Involving Seniors in Developing Privacy Best Practices:

Toward Responsible Development of Social Technologies for Seniors

REPORT OF FOCUS GROUP FINDINGS

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I.   INTRODUCTION

Companies that develop digital networked technologies are increasingly marketing these devices and applications to provide social support for seniors and their caregivers, in order to prolong a seniors' ability to live independently ("aging in place"). For this study, "digital networked technologies" include technologies in common current use, such as desktop and laptop computers, tablets, smartphones, and digital home assistants; current calling, messaging and social media applications and platforms (e.g. Facebook); as well as currently available consumer-grade social robots that are not in common use.

Prominent tasks that these technologies are being pitched to perform for seniors include a range of social support functions:

- Facilitating social connections and activities to address social isolation;
- Monitoring for health and safety issues;
- Providing reminders, prompts and information retrieval, both in everyday use and more specifically to address short term memory loss or other cognitive ability reductions; and
- Providing conversation and companionship to provide reassurance, encouragement, and entertainment, especially to address loneliness.

Accomplishing these tasks generally requires the devices and applications to collect, use and sometimes share personal data either actively or passively provided by the senior user.

This project aimed to collect seniors' perspectives on these current and emerging technological devices and applications, in both their present and future forms. To this end, focus group discussions prompted seniors to share their experiences and express their views on how and why they or other seniors are using, would or would not use, or might consider using specific technologies for the various suggested social support functions. In gathering data about the concerns, limitations, and benefits that seniors perceive these technologies to present, the researchers aimed to focus especially on personal data protection. We sought to understand how seniors currently employ strategies to protect their personal information, and what knowledge, tools, and support they would need in order to consider expanding their current practices to new functions or devices.

II.   METHODOLOGY

We held six focus group interviews at six different seniors centres across Canada in Summer/Fall 2019. Three focus groups were held in Ontario (one in a major urban centre, one suburban, and one farther outside the suburban belt); two were held in a smaller city in British Columbia; and one was held in a major urban centre in Quebec (this one was held in French, the other in English). A total of 44 participants took part in this phase of the study, with groups ranging in size from 5-11 participants. All participants were recruited by staff at the senior centre where the focus group was held, or via a flyer posted there or sent out to the senior centre's newsletter. Consequently, all participants were active in senior centre life, and so were generally not vulnerable members of the senior population.

All participants filled out a short survey at the start of the focus group to collect basic demographic information and self-reported level of familiarity and comfort with digital networked technologies.

The gender breakdown was 75% women (33) and 25% men (11). The median age was 74-75. This background information is summarized in Table 1 below:

TECHNOLOGY COMFORT LEVEL SURVEY (Table 1)

Do you have and use a smartphone? (e.g. iPhone, Samsung Galaxy, etc.)	Yes	33
	No	9
	Missing	2
If yes, do you use any applications on the smartphone – other than using it as a phone? (e.g. text, maps, internet, games, etc.)	Yes	30
	No	10
	Missing	4
Do you have and use an Internet connected computer in your home?	Yes	37
	No	7
Do you have and use a digital assistant in your home? (e.g. Amazon Alexa, Google Home, etc.)	Yes	19
	No	25
Do any of your close family members or friends have a digital home assistant that you have seen being used? (e.g. Amazon Alexa, Google Home, etc.)	Yes	27
	No	17

On a scale of 1-10, how comfortable do you feel with learning how to use new technologies? (1 is not comfortable at all and 10 is expert)

1	2	3	4	5	6	7	8	9	10
2	1	2	4	10	5	6	6	3	4

Do you read the instructions provided with a new device before using it?	Yes	30
	No	8
	Missing	6
Do you prefer to have someone show you how to use a new device, or would you rather figure it out for yourself?	Show Me	32
	Figure It Out	8
	Missing	4

On a scale of 1-10, how familiar would you say you are with how to protect your privacy while using a smart device? (1 is not familiar at all and 10 is very familiar)
Note: 3 missing

1	2	3	4	5	6	7	8	9	10
12	2	4	2	4	3	3	4	3	4

On a scale of 1-10, how familiar would you say you are with Canadian rules about when a company needs your consent to collect, use or share your personal information? (1 is not familiar at all and 10 is very familiar)
Note: 3 missing

1	2	3	4	5	6	7	8	9	10
16	2	2	1	8	3	2	3	2	2

The survey results show that:

- Most of the participants did use some form of Internet connected device (84% had an Internet connected computer at home, and 75% had a smartphone of their own);

- A significant proportion (almost 30%) placed their knowledge of how to protect their privacy online at the lowest point on a scale from 1-10;
- An even higher proportion (almost 40%) placed themselves at this lowest point for knowledge of Canadian data protection rules;
- Nonetheless, the rest of the participants scattered themselves over the whole 10 point range for both of these questions.

These results indicate both a need for more education and support regarding privacy protection among seniors, and a need to acknowledge varying levels of comfort and knowledge.

Each focus group was led by one interviewer, who prompted discussion through a uniform set of open-ended, semi-structured questions (Appendix A). The first portion of the group discussion focused on the participants' current uses of and attitudes toward technology for social support across several categories of functions (video calling, reminders, business transactions, entertainment, and companionship). Each group was then shown videos produced by companies promoting a particular personal robot for home use. The first group was only shown two promo videos (for ElliQ and Mabu), but the remaining five groups were shown three promo videos (ElliQ, Mabu, and Temi). ElliQ and Mabu are both marketed specifically for use by seniors, though via different business models, while Temi is marketed more generally for use by families. Temi was added after the first group because ElliQ and Mabu are stationary robots, while Temi is a mobile robot that can move around the home, and this feature was potentially important to the functions that were being discussed in the study. We note that the focus group participants were reacting not only to the robots depicted in the videos, but also to how they were portrayed and framed in the promotional videos. A description and analysis of the videos is at Appendix B.

After viewing the videos, the interviewer asked a further set of open-ended questions about the participants' reactions to the robots and their attitudes towards the social support functions they might serve, which mirrored the ones already talked about in relation to more familiar technologies in the first half. The final set of open-ended questions focused on the strategies that participants use to protect their personal data, their views on privacy policies and the obligation to obtain consent from users, and what information they felt they needed to know and understand about how their personal data is being collected and used by these new devices.

All focus group interviews were recorded and transcribed. The transcriptions were then uploaded into the qualitative analysis software NVivo, and were coded for major themes across the six groups. The transcripts were then re-read as a whole to extract the second layer of major themes, and these themes were then organized into the findings below.

III.   LIMITATIONS and DIFFICULTIES

The focus group method was fruitful for beginning to gain insight into how seniors think about privacy and data protection when they are considering whether to employ technology for social support. However, given the recruitment via senior centres, the focus group participants were all active in the senior centre and all able-bodied and nimble-minded, and so not among the more vulnerable in the senior demographic category. Other recruitment methods would need to be employed in order to sample a more diverse range of needs and vulnerabilities.

The design of the open-ended question sequence -- beginning with current uses of digital technologies for social support, showing the robot promo videos, and then revisiting the social support functions of a personal robot -- produced rich discussion in the focus groups. In future iterations, however, it would be wise to place explicit questions about privacy policies and privacy principles sporadically throughout the questions, rather than at the end. Participants tended to bring up privacy and data protection issues throughout on their own initiative, given that they were provided with information about the aims of the study in advance. However, a more planned approach to eliciting these views would have improved the study design.

IV.   FINDINGS

First, some general observations: Focus group participants expressed a **broad range of experiences and attitudes toward using technology for social support**, with some people characterizing themselves as tech savvy and others as not at all tech-oriented. Some uses of technology were fairly common across all participants in all focus groups (e.g. using digital networked technology for entertainment and video calling) while others were taken up by some and not others (e.g. using electronic calendars/reminders, online banking, purchasing, etc.).

The participants sometimes saw themselves as members of a **transitional generation** that sometimes embraces technology, and sometimes rejects it, preferring existing non-technological means of performing tasks and getting support. The factors that contribute to these choices are beyond the scope of this study, due to its small sample size (e.g. we are not able to correlate age, work history, and personal characteristics with receptiveness to technology use).

Reasons for using or declining to use current technology for social support typically involved a calculation of the relative **benefits, burdens and risks** involved in doing so – sometimes fairly loose, sometimes more formal. This same sort of calculation also informed participants' speculation about future technology use for social support, namely personal robots, and so informed the structure of exercises in the subsequent workshops.

In the focus groups participants often **proactively raised privacy and information security risks** in the discussion of their attitudes toward using particular technologies. That is, privacy issues were raised throughout the discussions, over and above specific questions about privacy posed by the focus group moderator.

The remainder of the findings are grouped as follows: 1) reasoning regarding current use of technology for social support; 2) reasoning regarding use of future technology (especially AI enabled social robots); 3) strategies and recommendations for mitigating risks.

A.   Reasoning Re Using Current Technology For Social Support Functions

The findings regarding current use of technology for social support follow the overall pattern of reasoning as a balancing of benefits, burdens and risks. We have organized the findings according to how this thought process played out in relation to prompted functions:

- Scheduling and reminders;
- Banking and other financial transactions;
- Facilitating social contact and connections with others;
- Conversation and companionship.

1.   Scheduling and Reminders

Most participants acknowledged their need to use some method for scheduling and reminders in order to keep track of appointments and events. Whether participants used technology for reminders varied widely, and reflect more general attitudes toward using new technological methods for doing something **that can still be easily done via established offline methods.** This discussion well-characterizes a looser version of cost/benefit reasoning that many participants engage in when deciding to use technology for such a function. Participants across groups fell into three categories:

- Use calendar reminders on a digital device (usually a computer or a phone);
- Use only older offline methods (an agenda or paper calendar);
- Use both.

Participants who used technology for electronic calendars:

- Praised the benefit of automatic reminders and the ability to share calendars with family members in order to coordinate schedules.
- A few used reminders for more complicated medication schedules (most used plastic pill boxes)

Those who used only paper calendars:

- Cited burdens such as that entering appointments is too complicated on a phone compared with simply writing it down;

Those who used both an electronic and a paper calendar:

- Cited several common reasons for doing both:
    - that they sometimes forgot to look at the phone and so missed reminders (which undermined the benefit);
    - that they could glance at the paper calendar more easily and quickly (comparative burden); and

- o that they did not entirely trust the electronic calendar and so used the paper as "back up" in case the phone was lost or stopped working (risks of technology failure).

Concerns regarding use of reminders depended on the sensitivity of the information:

- o Privacy and data handling:
  - o No participants expressed concerns about personal data handling or misuse in relation to calendars and reminders;
  - o While very few used electronic reminders for medication schedules, and none for exercise reminders, many **raised concerns about the collection of or misuse of personal health data if they were to use electronic reminders for health related purposes.**
- o Ethical concerns:
  - o Many cited concern that using technology would **diminish the user's cognitive abilities** as a reason not to use electronic reminders;
  - o Many stated that they preferred to rely on their own memory in order to keep up their cognitive functioning.

2. Financial Transactions

Most participants expressed concerns about personal data protection in relation to financial transactions, including both online banking and online shopping. Many participants expressed a high level of distrust and uncertainty in this category of functions. Many were very concerned about giving out financial information (banking details, deposits, credit cards) through technology, and many refrained from doing so under most circumstances.

With regard to online banking:

- o A fairly even split between participants who used online banking and those that do not.
- o Most of those that do use online banking services:
  - o Most only did so through their computer, with many of these participants distrusting mobile banking apps.
- o Those who did not use online banking often stated that they perceived a **high level of risk to their personal information**, and did not trust the security of electronic banking.
- o Many preferred to physically go to the bank and deal with a teller (some stated that they did not want to use Automated Banking Machines (ABM) machines either).
  - o Some who use online banking for some functions still preferred offline methods for others, such as depositing a cheque.

Overall, while convenience as the main **benefit** of doing online banking, it was not sufficient to overcome the **privacy risk** for those who chose not to do it, and similarly the level of trust the participant had in the security of the system could be sufficient to overcome that risk. The distinction between computer and mobile app reflects this sort of difference in the level of trust in information security systems, with many participants placing more trust in their computers and laptops than in mobile applications.

Some participants raised **ethical concerns** about online banking as a reason not to use it. These participants preferred to go to the bank in part because they wanted to interact with a human teller, and were concerned about the future job prospects for both these tellers and young people more generally. The theme of the ethical risk of **people being replaced by machines** was then raised again later, and looped back to this point, in relation to personal robots as caregivers.

With regard to online shopping:

- o A few participants stated that they regularly engaged in online shopping.
- o Most participants said they did not engage in any online shopping, although somewhat anachronistically, many did admit to purchasing tickets to events online.
    - o This distinction mostly depended on the benefit of efficiency for tickets (rather than waiting on the phone or in line at a box office), with little risk as tickets were purchased from trusted companies.

Most stated strong reticence to give out their credit card information online, unless there was a strong benefit or little choice not to. Similarly, while most participants did play games through their devices, often for the benefit of **keeping their minds nimble**, most only used free games to accomplish that benefit, and so did not need to purchase games or make any in-game purchases.

3.   Communication with Family and Friends

Voice, text and video communication with friends and family was of central importance to most participants:

- o Many participants used various messaging and video calling apps to communicate with family and friends (e.g. Skype, Facetime, WhatsApp), especially if they live farther away;
- o A few had used video calling to access medical services and those who had found this useful;
- o Only one participant expressed concerns about personal data security related to video calling, and used an encrypted service (Signal), at the behest of her son;
- o None used any electronic means of keeping track of the frequency of contacts;
- o Some participants discussed more general security issues with phone calling, such as receiving unsolicited voice calls on their mobile phones. Most stated that they blocked these numbers.

On the other hand, most participants had a negative view of **social media platforms.**

- o Many did not use social media platforms (mainly mentioning Facebook, Instagram), or only used them in very limited ways;
- o Many expressed little to no trust in Facebook, in particular, stating that Facebook manipulates personal information, and many raised issues about information privacy and security on that platform;
- o Many also raised objections to how the platform pushes social contact that did not strike them as authentic;

    o   Those participants that did use Facebook stated they only did so to continue to access the information and pictures posted by younger family members. A few participants said they used Instagram to mainly receive, and some to post, images of travels, events, and meals, usually only with a small circle of friends or family.

Information security risks with social media platforms combined with an undifferentiated and uncontrolled flow of information about others made this model of social contact largely unappealing to most participants.

A few participants played online games with known friends, and only a couple stated that they had played online games with people they did not know. Most only played online games alone, as a way to keep their minds active.

4.   Conversation and Companionship

Unlike the above functions, the prospect of using technology for conversation and companionship was novel to most participants. Nonetheless, most participants had been at least exposed to **voice interaction** with Artificial Intelligence (AI) like Siri, Alexa or Google Home. A few had a digital assistant in their own homes, and a few more had encountered digital assistants in the homes of their younger family members.

    o   Those who had used voice interactions generally only did so for assistant tasks like information retrieval and simple commands (e.g. play music).
    o   Some stated that they enjoyed playing with the AI to see what it can do, for fun, including testing its limits as a joke, or to try and outsmart it in a game.
    o   Many participants expressed concerns about **privacy and information security risks,** often relaying that they had heard that digital assistants eavesdrop on conversations and share information unbeknownst to the user.
    o   A few shared anecdotes about a digital assistant chiming in to a conversation unprompted.
    o   Some worried that digital assistants presented a risk of **unwanted surveillance** by unknown parties.

Most participants rejected the idea of using an AI for companionship, by engaging in conversation (beyond commands, information retrieval, and jokes).

    o   Some rejected AI companionship because of the risk of **manipulation:** that is, exploiting information collected in conversation;
    o   Some expressed distrust in the neutrality or motivation of an AI in conversation;

Ethical concerns also entered prominently into the risk calculation once participants' envisioned more complex conversations, as elaborated in relation to social robots below.

B. Reasoning Re Using Future Technology For Social Support Functions: Social Robots

Upon viewing the promotional videos for personal robots for home use, most participants rejected the prospect of bringing these devices into their own homes in the present day and at their current level of ability. Some were strongly opposed to using robots for social support in general, while others were more open to such devices being useful to other seniors with higher needs, or they themselves in the future. The findings are organized according to the benefit, burden, risk calculations, which were prominent across all focus groups.

1. Benefits of Using a Personal Robot

The most common types of benefits raised by participants in relation to both current and future technologies were:

- **Fulfills a clear need:**
  - Since focus group participants were generally very active seniors, their level of need was not very high at this point in their lives;
  - Some suggested that social robots might be useful for other seniors with higher needs (e.g. seniors with dementia or other cognitive impairment, seniors with mobility issues);
  - Some stated they would be open to considering using a social robot themselves if their level of need increased.
- **Making a task easier:**
  - Some acknowledged being able to use **voice commands** (via a digital assistant, or a robot) to make some tasks easier;
  - Some mentioned voice commands being especially useful to seniors with mobility issues;
  - Most did not make distinctions between a social robot and a more familiar AI (e.g. Siri, or Google Home).
- **Fun of interacting:**
  - Most participants who enjoyed chatting with an AI characterized it more like companionate engagement rather than more sustained companionship via conversation (e.g. watching a movie together, playing games, and learning a new language).
- **Companionship:**
  - Most participants did not see a current benefit in using a personal robot for companionship, though some did see benefits to companionship for seniors with specific vulnerabilities (e.g. being socially isolated).
- **Monitoring:**
  - Some participants were open to **benign forms of surveillance**, like monitoring for falls or other medical incidents, using voice function to ask if you are alright;
  - Some noted that other systems already do this, and did not see particular benefit to using a robot for this function.

In the absence of clear benefit, such as improved ease of function or fun, most participants were not inclined to adopt the new technology.

2.   Burdens of Using a Personal Robot

Many participants expressed the view that new technologies are often more trouble than they are worth to use, and extended these burdens to social robots:

- **Too complicated to set up and use**;
  - Many complained that even current technologies – mobile phone apps for instance – are too complicated, and that they need family members to help them set them up;
  - Many complained that even if a technology is set up, the constant need for updates, and often the need to set up the device again after an update, was frustrating;
  - Many participants held the same view of robot technology, expressing concern that if it is too hard to set up, they would not use it;
  - Many stated they would be much more open to consider using a new device like a robot if it was simple to set up and configure settings.
- **Need easy-to-understand instructions:**
  - Many wanted clear and simplified instructions on how to set up and safely use both existing and future technologies.
  - Some mentioned preferences for interactive guidance, whether by way of an in-person class or a hands-on tutorial, as preferable to written instructions or phone support.
- **Cost:**
  - Many participants complained about the cost of new technologies – from mobile phones to robots – and the need to regularly upgrade, update, and often subscribe to a particular service.

A common theme throughout the focus groups was that technologies are **meant to make life easier, not harder** (which is also, if cast more abstractly, an ethical issue). Some complained about the proliferation of "self-service" technologies in their current lives which made tasks harder rather than easier – for instance at supermarket checkouts, or at ABM machines. They extended the same concerns to home-use robots, where the burden of needing to know how to use it properly was perceived to be high: some participants therefore doubted that robots would really make life easier.

3.   Risks of Using a Personal Robot: Privacy and Data Protection

The most prominent category of risk identified by participants were risks to privacy and personal data. Participants often rejected use of a technology either entirely or for some purposes because of these privacy risks.

- o **Losing control over their personal information**:
  - o Most of the participants expressed concerns about losing control over financial information (such as credit card numbers);
  - o Trust and distrust of some platforms played a key role in determining whether to share personal information.

- o **Surveillance and eavesdropping:**
  - o Many participants expressed concerns about digital assistants and some cited examples of incidents where a digital assistant listening in on a conversation without having been asked;
  - o A few expressed concern that users never know exactly who is listening or where the information from conversations overheard by the device is going;
  - o A few stated that the companies – Amazon, Google – listen in;
  - o Unwanted surveillance, whether actual or potential, was often cited as a reason not to use digital assistants.

- o **Vulnerability to bad actors**:
  - o Many participants were concerned about hackers getting access to personal information via technological means (e.g. compromising the security of a digital assistant or other devices);
  - o Many had some contact with scammers and fraudsters – usually via email or unsolicited phone calls;
  - o Some had experience with false charges on credit cards.

Security vulnerability was a prominent reason cited by participants for not using certain devices.

4. Risks of Using a Personal Robot: Ethical Concerns

Ethical concerns were another type of risk often raised by participants, especially in relation to AI and robots, which figured into the calculus of whether a technology should be adopted.

- o **Worse not better:**
  - o Many participants raised concerns regarding whether the issues social support technologies are meant to help alleviate would actually make those issues worse: especially regarding cognitive function and social connection.
    - For cognitive function, users could become more dependent on technology, and so could reduce their ability to remember things and make decisions for themselves.
    - For social connection, some participants expressed concern that using an AI or robot for companionship might cause a person to rely on the robot rather than to seek out human companionship and contact, and so make social isolation worse.

- **Better than nothing:**
  - While nearly all participants did not see themselves as needing a personal robot at this time, many did consider that other seniors (or themselves in the future) might have needs great enough to outweigh the risks.
  - Some speculated that robots could be useful for seniors with dementia; people who are "shut in" and socially isolated; or people with mobility issues that make it difficult for them to move about or get out of their homes.
- **Talking to robots as a sign of decline:**
  - In rejecting conversation with a robot, many participants considered talking to an AI or robot to be a sign of something wrong: for instance, poor human contacts, or a sign of a person's mental decline.
  - Most participants strongly preferred human relationships and worried that using an AI for companionship would be a poor substitute.
- **Conversation with robots degrading quality of human relationships overall:**
  - Some participants considered social robots as an extension of the ways that current technologies are taking a toll on human contact (e.g. couples separately on their phones over dinner).
  - Some participants expressly rejected robots that expressed empathy or signs of friendship as false.
  - Others found them to be infantilizing, "patronizing" or "nagging" (in other words, low quality relationships).
  - Some doubted the neutrality of conversations with a robot, expressing concerns about manipulation (again, often informed by concerns raised in relation to Facebook), and not knowing what the motivations and biases of the robots' programmers might be.
- **Should not replace human caregivers:**
  - Some participants complained about "self-service" technologies in supermarkets and banks, and saw social robots in this context;
  - Some worried about the replacement of human workers by machines, and stressed that robots should not replace human caregivers.
- **Over-technologization:**
  - Some participants expressed concerns about there being "too many devices in our lives as it is"
  - Some rejected robots as an unnecessary infusion of more technology into space better served by humans.

C.   Strategies and Recommendations

Participants employed a variety of strategies for mitigating or otherwise handling privacy and information security risks, and made some recommendations for how to better support seniors with these risks. The primary means of dealing with ethical risks was not to use the technology, but some made recommendations about how to mitigate ethical risks as well.

1.   Strategies for Self-Protection of Personal Data

Concern about information security was a prominent reason to avoid using a particular device or service (e.g. Cloud services, digital assistants, social media, etc.) or for not using technology for a particular social support function (e.g. online banking, online purchasing, location services).

- o **Just don't use it:**
  - o Not using technology or application deemed risky was the most common strategy for avoiding risk.
- o **Familiar strategies:**
  - o Using passwords, using restrictive privacy settings (e.g. turning off location services), blocking unrecognized contacts (calls, emails, social media), and using only trusted companies (both for their devices and for services).
  - o Many participants cited the importance of knowing about phishing and other scams, so as not to fall victim to fraud.
- o **More esoteric strategies:**
  - o A few participants stated that he gave out a mix of true and false information about himself to confound systems collecting personal information.
  - o Others described strategies that rely on an impression of relative safety, rather than technical knowledge per se: many considered laptop computers to be more secure than mobile phones; some did not connect devices to one another (e.g. phone and computer); one described not opening two types of communication methods at the same time (email, text).
- o **Instruction on risks and security features:**
  - o Many participants stated that they found too much technical information to be overwhelming, and wanted simplified, in-person instruction on how to set-up and safely use the devices they already had, which was hard to come by.
- o **Rely on trusted family member or company:**
  - o Many had given up on understanding or learning how to protect themselves and so preferred to either have a trusted family member set it up and maintain it for them;
  - o Others praised the support provided by particular companies (e.g. Apple stores).

As noted above, the short survey responses at the start of the focus groups reflect little to no knowledge of **legal rules regarding data protection** among participants. Indeed, no participants raised specific legal protections (e.g. PIPEDA) in the focus groups, though some more generally stated that legal rules were required to get companies to protect customers' data.

2.   Recommendations for Addressing Ethical Concerns

Participants expressed few strategies for addressing ethical concerns, other than rejecting the use of the technology entirely.

- o **Ethical risks should still be attended to:**
  - o Even where benefits tilted toward the adoption of technology, participants stated that key ethical concerns should still be attended to:
    - ▪ not replacing human caregivers;

- not infantilizing;
- not bringing technology into a seniors' home just for technology's sake.
  - o **Encouraged studies to better address ethical design of robots**
    - o In not rejecting robots entirely, some participants wished for a future of more effective and ethical designs;
    - o Some encouraged studies to better determine best designs for seniors with various needs and conditions.

V.   DISCUSSION and CONCLUSION

The above findings, preliminary and provisional though they may be, do point to some valuable insights, including:

- Many seniors are concerned about their privacy and personal information security across the devices they currently use, and these **concerns extend to potential future use of new technologies**, including personal robots;
- The dominant position taken by the seniors in both the focus groups is **highly privacy protective**: many choose not to use technologies or applications if they are not confident that they will be able to use them safely;
- **Reasoning related to acceptance of robots and AI-driven conversational digital assistants was similar**: any anthropomorphic features, including voice interaction without humanoid physical form, raised both privacy/surveillance concerns and ethical concerns (e.g. re undermining human relationships, autonomy, quality of social contacts)

Nonetheless, as in our culture more generally, seniors joked about getting robots to do functions they are currently not capable of (e.g. as a housekeeper, cook or boyfriend). This hope of future development left open the prospect of using social support robots with seniors whose needs were more closely matched to what a robot could do.

Given this openness, as well as the persistent concerns raised by the participants, **tailored educational resources** are needed to better support seniors gain more competence and confidence in technology use, as well as high standards for privacy protection in devices and applications aimed at seniors.

Seniors are socialized to feel vulnerable or are often framed as victims of scams and manipulation. A feeling of **technological helplessness** is not uncommon among seniors, sometimes exacerbated by younger family members who tell their elderly relatives they don't trust them to be able to protect themselves. Risks to privacy and personal data are framed as especially acute vis a vis seniors in the media. In other words, there are multiple factors contributing to this sense of technological helplessness. Nonetheless, there are also seniors who do not fit this category at all -- though they sometimes see other seniors as fitting that profile, demonstrating the power of the image of the technologically helpless senior.

Talking about privacy abstractly does not help seniors to obtain the knowledge they need. Seniors generally value their autonomy and will only adopt technologies that offer a clear benefit, and only if they are able to do so within their privacy comfort level. **Straightforward, in-person instruction and support** are preferred methods of providing seniors with a means of feeling more confident that their personal information will not be misused (whether by family, by companies, or by nefarious "hackers").

Further, **clear rules on the limits** of personal information use by companies, and **clear indicators of trustworthiness** are also needed to empower seniors to take advantage of social support technologies that truly will help them to age-in-place. Such measures will help ensure that more seniors can continue living independently in their homes: by being well-connected to friends, family and community, and able to access personalized supports to meet their particular needs.

APPENDIX A: Focus Group Interview Guide

Project Title: *INVOLVING SENIORS IN DEVELOPING PRIVACY BEST PRACTICES: TOWARD RESPONSIBLE DEVELOPMENT OF SOCIAL SUPPORT TECHNOLOGIES FOR SENIORS*

The following open-ended questions will be used to guide the focus group discussion:

1. Exploring current use of digital technologies for social support:
    b. Video Calling:
        i. Do any of you currently use Skype, Facetime or other video calling services to communicate with family and friends?
            1. If so, Can you describe how you use it? (e.g. how often, with whom, who initiates the call)
            2. Have you ever had a video call from a non-family member or friend? (e.g. a support service provider like a nurse, or a counsellor, or a business contact)
    c. Reminders:
        i. How do you currently remind yourself of appointments?
            1. Have you ever used a digital calendar for appointment reminders?
        ii. If you currently take daily medication, how do you currently remember when to take them?
        iii. Do you currently have any methods for encouraging you to engage in daily exercise, social activities, hobbies, etc.?
    d. Facilitating interaction with businesses:
        i. Do you currently ever make appointments with businesses over the Internet?
        ii. Do you currently make any purchases over the Internet, including over your computer, smartphone, e-book reader or other device?
        iii. Do you currently do any banking over the internet?
    e. Entertainment and Companionship
        i. Do you ever watch entertainment media through digital devices?
        ii. Do you ever play games through digital devices?
        iii. To your knowledge, have you ever had a conversation with a robot or other artificial intelligence?

At this point, participants will be shown a video demonstrating the capabilities of several social support robots that are currently being marketed for use by seniors. These will be compiled from marketing materials available through the websites of the companies selling these products, such as Elli-Q (https://elliq.com/) and Temi (https://www.robotemi.com/).

2. What is your first reaction to seeing what these devices can do?
    a. Prompts: interested, creepy, useful?

3. Are there any of the following tasks, that you could imagine using a device like this for?
    a. Facilitate communication with friends and loved ones
    b. Reminders:
        i. Appointments
        ii. Medications
        iii. Daily exercise
    c. Facilitating interaction with businesses:
        i. Making appointments (e.g. for haircuts, optometrist, etc.)

        ii.   Purchasing goods (e.g. groceries, books, small appliances, gifts)
- d. Companionship:
    - i. Would you consider watching a movie or TV show through or with a robot?
    - ii. Would you consider playing a game with a robot?
    - iii. Would you consider allowing a robot to compile photo slide shows – either to show you or someone else?
    - iv. Would you consider having a conversation with a robot?

4. Is there anything you would need to know about these functions before you would be willing to use them?

5. Privacy Policies and Data Protection Principles: about consent
    - a. If you use your smartphone for functions other than regular phone calls, what do you recall about how you had to consent to an application collecting and using your personal information? (e.g. clicking "I agree"? Scrolling through a legal agreement?)
    - b. What do you think would be important for robot designers to do to ensure that you have agreed to use specific features of a social support robot?
        - i. Camera – for instance, for video calling? Picture taking?
        - ii. Microphone – for voice activated digital assistants, voice-to-text messaging?
        - iii. GPS Location data – for using maps? For suggestions about the nearest store?
        - iv. History – for storing a history of your activities or interactions with the robot, or if using it to connect to the internet, on a website, service or social media platform?

6. Privacy Policies and Data Protection Principles: about transparency
    - a. How much do you feel you understand about how your personal information is collected, used and shared by the digital devices you currently use?
    - b. What, if anything, do you feel you would like to better understand about how your personal information is collected, used and shared by the digital devices you currently use?
    - c. Are there any particular data collection processes or practices of the social support robots that you feel you need to better understand before you would use it yourself?

7. Are there any ways that you can imagine a social support robot using your personal information that you feel would not be reasonable? How would you distinguish between what is reasonable and what is not?

APPENDIX B: Description and Analysis of the Videos

The three robots' promotional videos shown to the focus group participants were chosen because these robots are currently available or promise to be available soon in the United States, and are specifically geared to use in a consumer's home. None are currently available for purchase in Canada.

ElliQ is marketed as a companion robot targeted to help facilitate social connections for older adults, by making digital technology accessible through voice interaction and providing an additional layer of conversational companionship. The video shown in the study demonstrates ElliQ using interactive voice commands to help an older woman ("Mary") connect with family and friends through video chats, maintain a fitness regime, monitor her smart home technology, and keep up to date with online games and video lectures (e.g., TEDtalks). The message is that ElliQ can integrate several digital platforms in order to simplify 'digital life' for older users that need a bit more digital assistantship than a younger person (i.e., Mary's daughter), in order to overcome loneliness, forgetfulness, boredom/inactivity, or isolation. ElliQ's representation, which may or may not be accurate, presents a useful, friendly, AI companion robot that can presuppose Mary's needs, preferences, and social media activities as if it has been customized for her personal life. The company website, marketing materials and journalistic responses are aligned with the perceived market for geron-technology. *ElliQ* is framed as a tech salve for issues attributed to the aging demographic bubble that will affect global populations.

Mabu is also represented as a robot for older adults, however, stress falls on an aging body needing constant health monitoring, more than general social support. Mabu's primary function in the video is to keep the user, in this case an older man ("Edgar") on a medical regime at home but also outside through device alignment (i.e. Mabu sends phone notifications to remind him to take his medications). Mabu's voice interaction functionality is unclear in the video, as the device also has a tablet on its body that provides limited buttons in answer to Mabu's queries about how the user is feeling today, and offering to notify his pharmacist to adjust medications (an adjustment later depicted as successful in making Edgar feel better). Mabu is framed as providing minimal conversation, while Edgar appears to invest affection in Mabu, personalizing by given it the name "Betsy" and placing a small scarf around its neck after he himself shivers and puts on a sweater. The video frames Edgar in need of constant connection to the health platform, and by extension, his health care providers, specifically, a pharmacist.

Temi is not specifically marketed for seniors, but rather as a device that facilitates gadget and platform integration for multi-generational families. The slick video concentrates on a middle-aged man, the family caregiver, depicted in personal activities, overseeing the two children, and communicating with his spouse and mother. The advertising pitch is that families are overwhelmed by tablets, speakers, digital assistants, etc. and need help to simplify technologically facilitated connections to people and information. Midway through the video, Temi rolls into the room, sending the message that a robot that *travels to you* can consolidate family-based technologies as a better means to engage with digital platforms, order food, and video chat with other family

members. The main human character issues many commands to Temi in the course of the video, which Temi carries out with minimal or no voice interaction.

The three robot videos share certain traits. Each one is first set in a living-room in which the anthropomorphized robot forms part of a household offering personal digital assistantship to a stereotypical character that exhibits some need or urgency. Each one concentrates on a person who will benefit from owning the robot, framing a focused, human-centric pitch to legitimize a purchase. Finally and unsurprisingly, each one offers a utopic narrative to frame how life will be better when one owns a personal robot, and how seamlessly the robot will be able to carry out its prescribed functions.