cognitive and physical exercises [12, 13] and provide medical information [14]. Social robots can also be used in mediation, acting as intermediaries between beneficiaries and therapists [14].

However, the emergence of these new therapeutic interventions raises deontological questions. Some authors have specifically addressed ethical concerns raised by SRIs, such as the reduction of human contact [15], misrepresenting or concealing the robot's true nature [16], and maintaining dignity and autonomy, which involves obtaining participants' consent [8, 17], and protecting personal data [18]. However, research on ethical recommendations for SRIs tailored to older adults is sparse, and standardized ethical guidelines for health professionals have not yet been developed.

Drafting ethical guidelines for SRIs requires a careful and comprehensive analysis of the situations experienced by professionals in the field. These recommendations will assist health professionals in maintaining ethical standards while conducting SRIs with individuals living with dementia. This study had two main objectives: (1) to understand how professionals who conduct SRIs perceive and approach the ethical issues of social robot use with older adults and (2) to establish ethical guidelines to help professionals carry out SRIs with older adults.

Materials and methods

Recruitment of participants

To achieve these two objectives, we conducted semi-structured in person interviews with professionals including medical doctors, nurses, psychologists, neuropsychologists, physical therapists and activity leaders with experience in using social robots with older adults in nursing homes and geriatric hospitals in and around Paris (France). Our recruitment method can be defined as convenience sampling as we included twenty healthcare professionals who were available to answer our questions during the study. Although these professionals came from different disciplines, they worked together with a shared, comprehensive, and complementary approach to the care of older adults in institutional settings. Our interviews allowed us to reach data saturation. The participants did not receive any compensation for the interviews.

Interview method

An interview guide for professionals in geriatric facilities who use or have used social robots in their daily practice was developed and is detailed in Annex 1. To ensure question validity for the interviews, the following steps were taken. Firstly, research experts (CW and VCL) wrote the questions based on prior research on ethical concerns in social robotics. Secondly, other experts (MPin and ASR) reviewed the questions before use. Thirdly, a small set of test interviews were conducted with healthcare professionals (BL, SD, MPic, HL) to refine unclear questions. In addition, we used a structured interview guide to ensure consistent questioning. The semi-structured interviews included, but were not limited to, the following three main research questions:

1. How should SRIs be conducted? More specifically, how should the robot be presented to the beneficiary, and what procedures should be followed to obtain the participant's consent?
2. What ethical issues are raised by SRIs in geriatrics?
3. What is the robot's role in SRIs, and how does it affect human interactions, infantilization, and autonomy?

Data analysis

The interviews were recorded and transcribed. After transcription of the interviews, the recordings were

deleted. The content of the interviews was analyzed via an inductive thematic analysis method inspired by Braun and Clarke (2006) [19]. This method involves multiple readings of the interviews to thoroughly understand the content, identify the topics addressed, and categorize the comments to maximize the results. After initial coding of the interviews, the codes were organized into themes, which were reviewed and then arranged into a thematic map. Finally, the themes were defined and named, with examples provided to illustrate each theme. To assess inter-rater reliability in coding the interviews, we employed a systematic approach involving two researchers (VC, ASR). Each researcher independently carried out an inductive thematic analysis of the interview content. Following this, we compared the assigned codes to determine the level of agreement between the two raters. In instances where discrepancies arose, we facilitated discussions to resolve differences and refine the coding scheme as needed. This process ensured a consistent and reliable coding framework, thereby enhancing the validity of our study's findings.

Results

Between January and June 2022, 20 professionals were interviewed. They included 70% women and 30% men. The participants' gender, profession, and professional experience are listed in Table 1. The average interview duration was 47.8 min (SD 7.03 min).

Table 1 Participants' professions, gender, and years of professional experience

Participants	Profession	Gender	Years of experience
P1	Geriatric physician	M	> 15
P2	Geriatric physician	M	> 15
P3	Geriatric physician	M	> 15
P4	Psychologist	F	> 5
P5	Psychomotor therapist	F	> 5
P6	Psychologist	M	> 15
P7	Psychologist	F	> 15
P8	Geriatric physician	F	> 15
P9	Activity leader	F	< 5
P10	Geriatric physician	M	> 15
P11	Psychologist	F	> 5
P12	Neuropsychologist	F	> 15
P13	Neuropsychologist	M	> 15
P14	Neuropsychologist	M	< 5
P15	Neuropsychologist	F	> 5
P16	Psychologist	F	> 5
P17	Activity leader	F	< 5
P18	Psychologist	F	> 15
P19	Activity leader	F	> 15
P20	Psychologist	F	> 15

Themes overview

Six main themes emerged from the analysis of the interviews: (1) deciding on and preparing the robot's integration into an institutional setting, (2) preparing a robotic intervention, (3) introducing the robot to older adults, (4) obtaining consent or assent from older adults, (5) conducting a robotic-mediated intervention, and (6) observed effects of SRIs. Additionally, various subthemes were identified, as shown in Table 2.

Deciding on and preparing the robot's integration into an institutional setting

The ethical use of social robotics should be considered not only from the perspective of beneficiaries but also from that of professionals, who may perceive their introduction into geriatric care practices as disruptive or imposed**.** Additionally, in understaffed teams, the expectation to integrate a social robot into daily care can feel overwhelming, particularly when professionals are not involved in the decision-making process regarding its implementation.

a) Involving Professionals in the Decision to Implement SRIs

None of the professionals interviewed reported being involved in the decision-making process regarding the type of robot, or any kind of technology-based activity, or its potential usefulness within their team. For some healthcare professionals, the inclusion of the robot in their practice was challenging, possibly because the robot was imposed rather than requested.

> *Therefore, for us, it was quite a shock, because we did not ask for the robot. It was suggested to us. However, it was not a request from the psychology team, for example, the activities team, or the rehabilitation team. It came, well, it invited itself into our residence. (Psychologist)*

Professionals emphasized the need to be involved in decisions about how to acquire robots to prevent feelings of imposition and to ensure that the technology is adequate to both patients' and their needs.

> *We mustn't forget that the users of this robot are the patients, but they're also the professionals because most of the patients are dependent, and so it [the robot] is going to go through professionals, so they're also users. (Geriatric physician)*

Table 2 Synthesis of results describing main themes and subthemes

Theme	Subtheme
1) Deciding on and preparing the robot's integration into an institutional setting	a) Involving professionals in the decision to implement SRIs
	b) Reflecting on human resources before implementing SRIs
	c) Respecting professionals' choice to use social robots
	d) Building on existing protocols and ethical standards
	e) Organizing team training
2) Preparing SRI sessions	a) Selecting criteria for the participation of older adults in SRIs
	b) Informing families and informal caregivers about SRIs
3) Introducing the robot to older adults	a) Taking into account the robot's appearance
	b) Explaining the Wizard of Oz technique
	c) Respecting beneficiaries' beliefs about the robot
	d) Clarifying the objectives of SRIs for the patients
	e) Adapting SRIs to each particular context
4) Obtaining consent or assent from older adults	a) Clarifying consent versus assent
	b) Ensuring continuous consent during the sessions
	c) Understanding and revisiting interest in the robot
5) Conducting SRI sessions	a) Ensuring human supervision and mediation in SRIs
	b) Navigating technical issues in SRIs
	c) Ethical reflection on the risk of infantilization
6) Observed effects of SRIs	a) Observed benefits for older adults
	b) Observed benefits for professionals

b) Reflecting on Human Resources Before Implementing SRIs

Professionals emphasized the need to evaluate the human resources required to implement SRIs before integrating robots into institutions. The implementation of SRIs demands extra time and effort from professionals for different reasons, such as the need for training. Professionals highlighted the necessity of anticipating that trained teams might leave the institution, particularly in departments with high turnover rates, such as oncology. Consequently, the time and costs required to train new teams must be included in the decision to implement a robot in the institution.

> *It takes an extremely long time to train people because you have to take time off work. But when you take time off, you have to find someone else to take your place, because the older adults aren't going to be on their own like that... (Activity leader)*

Preparing activities with a social robot also requires additional effort from teams. They had to reorganize their roles and tasks, acquire new knowledge, and dedicate extra time to setting up the workshops.

> *We had to do a lot more upstream work than we would have done without the [robot] NAO. We had to spend a lot of time preparing the whole session. You can't anticipate what's going to be said, for example, what words are going to be chosen for a text. (Psychologist)*

c) Respecting Professionals' Choice to Use Social Robots

Many professionals have questioned the usefulness of social robots and their actual impact on patients, exhibiting a degree of mistrust. Therefore, professionals who played the role of "facilitators" in driving the adoption of SRIs within the team or organization, highlighted the benefit of demonstrating how the robot works instead of merely discussing it.

> *When I wanted to present the robot to my team, I talked about it without showing it, and well, reactions were mixed, [...] but then I didn't explain anything, I just put the robot in front of them (the team) and showed them what it could do, [...] the team was quite fascinated by... and I said to myself, well already, if the professionals get a bit involved with the robot, it'll also give them a starting point. (Neuropsychologist)*

However, facilitators also emphasized the importance of respecting professionals' preferences and perspectives on these new technologies.

[B]ut the more or less positive reception from the teams is natural. We respect each other's choice of therapeutic practices: some use massage, touch, music, and some have agreed to use the robot. The aim is to see what can best suit and help each patient. (Psychologist)

d) Building on Existing Protocols and Ethical Standards

Professionals emphasized the advantage of building SRIs based on existing care interventions, with the addition of a social robot, rather than creating new ones from scratch. Attempting to develop entirely new interventions can generate additional stress for teams. Some of this extra time and effort could be spared by integrating the social robot into existing therapeutic groups and activities. When the robot arrived, professionals preferred to use it within activities they had already mastered. They could feel reassured by conducting an activity where the robot is the only new element.

[E]veryone has first chosen something [an activity] with which they're already comfortable, ... and now they're involving on a new teammate [the robot] they did not know. So, there can't be another unknown in the equation, because... it won't work! (Physical therapist)

e) Organizing Team Training

Healthcare professionals expressed dissatisfaction with the insufficient training content available to them regarding SRIs. In their view, the materials provided by the manufacturer were limited to technical issues and did not address other topics, such as the therapist's role during the intervention. A psychologist emphasized the need for guidelines concerning the use of social robots.

Having a meeting [training session] is good, but if there's nothing to back it up, it's all downhill from there, because if you don't use the tool [the robot] the next day, you need something to fall back on. (Psychologist)

Professionals have suggested several ideas to improve training, such as proposing training meetings with role-playing exercises or discovery sessions with robots.

I think that the presentation of the robot and then perhaps some role-playing could be interesting, to learn to adapt to the reactions of the patient in front of you, right. [...] You must adapt to each case, to events. (Physical therapist)

Some interviewees suggested the use of videos as an efficient, fun, and accessible approach to training.

Yeah, well, the problem with professionals [...] is that they also have very, very, very, very little time, [...] but I think the best training for me is oral training, role-playing, and possibly more video-based material that's shorter to watch and more enjoyable than reading. (Psychologist)

Preparing SRI sessions

As with any type of intervention, healthcare professionals using social robots stressed the importance of tailoring activities based on users' profiles, relying on prior knowledge of the patient and their entourage.

a) Selecting Criteria for the Participation of Older Adults in SRIs

Professionals emphasized the need to define the profiles of individuals who could participate in SRIs. For example, the PARO robot was deemed appropriate for those in the advanced stages of dementia, as it reassured them and elicited affectivity that facilitated interaction. However, there was no single rule for selection; instead, professionals relied on their experience and knowledge of individual situations to define target groups.

For the memory workshop, I wanted a fairly high MMSE [cognitive functioning score]. So, we're automatically on MMSEs above 20. And for the gentle gymnastics, I was less fussy and included more people with praxis problems. (Neuropsychologist)

Healthcare professionals considered themselves capable of identifying individuals who might be more or less interested in the robot before proposing it. They could also anticipate who might initially refuse but later show interest after observing others or hearing positive feedback.

We've had people who were refractory [to the use of the social robot], and they're free [to choose whether or not to participate] too, aren't they? [and others] who couldn't stand it at all. That's it. People say negative things to us, like 'I'm not interested. Oh no, but do you take me for a fool?' And then, well, they left, but that didn't stop some of them, after a while, from wanting to come back to the group [using the robot] and see what happened. (Activity leader)

Some reservations were expressed regarding patients with a history of severe psychiatric disorders, as the use of the robot could generate anxiety during or after use:

[F]or some individuals, particularly those with psy-

chotic disorders, the removal of the robot could trigger intense anxiety, resulting in emotional distress, crises, or crying episodes. (Geriatric physician)

b) Informing Families and Informal Caregivers about SRIs

Healthcare professionals noted that informing and discussing with family members and informal caregivers helped dispel preconceived notions about social robots and establish a relationship of trust with the institution. One professional shared this anecdote:

There was a nursing home that did something great: before bringing in the robot, they held a kind of meeting with the families (…), and they said, 'We're going to participate in a [research] protocol; they're going to send us a robot,' and they presented the robot (…), explaining why they were going to use it with their loved ones. And I thought that was great because it already allows you, in a way, to gather a kind of consent—which you don't have to ask for legally, if the person [older adult] isn't under guardianship—but it's a form of family approval and information. That way, the next time they [family members] come to the nursing home, if they see the seal [robot], they won't be like, 'What is this thing?' (Psychologist)

Introducing the robot to older adults

The interviews highlighted specific ethical issues associated with SRIs that must be considered when the social robot is presented to beneficiaries. Professionals unanimously agreed that the robot should be presented transparently, with a clear explanation of its nature and purpose. However, they highlighted that the content of the presentation, as well as the methods and expressions used, should be adapted to each situation.

a) Taking into Account the Robot's Appearance

Professionals should be careful in their description of the social robot, as its appearance and fairly autonomous movement capabilities can be misleading for some beneficiaries.

I think the first thing is to make it clear that it's a robot. […] I think there are certain situations in which it's not necessarily obvious to understand this. I'm thinking of certain robots, let's call them animaloid, where you can sometimes believe that it [the robot] is not really a robot, and so this is important. (Geriatric physician)

b) Explaining the Wizard of Oz Technique

Transparency is a recurring issue concerning the use of the NAO robot and the "Wizard of Oz" technique that is sometimes used to control the robot. In this technique, an engineer or a trained professional manages the robot's movements and speech from a computer in real time. Regardless of their cognitive status, understanding the Wizard of Oz technique can be challenging for patients, e.g., too abstract or technical. Professionals have suggested the use of metaphors with remotely controlled objects or cordless phones to facilitate the understanding of beneficiaries.

Many patients believe that the NAO robot operates entirely on its own, which can be misleading. To clarify the Wizard of Oz technique, I use simple metaphors to explain that a professional is actually controlling its actions in real-time. This approach helps build trust and ensures transparency in our interactions. (Psychologist)

c) Respecting Beneficiaries' Beliefs about the Robot

Most professionals believe that while some beneficiaries recognize social robots as inanimate objects, they willingly engage with them as if they were animated beings or even live animals. Excessively emphasizing that the robot is merely a machine can undermine the purpose of the SRI.

When I introduce the robot, I don't want to mislead them about the idea of it [seal or cat robot] being an animal. However, I also avoid over-explaining its functionality, as too much detail could disrupt their ability [the beneficiaries/patients] to project onto it, potentially creating a barrier to engagement. (Psychologist)

Some professionals believe that allowing individuals to interact with the robot freely enables the most meaningful benefits to emerge. They worry that constantly reminding patients of the robot's mechanical nature could break their engagement and diminish the positive effects of the interaction.

I believe it's important to accept that the patient is using a metaphor [perceiving the robot as more than just a machine] without trying to convince them otherwise. (...) It helps them reminisce and evoke emotions. In the end, the robot is just an object, but I see no issue with them talking to it, just as one might talk to a stuffed animal. [...] I think it would be incredibly tiresome if the clinician kept insisting, 'It's

a machine, I remind you it's a machine!' That would be pointless. (Neuropsychologist)

d) Clarifying the Objectives of SRIs for Patients

Transparency with the patient regarding the objectives of the robotic intervention is strongly encouraged, as it helps build trust and facilitates engagement. An onco-geriatrician highlighted this approach, explaining how the robot can be introduced as a comforting tool:

We know that the bandage treatment may be painful, so we give you this robot to hold onto, helping to distract you and ease the discomfort. [...] Once we're done, we'll leave it [the robot] with you for a while before moving on to something else. (Onco-geriatrician)

This explanation reassures the patient, framing the robot as a supportive presence during a potentially distressing procedure.

e) Adapting SRIs to Each Particular Context

A key principle in promoting the integration of social robots into professional practice appears to be flexibility. According to professionals, a single guide intended to prescribe a uniform approach—whether in terms of the type of intervention or the way the robot is introduced—would be unworkable, given the wide range of situations and patient or resident needs. In care institutions serving older adults, the organizational context, the work climate, the perspectives of the care team, and the available human and material resources all shape how the robot is used and the step-by-step procedure, or protocol, for integrating it into daily care practices.

They tried to minimize difficulties for the staff by only using PARO [the robot] at night. This prevented interference with other professionals and allowed scheduled daytime care activities to continue uninterrupted. (Geriatrician)

Obtaining consent or assent from older adults

In institutions such as nursing homes that accommodate individuals with dementia, obtaining informed consent and assent for the use of social robots can be particularly complex.

a) Clarifying Consent Versus Assent

The information provided to participants enables them to understand the terms of the SRI and give their agreement before participation. One of the geriatricians emphasized the importance of clearly distinguishing between consent and assent:

But most of the time, people with dementia are not necessarily capable of giving consent in the legal sense of the term [...] Consent basically implies having understood the situation, having analyzed the different possibilities and alternatives that may exist, thirdly, having made a choice and fourthly, maintaining it over time. (Geriatric physician)

When it is not possible for the beneficiary to communicate verbally, professionals focus on obtaining assent. Assent is an intermediate solution for obtaining the agreement of people who are unable to consent to an intervention.

The therapist evaluates whether a person agrees or hesitates to engage with the robot, recognizing that *"a slight disagreement is considered a lack of consent, which is ultimately interpreted as a refusal to participate [in the SRI session],"* explained the geriatrician. Moreover, obtaining assent requires professionals to actively supervise human–robot interactions and interpret various behavioral cues, while obtaining consent primarily involves following a formalized procedure. Assent is provisional and must be continuously confirmed throughout the intervention, whereas consent is obtained at a specific point in time. Consequently, therapists must remain vigilant, adjusting or halting the activity if a participant shows signs of discomfort. However, consent and assent can be complementary. As one psychologist explained, residents or their relatives give general consent for all institutional activities upon admission, while staff continuously assess verbal and nonverbal cues to obtain assent for each specific activity.

b) Ensuring Continuous Consent During the Sessions

Professionals agree that recognizing a patient's discomfort, rejection, or engagement with the robot is a crucial skill developed through training and experience. When using social robots, they observe that individuals with impaired judgment or verbal expression can still communicate their reactions through gestures such as turning away, grimacing, or shouting. Understanding both negative responses (e.g., agitation or distress) and positive ones (e.g., engagement or enjoyment) is essential for interpreting a patient's experience. Facial expressions, body language, and other nonverbal cues provide key insights into their comfort and willingness to interact. To accurately assess these signals, professionals emphasize the importance of knowing the patient's profile, including their physical and mental health, life history, preferences, and dislikes. This knowledge enables them to anticipate

reactions, adapt interactions accordingly, and ensure that the robot's use remains suitable and beneficial. As one activity leader described:

> *We try to observe the person's reaction—it's already a good indicator. If they don't start screaming, crying, or trying to leave, then maybe there's something we can build on. (Activity Leader)*

Verifying a participant's willingness during each session is crucial, making assent verification an ongoing process rather than a one-time event. In SRIs, professionals must actively mediate interactions, ensuring that the patient remains comfortable and engaged. Obtaining formal consent, whether written or verbal, is not always a natural or practical approach in certain care interactions:

> *I can hold the robot under my arm or place it on her [the patient] if she is seated. I observe the patients' reactions to see if they are interested or not. It's a very gradual process, but I don't necessarily ask for explicit consent—yet, in one way or another, it is obtained. (Psychologist)*

Thus, in SRIs, obtaining assent through behavioral observation may be more appropriate than relying solely on explicit verbal consent, similar to other activities where direct agreement is rarely sought.

c) Understanding and Revisiting Interest in the Robot

Just as professionals carefully monitor consent, they also recognize that a patient's initial refusal of the robot does not necessarily mean they will never be interested in it. Instead of interpreting a single rejection as definitive, they suggest reassessing the patient's response over time and making multiple attempts while gauging their level of interest. However, if the robot is consistently refused at each presentation, it is important not to insist. The challenge arises when a patient's emotional receptiveness is uncertain at a given moment, requiring careful observation to determine whether reintroducing the robot is appropriate.

> *I rely on gestures and behavior... We can try several times and observe what happens over time. However, if she [the patient] doesn't want to participate in the [robot-mediated session], I don't insist. (Neuropsychologist)*

Conducting SRI sessions

Most professionals interviewed felt that the ethical and professional principles guiding the use of social robots were not fundamentally different from those already applied in their practice or within the broader health and social care context**.** However, they identified certain ethical concerns that may be unique to SRIs. These aspects will be explored in the following sections.

a) Ensuring Human Supervision and Mediation in Social Robot Interventions

Healthcare professionals emphasized the essential role of human supervision in SRIs, stressing that robots should never replace human interaction but rather serve as a tool for therapeutic mediation:

> *I believe under no circumstances should they replace or substitute a human. In other words [...] it's a tool, a tool, and it must remain a tool [...] the robot must remain under the healthcare provider's control [...] It's a tool among other therapies. (Psychologist)*

All professionals interviewed recognized the importance of human presence and mediation in interactions between robots and beneficiaries. This explains why they do not see social robots as a replacement for their role in geriatric care but rather as tools that complement their work. For some, the human mediator is the cornerstone of these interventions, ensuring meaningful and appropriate engagement. Additionally, many professionals highlighted the need for training to effectively fulfill this mediating role.

b) Navigating Technical Issues in Social Robot Interventions

Professionals acknowledged the robot's limitations, which required them to develop new strategies to manage technical issues. Delayed responses, comprehension errors, battery failures, or mechanical malfunctions could cause confusion and frustration among beneficiaries (the participants in SRIs). Many professionals emphasized the need for a human mediator to compensate for these shortcomings.

> *We never leave a patient with dementia alone with these technologies [social robots]. These are patients who cannot verbalize, and by default, we offer them this experience—typically when they are very distressed [showing signs of agitation or anxiety]. When you're distressed, you don't want to be alone; you want someone with you [to provide reassurance and support]. (Psychologist)*

To address these challenges, professionals developed strategies to manage unexpected technical issues, often incorporating humor and improvisation to maintain a positive and engaging atmosphere. For example, when robots responded too slowly or malfunctioned,

facilitators would use lighthearted remarks to ease participants' concerns and prevent frustration. In the case of NAO (the robot), if it took too long to respond, the facilitator might joke, *"Are you tired, NAO?"* to reassure participants, who sometimes feared they had caused the issue. Over time, these strategies were refined and integrated into the structured scenarios of the sessions, ensuring smoother interactions and minimizing potential distress.

> *There are always little moments of 'Oh, why did it do that?' or 'Oh, it fell!' So, during the session (…), you had the main facilitator and NAO (the robot), and the facilitator would talk to NAO to keep the participants engaged, saying things like, 'So, NAO, you still haven't answered the question.' (Activity leader)*

Interestingly, older adults did not seem to hold the robot accountable for its mistakes. Instead, professionals observed that its "imperfections" often encouraged amusement and empathy, allowing participants to immerse themselves in the interaction and engage playfully by making jokes or offering words of encouragement to the robot.

However, technical malfunctions could also provoke concern and anxiety, particularly among participants who perceived the robot as a sentient being and believed it had "hurt itself." Some respondents reported that users struggled to understand how the robot functioned, as its movements appeared autonomous. Using the example of NAO, a psychologist explained that many participants had difficulty grasping that the robot was continuously controlled by a computer. To clarify this, they used a familiar analogy**,** comparing the robot's remote operation to a cell phone communicating with a network**,** an explanation that helped residents better understand its functionality.

c) Ethical Reflection on the Risk of Infantilization

The introduction of social robots in geriatric care settings raises ethical concerns, particularly regarding the risk of infantilizing patients**,** depending on how the robots are presented and used. Professionals noted that whether the use of a social robot is perceived as infantilizing largely depends on how it is introduced to beneficiaries. However, they identified different factors contributing to this perception, highlighting various aspects rather than a single defining cause. For example, a psychologist and a physical therapist pointed out that not all robot models and designs carry the same risk of infantilization. They emphasized that appearance plays a key role in perception, noting that PARO (a seal robot) appeared *"too childlike,"* resembling *"a big cuddly toy,"* whereas residents preferred NAO (a humanoid robot), which they did not associate with being *"for children."*

In addition to the robot's model and design, other professionals highlighted the importance of how the robot is introduced and framed during interactions. The way the therapist presents the robot, along with broader linguistic elements—such as syntax and intonation—plays a crucial role in either reinforcing or mitigating infantilization. Consequently, infantilization may not be inherent to the robot or the activity itself but is instead shaped by the therapeutic context and the professional's approach.

> *In fact, it is more than just the robot itself; what makes the difference [regarding the risk of infantilization] is how the professional presents it. For example, if a person is interacting with the robot and the care worker says, 'That's a nice toy, you've got a nice toy' (in a deliberately naïve tone), it reinforces a childish perception. [...] You never present NAO as a toy; it's not a toy. (Psychologist)*

Observed Effects of SRIs

Despite initial reluctance among some healthcare professionals regarding the use of social robots, most ultimately recognized their benefits after witnessing their impact in practice. Many were surprised by the effects observed, not only on certain patients but also on the professional team.

a) Observed Benefits for Older Adults

Healthcare professionals observed that using social robots helped older adults express emotions and experiences more freely, stay engaged in activities, foster a positive mood, and reduce anxiety. Additionally, they noted that some robots appeared to aid sleep and alleviate agitation, while others stimulated creativity and imagination.

To explain these positive effects, professionals proposed several hypotheses. They suggested that the ease of interaction stems from the simplicity of the relationship, characterized by a lack of judgment, which is facilitated by the robot's neutrality or appealing appearance. Some professionals likened this effect to that of cuddly toys, dolls, or therapy animals like dogs. Others attributed the benefits of certain robots to their ability to restore a sense of touch, emphasizing that for many patients, physical contact is often associated with unpleasant experiences such as hospital transfers, bathing, or medical procedures.

In some cases, the presence of social robots appeared to encourage patients to express fears or confide in professionals. These exchanges seemed to be facilitated by

the perception of being listened to or the simplification of interactions that robots provide. Unlike humans, robots do not expect responses, express surprise, or pass moral judgments, which, according to some professionals, reduces the anxiety and complexity of human interactions. In particular, the robot's predictable and neutral behavior seemed to create a less intimidating social environment for patients. One activity leader shared an experience that illustrated this effect.

> *I had a really striking moment with a social robot in a dementia care unit. There was this one lady, very withdrawn, who barely engaged with anyone. One day, I set up the robot to sing and dance. At first, the residents were surprised, but as it continued, something remarkable happened—this lady slowly turned toward it. Then, out of nowhere, she reached for my hand, something I had never seen her do before. It was a really touching moment that showed just how powerful these interactions can be. (Activity leader)*

b) Observed Benefits for Professionals

For some healthcare professionals, integrating robots into their practice provided a valuable complement to their existing care strategies, particularly when supporting individuals with dementia. Engaging with patients who experience confusion, anxiety, or repetitive speech can require continuous emotional attentiveness, and professionals found that social robots could serve as an additional tool to help address these emotional needs. Observing patients confide in the robot or use it as a mediator allowed professionals to broaden their approach, ensuring that patients felt heard while also creating moments of emotional relief for both patients and caregivers.

As one psychologist reflected, *"there was initially a sense of sadness in seeing patients rely on a virtual entity for emotional expression."* However, the robot's presence ultimately enriched their approach by providing a neutral and reassuring space where patients could share personal thoughts or feelings more freely. The psychologist further noted that the robot could act as an intermediary**,** allowing patients to express thoughts they might hesitate to share directly with a caregiver. By speaking to the robot, patients could maintain a certain distance, expressing themselves without the immediate social expectations that come with human interaction. Unlike with a professional, where an exchange naturally leads to a response, the robot creates a space where the patient does not necessarily seek an answer but rather a form of attentive listening:

> *But then I thought that, in some cases, it's as if the patient is saying, 'I'm telling this to the robot so that I don't have to say it to you directly, but I'm still saying it to you (as a caregiver).' So, in the end, it creates a certain distance, a kind of restraint… because if I tell something to a professional, they will interact with me. Here, the patient doesn't necessarily expect a response, but rather the quality of listening. (Psychologist)*

Discussion

This study aimed to explore the perspectives of healthcare and social care professionals on the introduction of SRIs for older adults, with a particular focus on the ethical considerations surrounding these practices. Additionally, it sought to develop professional practice recommendations to support the effective implementation and use of social robots, particularly in managing situations that may present ethical challenges.

To achieve these objectives, we conducted a qualitative study involving in-depth interviews with 20 healthcare professionals experienced in SRIs. Through these interviews, we gathered insights into their perceptions, experiences, and perspectives on key aspects of SRIs, including how robots are introduced to patients, procedures for obtaining informed consent from older adults, and criteria for assessing the suitability of these interventions for specific individuals. Participants highlighted several critical considerations, particularly ethical concerns and the need for professional training, both of which are essential for the successful integration of SRIs in institutional settings.

The need for additional preparation and training

The analysis of the interviews highlighted the importance of thorough preparation before acquiring a robot and SRIs, as well as the need to align these practices with healthcare ethical and professional guidelines. Despite recognizing the potential benefits of SRIs, healthcare teams reported a lack of available training on how to effectively integrate social robots into their work with residents. Participants noted that existing training materials from robot manufacturers focus primarily on technical aspects, often neglecting crucial elements such as the professional's role and ethical considerations in SRIs. This gap reinforces findings from previous studies, which emphasize the need for comprehensive training to ensure responsible use of social robots [11].

For instance, the IENE 10 project, led by Papadopoulos and Lazzarino (2024), represents a pioneering effort to address these training needs. Recognizing the lack of evidence-based, open-access training for health and social care professionals on socially assistive robots, the

project developed and evaluated the first Massive Open Online Course (MOOC) on social robot use in healthcare [20]. The course, designed through a collaborative, international approach, was structured around four core modules: awareness, knowledge, sensitivity, and competence. It provided training on robot functionality, operation, and key ethical issues related to their integration in care settings. A total of 185 participants completed the course, reporting improvements in their knowledge and skills related to social robots. The program was well-received, with participants rating its quality between good and excellent.

Similarly, in our study, professionals emphasized the value of practical training methods, particularly role-playing exercises and video-based instruction, as flexible and accessible ways to build competence. The integration of hands-on experience with structured training programs, underscores the need for a holistic training approach that prepares professionals for both practical challenges and ethical dilemmas, ensuring effective and responsible use of social robots in healthcare.

Identifying suitable beneficiaries for social robot interventions

Professionals emphasized the importance of identifying whether a social robot would be of interest to a beneficiary. This aligns with the literature, which highlights the need to assess individual preferences, needs, and cognitive abilities before introducing the robot [21]. Determining a resident's receptivity is crucial, as engagement with a social robot should be voluntary and meaningful. Some individuals may find the robot stimulating and enjoyable, while others may feel indifferent or even distressed by its presence. Tailoring interventions based on personal interests and emotional responses ensures a more effective and ethically sound integration of SRIs into care settings.

The importance of how the robot is introduced

Our findings suggest that the way a social robot is introduced plays a key role in shaping the resident's perception and willingness to interact with it. Experts in our study recommended personalizing the introduction based on the individual's cognitive abilities, past experiences, and the specific context of the activity. This approach is consistent with existing research, which underscores the importance of adapting the presentation to ensure that explanations are clear, accessible, and aligned with the resident's interests and life history [21]. A well-structured introduction can foster familiarity, increase comfort, and prevent potential misunderstandings.

Addressing the complexities of consent and assent in social robot interventions

Obtaining consent for SRIs is a key ethical concern, particularly when working with individuals with dementia. Professionals in our study noted that assessing consent capacity can be challenging, as some individuals may have fluctuating awareness or difficulty expressing their preferences. To address this, professionals adopted a flexible approach. When residents could communicate verbally, they were directly engaged in decision-making. For those with cognitive impairments, professionals relied on nonverbal cues such as facial expressions, gestures, and behavior to assess assent or refusal. This aligns with research highlighting the importance of recognizing nonverbal indicators of willingness or discomfort [21, 22].

A key distinction was made between consent, a formal agreement obtained at the institutional level, and assent, an ongoing expression of willingness. While initial consent may be given by residents or their families, assent must be continuously monitored throughout the intervention to ensure that individuals are comfortable and willing to engage.

By integrating assent-based practices, professionals help ensure that SRIs remain person-centered and ethically sound. Future research should focus on developing clear guidelines for assessing both consent and assent, prioritizing the autonomy and well-being of older adults.

Enhancing human connection through social robots

A key finding of our study was that professionals viewed social robots as complementary tools that support, rather than replace, human interaction. While concerns have been raised about robots reducing face-to-face engagement, our findings suggest that they can enhance communication and connection**,** particularly for residents with dementia.

For instance, Hung et al. (2019) found that using PARO helped facilitate meaningful interactions between professionals and residents, helping individuals with cognitive impairments stay engaged [11]. Similarly, Koh et al. (2023) highlighted that social robots can empower professionals by providing alternative ways to engage residents**,** particularly those who struggle with traditional social interactions [21]. These findings reinforce the need for adaptable approaches in SRI implementation, ensuring that robots are used to foster relationships rather than replace them.

Challenges in implementing social robot interventions

Professionals conducting SRIs reported encountering technical limitations, requiring them to adopt adaptive strategies to maintain engagement. One of the most

effective approaches was the use of humor, which helped address issues such as delayed responses, misinterpretations, or malfunctions. By reframing technical difficulties as part of the interaction, professionals were able to reduce frustration and maintain a positive atmosphere for participants.

Another major concern raised was the risk of infantilization. Professionals in our study emphasized that how the robot is introduced and integrated into interactions significantly influences whether it is perceived as infantilizing. They highlighted that the way professionals communicate about the robot—through their language, tone, and overall framing of its role—plays a key role in shaping perceptions. For instance, using playful or overly simplistic language or referring to the robot as a "toy" may lead residents to perceive it as childish, whereas positioning it as a therapeutic or assistive tool fosters a more respectful and empowering experience.

This contrasts with findings by Koh et al. (2022), where professionals believed that the degree of infantilization depended on how much the robot resembled a real animal [22]. Ienca et al. (2016) suggested that empowering residents to decide whether to engage with the robot could help mitigate infantilization by reinforcing autonomy and choice [23]. Our findings align with this perspective, emphasizing that the professional's communication style, the way the robot is framed within therapeutic activities, and active resident involvement are key factors in ensuring ethical implementation.

Psychological and emotional benefits

One of the key findings of our study was that social robots not only benefited residents but also provided emotional and psychological support for professionals. Engaging with individuals with dementia, particularly those who experience repetitive speech patterns, emotional distress, or communication difficulties, can be emotionally demanding. The use of social robots provided professionals with an additional tool to facilitate emotional interactions and reduce stress in these situations.

Some professionals highlighted the role of social robots as mediation tools, a concept widely used in psychotherapy. Mediation involves using an external object to facilitate communication, often helping individuals express themselves in ways they might struggle to in direct interactions. Research describes the robot as a "common third"—an object that fosters joint attention and interaction between a therapist and a resident [24, 25].

Tordo (2018) explored this concept in his work with autistic children, describing the social robot as a clinical support tool that aids therapist-patient interactions. He noted that its predictability and emotional neutrality make it particularly effective in fostering a sense of safety and stability [26, 27]. Similarly, in our study, professionals observed that residents felt comfortable expressing emotions and personal thoughts in the presence of the robot, sometimes using it as a mediator to discuss difficult topics that they might hesitate to address directly with a caregiver. By offering a neutral and stable presence, social robots may create a safe space for emotional expression, enabling beneficiaries to explore thoughts and feelings that might otherwise be difficult to articulate. These findings suggest that beyond their initial role in engagement and entertainment, social robots hold therapeutic potential when integrated thoughtfully into professional practice.

Recommendations for healthcare professionals

Based on the insights gathered from the interviews, we have developed practical recommendations to support professionals in integrating SRIs into geriatric care settings. These recommendations are intended for both healthcare management teams planning to introduce SRIs and professionals directly conducting these interventions. They aim to facilitate ethical and effective implementation, ensuring that social robots enhance care while respecting the needs and preferences of older adults.

Recommendations for healthcare management teams planning to implement SRIs

- Engaging staff in the decision-making process: Healthcare professionals should be actively involved in discussions regarding the acquisition and integration of social robots. Staff should collectively assess how SRIs can address the needs of beneficiaries and be incorporated into the institution's activity schedules. These discussions should consider organizational planning, human resources, and material constraints to ensure smooth and effective implementation. Involving staff in decision-making allows them to express concerns, suggest adaptations, and take ownership of the intervention, fostering a more thoughtful and effective use of social robots.
- Informing and involving families in SRI implementation: The families of beneficiaries should be informed about the introduction of SRIs and the rationale behind their use. This includes explaining the purpose, expected benefits, and ethical considerations of the intervention. Families should also be given the opportunity to ask questions, express concerns, and provide input regarding the appropriateness of the intervention for their loved ones. Transparent communication helps build trust and ensures that SRIs

align with the preferences and values of both the residents and their families.
– Providing professionals with comprehensive training and preparation on SRIs: Institutions should offer structured and ongoing training programs to equip professionals with the necessary skills for operating the robot, integrating SRIs into therapeutic activities, and addressing ethical concerns. Training should cover multiple dimensions: (a) technical operation of the robot, ensuring professionals are comfortable with its functions, settings, and limitations, as well as learning how to manage basic troubleshooting and adjust interactions based on the robot's capabilities; (b) ethical and professional considerations, ensuring SRIs align with existing care principles, particularly in relation to consent, assent, and avoiding infantilization; (c) therapeutic applications, providing guidance on how to use robots as a complementary tool within existing care models, particularly for beneficiaries with cognitive or communication difficulties; and (d) communication strategies, helping professionals present the robot in a way that respects beneficiaries' dignity and encourages engagement.

To accommodate different learning needs, training should be delivered through a combination of hands-on workshops, online modules, video tutorials, and role-playing exercises that simulate real-life scenarios. Peer mentoring and knowledge-sharing sessions can also be beneficial, allowing experienced professionals to support those new to SRIs. Institutions should allocate sufficient time for preparation, ensuring that staff can familiarize themselves with the technology and adapt interventions to meet the specific needs of beneficiaries.

– Integrating SRIs into professional principles and ethical standards in geriatric care: Healthcare institutions should ensure that SRIs align with existing professional principles and care practices in geriatric settings. The same ethical guidelines applied to other therapeutic interventions should be followed when using social robots. Rather than requiring entirely new care models, robots should be seamlessly incorporated into established therapeutic approaches, allowing professionals to build on their current practices while using robotic tools as complementary aids to enhance patient engagement, emotional support, and social interaction.
– Facilitating ethical and clinical reflection: Ethical considerations surrounding SRIs may arise before, during, and after their implementation, requiring ongoing reflection by healthcare teams. Before introducing a social robot, professionals may need to assess whether the intervention is suitable and meaningful for a specific beneficiary, ensuring that it aligns with their preferences, cognitive abilities, and emotional well-being. During SRIs, unexpected ethical concerns may emerge, such as beneficiaries expressing discomfort or refusal, difficulties in interpreting nonverbal cues, or concerns about infantilization depending on how the robot is framed. After the sessions, professionals may also need to evaluate the impact of the intervention, for example, in cases where a resident forms an excessive attachment to the robot or when the expected benefits are not observed.

To address these issues, institutions should establish structured opportunities for ethical and clinical reflection, where professionals can regularly share their experiences, discuss dilemmas, and refine their approaches. Team debriefing sessions can provide a space to explore: (a) Ethical challenges related to consent and assent, particularly when working with individuals with neurocognitive disorders; (b) best practices for presenting the robot to reduce the risk of infantilization; (c) strategies for managing misunderstandings, such as when residents attribute unintended meanings to the robot's actions or responses; (d) Appropriate ways to handle emotional reactions, including excessive attachment or distress when the robot is removed, and (e) institutional adaptations, such as refining protocols or adjusting training programs based on observed challenges. Table 3 presents a summary of the key recommendations for healthcare management teams planning to implement SRIs.

Recommendations for Professionals Conducting SRIs

– Identifying suitable beneficiaries for social robot interactions: Before implementing an SRI, professionals should carefully assess whether the intervention is appropriate for a specific resident. Not all individuals will benefit equally from robot-assisted interactions, and selecting participants should be based on their cognitive abilities, emotional state, interests, and potential responsiveness. Evaluating the relevance of SRIs on a case-by-case basis ensures that the intervention is tailored to the individual's needs, maximizing engagement and well-being while minimizing the risk of discomfort or disengagement.
– Thoughtful presentation of the robot to beneficiaries: The way a social robot is introduced can significantly shape the beneficiary's perception and willingness to interact with it. Professionals should carefully select their words, tone, and approach when presenting the robot, ensuring that the interaction is framed in

Table 3 Summary of recommendations for healthcare management teams planning to implement SRIs

Recommendation	Description
Engaging staff in decision-making	Involve healthcare professionals in discussions about SRI implementation, allowing them to assess the needs of beneficiaries and integrate SRIs into activity schedules while considering resource constraints
Informing and involving families	Provide families with information on the purpose, benefits, and ethical considerations of SRIs, encouraging their input and addressing concerns to build trust and alignment with residents' preferences
Providing comprehensive training	Develop structured training covering technical operation, ethical considerations, therapeutic applications, communication strategies, and troubleshooting. Offer various learning formats such as workshops, online modules, and mentoring
Integrating SRIs into professional principles and care practices	Ensure SRIs align with existing ethical and therapeutic frameworks, incorporating them as complementary tools within established geriatric care practices
Facilitating ethical and clinical reflection	Create opportunities for professionals to reflect on ethical challenges, best practices, and intervention outcomes before, during, and after SRIs. Encourage discussions on consent, assent, potential emotional responses, and necessary protocol adjustments

a way that respects the resident's autonomy, preferences, and dignity. Presentations should be personalized based on the resident's cognitive and emotional profile, ensuring clarity while avoiding infantilization. Additionally, professionals should remain attuned to how the beneficiary perceives the robot and be flexible in adapting their approach if needed to foster a positive and meaningful experience.

- Ensuring consent or assent for participation: Professionals must ensure that each resident explicitly agrees to engage in SRIs, either through informed consent or ongoing assent. In cases where individuals can express verbal consent, professionals should provide clear explanations about the purpose of the interaction and allow residents to make an informed choice. When working with individuals with neurocognitive impairments, it is essential to continuously assess nonverbal cues, gestures, and behavioral signals to confirm that the resident remains comfortable and willing to participate. Any sign of withdrawal, distress, or disengagement should be interpreted as a refusal to continue, and the intervention should be adjusted or stopped accordingly.
- Managing technical issues with creativity: Technical malfunctions or unexpected robot behavior can occur during SRIs, potentially causing frustration or confusion among residents. To maintain engagement and prevent negative reactions, professionals should use creativity and humor to normalize and reframe these issues as part of the experience. For example, if a robot delays its response, makes an error, or stops functioning, the professional can engage beneficiaries by making lighthearted comments such as "It looks like the robot needs a little more time to think!" or "Our friend here might need a break—just like us sometimes!" Such strategies help reduce anxiety, maintain a positive atmosphere, and reinforce engagement, ensuring that technical problems do not disrupt the therapeutic value of the session. Table 4 provides a summary of key recommendations for professionals conducting SRIs.

Limitations

This study has several limitations that should be acknowledged. First, the research was conducted in an urban setting (Paris and Issy-les-Moulineaux), limiting the generalizability of findings to rural areas, where access to technology, institutional resources, and patient engagement with social robots may differ.

Table 4 Summary of recommendations for professionals conducting SRIs

Recommendation	Description
Identifying suitable beneficiaries	Assess each resident's cognitive, emotional, and social profile to determine whether an SRI would be beneficial and engaging for them
Thoughtful presentation of the robot	Adapt the introduction of the robot based on the beneficiary's cognitive and emotional profile, using appropriate language, tone, and framing to promote engagement while avoiding infantilization
Ensuring consent or assent	Confirm the resident's willingness to participate, either through explicit verbal consent or ongoing nonverbal assent, while monitoring for signs of discomfort or disengagement
Managing technical issues with creativity and humor	Use humor and creativity to address technical malfunctions, reassuring residents and maintaining a positive, engaging atmosphere during SRIs

Second, the study focused exclusively on healthcare professionals' perspectives, without incorporating the views of older adults themselves or their families, whose experiences and attitudes toward SRIs could provide key insights into the ethical and practical implications of robot use.

Additionally, the sample was composed of professionals with experience using only a limited number of social robots, which may not fully reflect the diversity of robotic models available, particularly as new designs and functionalities continue to emerge. The findings, therefore, may not capture the full spectrum of ethical considerations that arise with different robot capabilities, interaction styles, and therapeutic applications.

Conclusion and future work

This study examined the ethical considerations of SRIs in geriatric care through interviews with 20 healthcare professionals, leading to practical recommendations for both healthcare management teams and professionals conducting SRIs. These findings emphasize the importance of consent and assent, ethical presentation, professional training, and ongoing ethical reflection to ensure responsible integration.

While social robots are increasingly available, ethical guidelines for their use remain underdeveloped. This study provides preliminary recommendations, but further research is needed to establish standardized ethical frameworks and explore effective dissemination methods, such as online instructional videos for professionals and caregivers.

Given the study's limitations, future research should examine SRI implementation in diverse settings, particularly in rural areas, and incorporate the perspectives of older adults and their families. Comparative studies assessing different robot models and functionalities could further refine ethical guidelines and best practices.

By addressing these gaps, future research can contribute to clear, evidence-based ethical standards, ensuring that social robots enhance rather than compromise the quality of care for older adults.

Abbreviation

SRIs Social Robot Interventions

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12877-025-05891-z.

Supplementary Material 1. ANNEX 1 Questionnaire for the interviews with professionals.

Acknowledgements

We would like to thank the healthcare professionals who participated in our study.

Authors' contributions

Conceptualization and methodology, MP and A-SR; formal analysis and investigation, VCL; writing—original draft preparation, CW; writing, review and editing, HL and MP; project administration, LB, SD, and SD. All authors have read and agreed to the published version of the manuscript.

Funding

This work was supported by Janssen Horizon within the framework of the ROBETHICS project.

Data availability

Requests to access the datasets should be sent to anne-sophie.rigaud@aphp.fr.

Declarations

Ethics approval and consent to participate

Our study adhered to the Declaration of Helsinki (https://www.wma.net/policies-post/wma-declaration-of-helsinki/). Ethical approval for this study was obtained as part of the ROBETHICS project, which was submitted to the Comité d'Éthique de la Recherche (CER) of Université Paris Cité and approved under IRB N°: 00012021–110. All participants voluntarily agreed to take part in the study and provided written informed consent.

Consent for publication

Written informed consent was obtained from all participants in our study through signed consent forms granting permission for the dissemination and use of data shared during the interviews. To ensure privacy, any information that could identify individuals has been fully anonymized.

Competing interests

The authors declare no competing interests.

Author details

[1]INSERM Optimisation Thérapeutique en Pharmacologie OTEN U1144, Université Paris Cité, Paris 75006, France. [2]Service Gériatrie 1&2, Centre Mémoire de Ressources Et Recherches Ile de France-Broca, AP-HP, Hôpital Broca, F-75013 Paris, France. [3]Centre d'Expertise National en Stimulation Cognitive (CEN STIMCO), 54 Rue Pascal, Paris 75013, France.

Received: 17 July 2024 Accepted: 26 March 2025
Published online: 22 April 2025

References

1. The OECD. Demography - Elderly population - OECD Data. 2022. http://data.oecd.org/pop/elderly-population.htm. Accessed 1 Mar 2024.
2. Abdi J, Al-Hindawi A, Ng T, Vizcaychipi MP. Scoping review on the use of socially assistive robot technology in elderly care. BMJ Open. 2018;8(2):e018815.
3. Kachouie R, Sedighadeli S, Khosla R, Chu MT. Socially assistive robots in elderly care: a mixed-method systematic literature review. Int J Hum-Comput Interact. 2014;30(5):369–93.
4. Henschel A, Laban G, Cross ES. What makes a robot social? A review of social robots from science fiction to a home or hospital near you. Curr Robot Rep. 2021;2(1):9–19.
5. Broekens J, Heerink M, Rosendal H. Assistive social robots in elderly care: a review. Gerontechnology. 2009;8(2):94–103.
6. Bemelmans R, Gelderblom GJ, Jonker P, De Witte L. Socially assistive robots in elderly care: a systematic review into effects and effectiveness. J Am Med Dir Assoc. 2012;13(2):114-120.e1.
7. Yu C, Sommerlad A, Sakure L, Livingston G. Socially assistive robots for people with dementia: systematic review and meta-analysis of feasibility, acceptability and the effect on cognition, neuropsychiatric symptoms and quality of life. Aging Res Rev. 2022;78: 101633.

8. Vernooij-Dassen M, Vasse E, Zuidema S, Cohen-Mansfield J, Moyle W. Psychosocial interventions for dementia patients in long-term care. Int Psychogeriatr. 2010;22(7):1121–8.
9. Robinson NL, Cottier TV, Kavanagh DJ. Psychosocial health interventions by social robots: systematic review of randomized controlled trials. J Med Internet Res. 2019;21(5): e13203.
10. Shishehgar M, Kerr D, Blake J. The effectiveness of various robotic technologies in assisting older adults. Health Informatics J. 2019;25(3):892–918.
11. Hung L, Liu C, Woldum E, Au-Yeung A, Berndt A, Wallsworth C, et al. The benefits of and barriers to using a social robot PARO in care settings: a scoping review. BMC Geriatr. 2019;19(1):232.
12. Rouaix N, Retru-Chavastel L, Rigaud AS, Monnet C, Lenoir H, Pino M. Affective and engagement issues in the conception and assessment of a robot-assisted psychomotor therapy for persons with dementia. Front Psychol. 2017;8: 950.
13. Fasola J, Mataric M. A socially assistive robot exercise coach for the elderly. J Hum-Robot Interact. 2013;2(2):3–32.
14. Blavette L, Rigaud AS, Anzalone SM, Kergueris C, Isabet B, Dacunha S, et al. A robot-mediated activity using the nao robot to promote COVID-19 precautionary measures among older adults in geriatric facilities. Int J Environ Res Public Health. 2022;19(9):5222.
15. Sharkey A, Sharkey N. Granny and the robots: ethical issues in robot care for the elderly. Ethics Inf Technol. 2012;14(1):27–40.
16. Wangmo T, Lipps M, Kressig RW, Ienca M. Ethical concerns with the use of intelligent assistive technology: findings from a qualitative study with professional stakeholders. BMC Med Ethics. 2019;20(1):98.
17. Körtner T. Ethical challenges in the use of social service robots for elderly people. Z Für Gerontol Geriatr. 2016;49(4):303–7.
18. Fosch-Villaronga E, Lutz C, Tamò-Larrieux A. Gathering expert opinions for social robots' ethical, legal, and societal concerns: findings from four international workshops. Int J Soc Robot. 2020;12(2):441–58.
19. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77–101.
20. Papadopoulos I, Lazzarino R. Developing, delivering, and evaluating an online course on socially assistive robots in culturally competent and compassionate healthcare: a sequential multiphase, mixed-method study. Digit Health. 2024;10:20552076241271790.
21. Koh WQ, Vandemeulebroucke T, Gastmans C. The ethics of pet robots in dementia care settings: care professionals' and organisational leaders' ethical intuitions. Front Psychiatry. 2023;14:1052889.
22. Koh WQ, Toomey E, Flynn A, Casey D. Determinants of implementing pet robots in nursing homes for dementia care. BMC Geriatr. 2022;27(1):457.
23. Ienca M, Wangmo T, Jotterand F, Kressig RW, Elger B. Ethical design of intelligent assistive technologies for dementia: a descriptive review. Sci Eng Ethics. 2018;24(4):1035–55.
24. Klein B, Gaedt L, Cook G. Emotional robots. GeroPsych. 2013. https://doi.org/10.1024/1662-9647/a000085.
25. Elias JZ, Morrow PB, Streater J, Gallagher S, Fiore SM. Towards triadic interactions in autism and beyond: transitional objects, joint attention, and social robotics. Proc Hum Factors Ergon Soc Annu Meet. 2011;55(1):1486–90.
26. Tordo F. Les médiations robotiques avec l'enfant autiste. In: Et si Alzheimer(s) et Autisme(s) avaient un lien ? Toulouse: Érès; 2018 p. 215-23.
27. Tordo F. Robothérapie. Synthèse des fonctions thérapeutiques de la médiation robotique. In: Robots, de nouveaux partenaires de soins psychiques. Toulouse: Érès; p. 77-87.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.