

Ethical Issues In The Use Of Surveillance Cameras To Support Ageing In Place

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Abstract

Background and Objective: Surveillance technology allows family members to monitor older adults' daily activities and their interaction with the home environment. In particular, video surveillance cameras and surveillance technology's implementation raises critical ethical concerns due to their invasive and obtrusive nature. Thus, this paper aims to address the ethical issues regarding the use of video surveillance for older adults to age in place.

Methods: A literature review is conducted using Springerlink, Sciencedirect, and PubMed Publications related to older adults' care, ageing in place, and the use of surveillance technologies were included in this project.

Results: A total of 19 publications met the inclusion criteria. Nine ethical issues emerged from the data: informed consent, privacy, conflict of interest, stigmatization and obtrusiveness, homogeneity among older adults, and imbalance relationship. These nine themes were further explored in respect to ethical principles, including autonomy, beneficence, non-maleficence, justice and fidelity)

Conclusion: Although surveillance cameras can be invasive, well-grounded ethical thinking and proactive response help reduce the risk and ethical challenges associated with it. By examining the ethical issue in video surveillance, it helps to reflect and enhance the current legislation.

Keywords: Surveillance Cameras; Ageing in Place; Older Adults; Ethics; Family Caregivers

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Chapter 1.

1.1. Introduction

The use of surveillance technology at home has exploded in recent years, leading to an ethical debate between proponents and opponents. Surveillance cameras, in particular, have generated controversies regarding monitoring older adults' health. Proponents argue that it increases security for older adults, and opponents counter-argue its obtrusive nature. Regarding health monitoring, there is a grey area; current laws and policies mandate that home monitoring is legal, yet ethical concerns arise. Too often, older adults don't enjoy the benefits of surveillance cameras, but actually, they are suffering from their use. In fact, research has found that the ethical issues are more complicated when the users of the technology systems are with mental disabilities, especially for older adults with dementia (Garay-Victoria & Lopez-de-Ipiña, 2008; Maresova et.al, 2018). The reason for that stems from the fact that surveillance technologies are designed for managing the health of frail older adults with physical and mental disabilities, who cannot make a rational judgement (Wangmo et.al, 2019). Therefore, it is utterly important to explore and assess the ethical challenges that older adults perceive in the use of surveillance technology. Understanding the ethical aspect helps develop a strategy for an integrated technology solution that would resolve older adults' ethical issues and improve their safety.

Overall, this project aims to examine the moral and practical acceptability of video surveillance in the family care of older adults and sets out the current state of the ethical debate. Although there are empirical studies conducted on the ethical issues of surveillance technologies for older adults, these are concerns about the regulation or measures that need to be taken to ensure their use is consistent with human rights obligations. For example, Mahoney et al. (2007) investigates the concerns of in-home monitoring for older adults living with dementia and reveals the difficulties in minimizing the risk of technologies, as there is a lack of universal legislation that targets the use of technology in dementia (Mahoney et al., 2007). There was minimum attention paid to incorporating decisions about surveillance technologies, particularly video surveillance, into ageing in place planning processes.

Due to the lack of literature studies explaining the ethical issues associated with the use of surveillance technology in ageing in place, it is essential to understand how surveillance cameras are involved in elderly care and proactively consider the ethically relevant issues emerging in this domain. Therefore, this paper will address the research gap by offering a comprehensive analysis of the relevant literature, focusing on the ethical implication of using surveillance cameras on older adults and their rights as users of these technological systems.

This project will also examine the complexity of the role of surveillance technologies in providing care for older adults with dementia. This project aims to contribute to the debate and discussions referred to above by mapping the key issues and discussing the existing policy regarding the practice of video monitoring in the context of family caregiving for older adults. The aim is to outline some general ethical principles that will clarify some of the ethical challenges and provide guidelines to help older adults and family caregivers make decisions about the adoption and use of surveillance technologies in the home. The discussion scope is quite wide-ranging, encompassing caregivers and older adults generally, but also with some specific discussion of caring for people with dementia.

This paper's structure is as follows: the section "Surveillance technology and older adults monitoring" outlines the recent development of surveillance technology in supporting the health and independence of the elderly. The section "Ethics" reviews the five ethical principles (beneficence, non-maleficence, autonomy, justice and fidelity) as the guidelines to understanding the ethical perspective in the use of surveillance cameras. The section "Literature review" provides the current understanding and exploration of the ethical implication in using surveillance technology and how older adults' perceptions influence these technologies' outcomes. The last section will summarize the project's key findings and discuss the ethical implication and future direction for using surveillance technology in-home care.

Chapter 2. Surveillance Technology and Older Adults Monitoring

2.1. Family caregiving for older adults ageing in place

Ageing in place allows older adults to manage their health and well-being at home through proactive care and remote reactive care (Nathan et al., 2018). Proactive maintenance ensures older adults, particularly those suffering from the complication of chronic health conditions, are taking the initiative before the symptoms manifest. On the other hand, remote reactive care ensures that older adults are placed in appropriate and effective health emergencies. Therefore, ageing in place minimizes the physical and mental stress associated with regular hospitalization and reduces the burden associated with healthcare expenditure. Although ageing in place may bring seniors a sense of independence, it requires various resources and social supports to accommodate their needs.

As the closest resource to the elderly, family members are expected to provide caregiving duties. Family members are the primary caregivers for older adults, and nearly 17.7 million older adults received support from their families in the United States. According to the 2011 National Survey of Caregiving conducted in the United States, 6.3 million older adults receiving family caregiver's help due to physical health decline, while 3.5 million older adults are receiving care due to dementia (Schultz & Eden, 2016). The duration and intensity of caregiving vary with the older adults' level of impairment. For instance, older adults with more advanced dementia may require a higher level of support and the average duration of caregiving provided by family members was five years (Schultz & Eden, 2016).

Several studies have found that geographic distance between the elders and their family members correlates with the level of burden and stress on caregiving (Schultz & Eden, 2016, Brodatz & Donkin, 2009; Bevans & Sternberg, 2012). Distance caregiving can increase caregiving duties and stress than on-site caregiving (Benefield & Beck, 2007). Also, distance caregiving increases the financial burden associated with travel costs to and from the older adults' residency. The average annual expense for

long-distance family caregivers was \$8728, which is \$3000 more than caregivers who lived closer to the elderly (Schultz & Eden, 2016).

To reduce the burden associated with geographic distance, technology-based intervention, including surveillance technology and telehealth technology provide physical, social and contextual support for distance caregiving. Mainly, surveillance technology is one of the few affordable technological systems that are marketed for distance caregiving. Surveillance technology enables short-term monitoring for remote reactive care (e.g. fall detection) and long-term monitoring for proactive care (e.g. lifestyle modification based on observed behaviours of the older adults) (Nathan et al., 2018). Therefore, it significantly reduces the burden associated with long-distance caregiving.

2.2. The emergence of Smart Technology and Home based care

At the beginning of the 21st century, developed countries have moved from the Industrial age to the Information age. The information age introduces computers and digitalization in our world. Digitalization in elderly care is characterized by the shift from traditional institutional care to home-based care. An estimated 4 million older adults live in private households in Canada (Statistic Canada, 2011). Receiving care at home is often viewed as a desirable option for elders who require assistance in their daily living and healthcare needs. Home-based care addresses older adults' functional goals within their home environment; thus, it promotes ageing in place (Szanton et al., 2016).

Smart Technology can help older adults age in place by creating a supportive environment for older adults to enjoy a higher level of independence and functionality (Kimberly Miller, 2013). However, despite playing a significant part in promoting ageing in place, adopting these smart technologies on a large scale has been limited. One of the major challenges with in-home technologies is creating a versatile home environment in function and user-friendly. Smart technologies should aim to perform tasks without disturbing the users and causing any pain or inconvenience.

To enable older adults to age in place, Cocco (2011) suggested that the design of smart home technologies should emphasize the safety of the environment while preserving older adults' sense of independence (Cocco, 2011).

2.3. The Application of Surveillance Cameras in supporting older adults

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2.4. The Application of Surveillance Cameras in supporting older adults

Although ageing in place allows older adults to remain independent, providing a supportive and safe environment for older adults can be challenging, especially for older adults with chronic illness and dementia. The age-related physical decline can pose challenges for older adults to meet the environment's demands (Seidel, Brayne & Jagger, 2011). Limitation in functionality can impose a significant threat to the health of

the elderly and increases the risk of injury. Family members provide most care for older adults living in their own homes. An estimated 7.8 million people provided care to a family member with long-term health conditions or problems associated with ageing (Statistic Canada, 2020). The majority of these caregivers were employed full time and not living with the care recipients (Fast & Keating, 2001). Therefore, seniors who live alone lack ongoing support and supervision compared to the care they receive from institutions (Evans, Price & Meyer, 2016). To address the time and subjective burden of caregiving, the adoption of surveillance technology allows family members to monitor the older adults' activities when they are not present at the elderly's home.

2.5. What is an in-home surveillance technology?

In-Home Surveillance technologies can be simple or complex. It includes sensor surveillance, network and targeted device surveillance, and biometrics and body scanners. In-home surveillance technology devices are defined as any technological devices or systems that involve monitoring individual information (e.g. behaviours) to improve the safety, health and functional capabilities of individuals with disabilities (Demiris et al., 2014; Mortenson et al., 2016). In-home surveillance technology services are defined as any service that directly assists an individual with a disability to manage, track and monitor their health and well-being (Fisk, 2015). In-home surveillance technology aims to evaluate the function, motion, and related activity of the individuals to increase the likelihood of older adults' age in place (Owen et al., 2017).

Although in-home surveillance systems are making ageing in place a viable option for older adults, many of these technologies require older adults to wear sensor devices. The disadvantage of these body-worn devices is older adults often forget to put them on after changing or shower (de Miguel, Brunete, Hernando & Gambao, 2017). Surveillance cameras are viewed as a more feasible option for monitoring older adults' activities, especially those with dementia.

Surveillance cameras are the most commonly used ambient sensors for elderly care. They allow family members to systematically and objectively observe and intervene through remote monitoring. Furthermore, they empower families with more significant insights into the issues and determine the appropriate intervention that meets the elderly's best interest of the elderly (Chen et al., 2014). Surveillance cameras can

carry out various applications, such as fall detection and recognition of their activities. Surveillance cameras with these equipped applications can alleviate caregivers' burden by alerting them to emerging care needs that require immediate attention when they are absent from home (Wild, 2010).

2.6. Passive Monitoring

Surveillance systems can be categorized into two types: passive monitoring system and active monitoring system. A passive monitoring system collects user data and analyzes it over a specific period. Based on the analysis, the system will generate results for the individual. Passive monitoring systems automatically transmit the collected data without the user's actions (Berridge, 2015). Since passive monitoring collects data from a set of timeframe, the collected data reflect on a real-life scenario. Therefore, passive monitoring surveillance systems are used to detect any health-related issues as they arise (Resnick & Appelbaum, 2019). Based on the recorded footage of the elderly residents, family members can act and take preventive measures after an incident occurs (Cocco, 2011). The benefit of using passive monitoring is they are unobtrusive to the users and do not require interaction with the device to collect specific data (Andreozzi et al., 1970).

2.7. Active Monitoring

Active monitoring system takes a more active role in providing care for elderly residents. Active monitoring system monitors elderly residents and may interfere in his or her behalf if necessary. Active monitoring system implemented in the elderly's home for security and safety purposes. Most of the monitoring systems installed in the residents' homes can detect and predict any risky behaviours of elderly residents. Active monitoring systems are equipped with a response system (e.g. a button) that allows older adults to call for help during dangerous situations (Berridge et al., 2019). The benefit of an active monitoring system is the predictability and objectivity of the systems. Compared to passive monitoring systems, older adults can control how their data are collected and the system's functionality.

2.8. In-Home Surveillance technologies Commonly Used By Older Adults

There are different types of in-home surveillance technologies, and each type serves its purposes and infrastructures in assisting older adults in their homes. The following section will examine the different kinds of in-home surveillance technologies and analyze their influences on the ageing process's ageing process, including their quality of care, health outcomes, and satisfaction they received from it.

2.8.1. Telecare: Personal Emergency Response System (PERS)

Telecare defines as “the continuous, automatic and remote monitoring of real-time emergencies and lifestyle changes over time to manage the risk associated with independent living.” (Lawson, 2011). Telecare, such as the personal emergency response system (PERS), allows users to call for help during an emergency manually. Even though PERS are straightforward technically and structurally, they provide medical and emotional support to older adults by notifying their family members in the context of personal emergency (Leung, Ma, & Ng, 2009). Personal emergency response system (PERS) is widely adopted in western countries as a health intervention for older adults. For instance, nearly 1.4 million PERS users in the United Kingdom (Stokke, 2016). PERS has many types of designs, and each is equipped with different characteristics, ranging from traditional alarm devices to wearable devices, such as pendants and necklaces. Regardless of these PERS devices' attributes and features, PERS is often described as the fundamental design for safety and surveillance telecare (Stokke, 2016).

Compared to other in-home surveillance technologies, PERS are less intrusive as older adults receive help only when they need it. Therefore, it provides them with more privacy and freedom when they age in place. McClement (2007)'s study on Lifeline, a personal response system, found that older adults (95%) are satisfied with PERS. In particular, they are most satisfied with the device's psychological values (McClement, 2007). Although PERS provided psychological relief for both families and older adults, a research study indicates that older adult's perceived stigma when using PERS, especially the wearable one (Agboola et.al, 2017). Fleming & Brayne (2008)'s cohort

study found that 80 percent of older adults wearing PERS did not use their alarm system to seek help after experiencing a fall (Fleming & Brayne, 2008). Due to these challenges associated with the PERS system, passive in-home surveillance technologies such as motion sensors have been proposed to manage older adults' risk in their own homes.

2.8.2. Motion sensors-based monitoring

Unlike personal emergency response systems (PERS), motion sensors-based monitoring technologies are more complex. It automatically generates a warning to the response center if it detects any risks in the environment. Other than detecting threats, motion sensors are often being used as a tool to study the behaviour patterns of older adults with disabilities, particularly for older adults with dementia. Several research studies indicated that motion sensors are useful in identifying and predicting abnormal and risky behaviours of older adults living with dementia (Lotfi, Mahmoud, & Langensiepen, 2011; Nauha et al., 2018; Zhang et al., 2014). Motion sensors are classified into two categories: wearable motion sensors and non-wearable motion sensors. Activity tracker is an example of wearable motion sensors. Compared to non-wearable sensors, wearable sensors are more popular among the elderly due to their affordability and flexibility (Stavropoulos et al., 2020). These wearable motion sensors provide ongoing recognition of body motions in different situations and activities. For instance, foot-attached sensors (e.g. shoes equipped with sensors) can provide gait-related information related to walking and locomotion (Wang, Yang & Dong, 2017). The collected data helps family members understand the elderly's behaviour change and assist them in finding the most feasible healthcare intervention for the older adults. Although wearable motion sensors are useful in lifestyle modification, the results collected from the devices should only serve as a reference for the elderly's health. Schukat et al. (2016) brought up the concern of these devices' validity.

Therefore, family members should avoid using these data as an indicator of the elderly's health. For example, an older adult who wears automatic fall detection wristband and his /her family solely relies on the device's notification can reduce their regular check up on the elderly. If the detection sensitivity is inadequate and falls occurred undetected, it would increase the risk of delay in medical treatment (Schukat et al., 2016). In addition, these wearable sensors are based on the assumption that older

adults wear the system at any time. Therefore, if the sensors were not equipped, it could affect the result of the data.

On the other hand, non-wearable sensors respond to the change of the older adults' daily activities (e.g. temperature, smoke) and collect data information to model older adults' events or activities (Uddin, Khaksar & Torresen, 2018). The advantage of non-wearable sensors is it allows families to identify the risk of their daily activities. For instance, passive infrared (PIR) motion sensors are heat sensitive and they are often installed in different places of the house to detect different types of events, such as stove use, use of water and opening cabinets. Then, these collected data are analyzed and serve as a means to determine if there are any abnormal activity patterns (Seiler, 2004). In addition, several studies have found that there was a higher acceptance rate of motion sensors compared to other in-home surveillance technologies due to its higher accuracy rate and less intrusive nature (Alwan et al., 2005; Barger et al., 2005; Lee et al., 2007; Lotfi et al., 2011). Due to its popular demand, motion sensors are expected to account for 8.35 percent of the global technological sensors market in 2022 ("IoT sensors global market breakdown: enabled sensors 2022 | Statista", 2020). Despite the potential of motion sensors, motion sensors' functions is limited to capturing the elderly's activities and movement but not their interaction with the environment.

2.8.3. Video Surveillance systems

On the opposite, video surveillance cameras can capture both individual's daily activities and the risk of the environment. Compared to other sensors, video sensors have the highest accuracy and validity rate. They provide visual information for both individual motion and their surrounding environment (Demiris et al., 2006; Buzzeli, Albe & Ciocca, 2020; Auvinet, Multon, Saint-Arnaud, Rousseau & Meunier, 2011). Often, video surveillance is used in long-term care homes to enhance the residents' safety, particularly for fall detection (Hall et al., 2017; Rougier et al., 2011; Horgas & Abowd, 2004). Many long-term care homes have installed video surveillance in common areas, such as the dining hall. Hall et al. (2017) suggested that implementing video monitoring systems can ease the burden on staffing shortage at long-term care facilities and manage the residents' health care needs (Hall et al., 2017). Legislation and policies governing long-term care homes are implemented to ensure residents' privacy is protected. For instance, the Personal Health Information Protection Act ensured that

older adults' health information is confidential, and their privacy is respected when they receive the treatments (Meadus, 2013). Since video surveillance is installed in a health care facility, there is the risk of residents' health information (e.g. receiving medical treatment) is recorded. In this regard, the risk of privacy breach is inevitable in long term care facilities. In 2018, Quebec introduced a new regulation on the use of surveillance cameras in long-term care homes. This regulation allows residents to install video surveillance in their rooms without permission from the long-term care facility (Kuzz & Griffiths, 2014). However, this regulation further states that roommates' consent is required if they live in a share-room facility.

Although video surveillance is designed primarily to increase security and safety in institutional settings, it can be adapted for domestic use in recording activities and behaviours of older adults at home. The availability and affordability of video surveillance cameras lead to its pervasive use in elderly homes, as family members become aware of the benefits these devices can serve. For instance, video surveillance systems are often used for fall detection by measuring the older adults' movement or orientation in their environment. Family members who do not live with the elderly, in particular, can be reassured through monitoring older adults' activities in their homes. In addition, video surveillance systems provide notifications regarding the change of activity patterns that may reflect the older adults' health status (Owen et.al, 2017). There are many different types of video surveillance cameras in the market, ranging from two-way audio cameras to video surveillance cameras with smart home features. Despite the wide adoption of video surveillance cameras used in private spaces, very little attention has been given to the private areas, in particular elderly's homes. Based on the census of 2000, nearly 95 percent of older adults resided in private households (Cohen & Miller, 2000). Based on this data, it is suggested that there is a change in demand from institutional care to home care.

Although the evidence suggested an increasing number of older adults ageing in place with the application of surveillance technology, there is a lack of literature emphasized on the practice of video monitoring in elderly's home. Many of the existing literature focused on video surveillance use in health care settings rather than elderly homes (Hall et al., 2017; Owen et al., 2017; Rougier et al., 2011). As more seniors prefer to age-in-place, it is crucial to understand the influence of technology, particularly video surveillance systems, in promoting independent living.

Despite the advantage of using video surveillance, video surveillance systems' intrusiveness nature sparks controversy when applied in health care for the elderly. Since the use of video surveillance systems is taboo, there is a lack of statistics regarding the number of users, the age distribution, and the ratio of race/ethnicity in adapting video surveillance systems.

2.9. Benefits of Surveillance Cameras

Generally, the use of surveillance cameras in elderly homes has several benefits, including reducing the risk of home accidents for the elderly and providing support for family members to manage the elderly residents' conditions such as chronic illness, fall, dementia and medical problems. Surveillance cameras can assist with ageing in place by providing safety monitoring. Studies have shown that using surveillance cameras can reduce the risk of injury if the older adults fall (Robinovitch, 2010; Whitehead et al., 2018; Auvinet, Multon, Saint-Arnaud, Rousseau & Meunier, 2011).

According to a report by the Public Health Agency of Canada, 50 percent of falls result in hospitalization at home. Such falls typically occur because the home environment is not suited for older adults' needs (Cocco, 2011). Furthermore, the same report suggested that the healthcare expenditure on accidental falls is an estimated \$2 billion annually. The application of surveillance cameras reduces the cost of health care expenditure. It maintains the quality of life and independence of older adults by minimizing the risk of injury from falls and accidents in the home (Public Health Agency of Canada, 2014).

The use of surveillance cameras is not only beneficial to older adults; it also reduces the caregiving burden from the family. Studies showed that the majority of family members found various forms of technology are helpful to them in managing their job and caregiving responsibilities (Neal, 2008; Matthews, et.al, 2015). In addition, simply acknowledge that the elderly resident is safely at home providing them important psychological respite. From the perspective of family caregivers, the main advantage of surveillance cameras is that it allows family members to observe and monitor the elderly without any geographic boundaries. Furthermore, it empowers family members to observe and react to elderly residents' behaviour and lifestyle in their own homes (Berridge & Wetle, 2019).

2.10. Concern with Surveillance Camera

Even though their potential to generate numerous benefits for the elderly, surveillance cameras as an ageing technology tool comes with risks and challenges. Reported concerns are often associated with: privacy, lack of control and acceptability.

One of the major concerns is the intrusiveness of surveillance cameras. Older adults perceive surveillance cameras as more unobtrusive technology compared to other wearable sensors. Privacy is one of the significant problems that hinder the adoption and use of surveillance cameras. Studies have shown that older adults are reluctant to use any devices that contain video or image capturing (Berridge & Wetle, 2019; Matthews et al., 2015; Liu, Stroulia, Nikolaidis, Miguel-Cruz & Rios Rincon, 2016; Boise et al., 2013). In addition, the lack of control of surveillance cameras may demote the autonomy of older adults as they are being observed daily. Older adults' acceptance of surveillance cameras is another hurdle. The acceptance of surveillance cameras depends on older adults' self-perception of needs. If older adults and their family members have different perceptions of needs, conflict may arise.

While these concerns are essential, this project's focus is on the ethical circumstances surrounding the use of surveillance cameras. Surveillance cameras provide access to family members to the most personal information of older adults' lives. Such action can potentially restrict older adults' most basic rights, particularly privacy and autonomy.

2.11. Reason of using video surveillance technology while ageing in Place

Although the adoption of surveillance technology can be intrusive, the benefits of video surveillance substantially outweigh the reduction of privacy inherent in its use (Townsend et al., 2011; Peek et al., 2016; Boise et al., 2013; Berridge, 2017). Peek et al. (2016) suggested that older adults' attitudes toward technology use are dependent on their (1) needs, (2) interest and (3) willingness to invest (Peek et al., 2016). Its utility determines older adults' desire to adopt monitoring technology. Boise et al. (2013) found that older adults will evaluate the monitoring technology based on (1) the ability to assist them in independent living, (2) the ability in responding to emergencies; and (3) the

ability to track their health status (Boise et al., 2013). The capabilities of surveillance technology enabled older adults to age in place and assisted older adults with everyday challenges, such as cognitive change, general health and risk management.

It is important to note that surveillance technology is adopted based on older adults' perception of cognitive and physical needs rather than their actual needs. Several literature studies have found that perceived usefulness correlates with the adoption of technologies at home (Li et al., 2019; Vichitvanichphong, Talaei-Khoei, Kerr & Ghapanchi, 2018; Cook & Winkler, 2016; Peek et al., 2016). Older adults view assistive technology as a preventive measure to reduce risks associated with age-related physical and mental declines (Cook et al., 2016). Peek et al. (2006) found that older adults' perceived consequences and benefits will influence their acceptance of surveillance technology. Older adults are more likely to adopt technology if the perceived benefits are outweighing the repercussions from it. For instance, older adults who have a strong desire to age in place are more willing to trade off their privacy (adoption of surveillance technology) for autonomy (Townsend et al., 2013). Surveillance technology should be adopted to meet the older adults' needs to avoid 'monitoring for monitoring sake' (Bowes, Dawson & Bell, 2012).

2.12. Cognitive Monitoring

Surveillance cameras are often used as a technological intervention to monitor the safety of older adults with dementia. Dementia is one of the most challenging chronic conditions for older adults, especially for elderly who live alone in their homes. Dementia is one of the leading causes of death in the elderly population and afflicts nearly 432,000 Canadians. Currently, the national cost of caring for dementia exceeds \$900 million a year, with long term care accounting for most of the expenditure (Alzheimer Society of Canada, 2016). One of the significant challenges of providing care to older adults with dementia links with their disruptive behaviours. As dementia greatly affects older adults' cognitive ability, it also decreases their ability to make appropriate responses to different situations. A few of the most common disruptive behaviours include wandering, physical aggression and agitation (Matthews et.al, 2015). Many family caregivers identify disruptive behaviours associated with cognitive decline as a stressor and burden of providing care to older adults with dementia (Williams, Herman, Gajewski & Wilson, 2009). Besides, Buhr et al. (2006) noted that 90 percent of

older adults with dementia exhibited disruptive behaviours linked to caregiver burden and adverse health outcomes (Buhr et al., 2006).

Several literature studies have highlighted the potential of home surveillance systems in managing their security and autonomy of the residents (Matthews et al., 2015; Mégret et al., 2010; König et al., 2015). Mégret et al. (2010)'s project on wearable video monitoring devices for people with dementia demonstrated that video monitoring provides greater insight into the interaction between the users with their environment; thus, it allows medical practitioners and caregivers to identify the constraints of the elderly's living environment. Furthermore, the video monitoring devices provide the instrumental activities of daily living of the elderly, which offers insights for family members in healthcare planning for older adults with dementia (Mégret et al., 2010). König et al. (2015)'s study stated that video surveillance cameras are useful in analyzing and assessing older adults' cognitive health status with mild cognitive impairment (MCI), particularly their interaction with their home environment.

Despite the potential of video surveillance systems in alleviating caregiving's burden, surveillance technology often developed without the proper understanding of older adults and their family members' specific needs. Older adults with dementia have difficulties in communicating their thoughts and needs to their family members. In particular, it is difficult to understand the perceived risk and benefit of video surveillance systems from older adults with dementia due to their limited cognitive abilities. Kang et al. (2010) stated that monitoring technologies' features need to be practical, compelling, and economical and user-friendly to both family members and the elderly (Kang et al., 2010). One of the main challenges of adopting video surveillance for older adults with dementia is associated with cost. Although adequately designed video surveillance systems help reduce the caregiving burden of family members, these assistive technologies are out-of-pocket expenses and not covered by the government healthcare plan (Kang et al., 2010). As a result, the in-home monitoring systems and service costs might affect family members' willingness to adopt the technologies. For example, Schultz et al. (2013) suggested a correlation between the older adults' functionality level and their desire to spend on assistive technology. Older adults are more willing to adapt to ageing technology, particularly in health-related technologies, when they experience a change in their physical and cognitive health (Schultz et al., 2013).

Chapter 3. Ethics

For many older adults, being independent is the primary goal of successful ageing. In some regards, surveillance cameras advance this notion by allowing older adults to remain their own home without relocation. However, this independence comes at a cost. For safety measures, intrusive actions may be enforced on elderly residents by their family members. Monitoring older adults' behaviours create a debate about whether family members should have the right to control the data generated by surveillance systems. Furthermore, the ethical concerns that family members look at may differ from what an elderly resident considers ethical. It all goes back to the self-perception of need and what is right or wrong. These concerns indicate that the use of surveillance cameras and ethics may not always coexist harmoniously. There are numerous ethical principles and ideas that can be applied to surveillance technology in old age care. Sixsmith et al. (2020) provide a useful overview, and some of these critical principles are discussed below and subsequently applied to the issues and concerns that emerged from the literature review.

3.1. Ethics Issues

3.1.1. Issue of Privacy and Confidentiality

Under the Constitution Act, the Charter of rights and freedom was established in 1982. The legislation provides everyone in Canada with protection against "unreasonable search and seizure." This legislation ensures that individuals in Canada have their rights against unreasonable intrusion, including their privacy and free expression. However, it is unlikely that this legislation's drafter could have predicted the influence of technology on Canadian society. Technology changes the nature of privacy. Privacy in the context of technology is best described as "individuals' rights to control over their data and restrict others from gaining access to their data" (Tavani & Moor, 2001). It is difficult to strike a balance between in-home monitoring and assuring older adults' personal information is fully protected from others. When the elderly decide to install a surveillance camera, he/she has agreed to share their personal information in exchange for safety and security. Although constitutional protection is in place, the current policy failed to address video surveillance in the private household. Outside of

the constitution, there is also a legislative framework to protect individuals' privacy from the private sector ("The Charter and Human Rights in the Digital Age", 2020). However, these regulations have been the subject of criticism for being outdated and unable to keep pace with technological advancement.

3.1.2. Issue of Consent

The adoption of surveillance cameras raises difficult questions in relation to informed consent. There are three major elements of informed consent, and they are (1) disclosure, (2) decision-making capacity and (3) voluntariness. Disclosure ensures that the technology providers are sharing the information with their users. It is generally accepted that the following should be disclosed to provide fully informed consent before the practice of monitoring: (1) the nature and the purpose of the technological systems ; (2) the expected benefits of the technology; (3) the risk and complication of the technology. According to the three listed disclosures, it is difficult to obtain informed consent for surveillance cameras since there is no clearly defined purpose of using surveillance cameras in the elderly home (security vs. behaviour monitoring). As a result, it becomes challenging to determine the expected benefits and risks associated with the use of surveillance cameras.

Voluntariness means that an individual makes a decision free from manipulation or coercion. However, it is difficult for older adults to make decisions free from manipulation or coercion since their families are involved in the decision-making process. Besides, older adults' relationship with family members and their social conditions can influence their preferences and needs.

Under The Personal Information Protection and Electronic Documents Acts (PIPEDA), all private sectors must obtain individuals' consent before or when their personal information is collected. However, the reality is that users are often scrolling through the agreement and accepting the terms and conditions without fully understanding how their personal information is used. Furthermore, PIPEDA does not explicitly classify which personal data is considered sensitive and which one is not. Therefore, it makes it difficult for private sector companies to support informed consent by listing all the potential risks of using their personal data.

3.1.3. Stigma and Obtrusiveness

Although surveillance cameras allow older adults to live independently and age in place, some elderly perceive it as a sign of dependence. Zwijsen et al (2011)'s literature review showed that stigma and obtrusiveness are one of ethical issues of assistive technology (AT) implementation in elderly's home (Zwijsen et al, 2011). Home plays a significant role for older adults (Lawrence & Murray, 2009). Home modification including implementation of assistive technology can influence older adults 'experience of their home, including their identity and sense of freedom. In their research study, Aplin et.al (2013) stated that older adults feel pressure and uncomfortable with the modification of their home (Aplin et.al, 2013). Even though technology allows older adults to be physically independent, older adults might still feel emotionally dependent on their family members. Kang et.al (2014) stated that objectively achieving physical independence may not be subjectively experienced as such (Kang et.al, 2014). For example, the use of surveillance cameras may enhance older adults' safety but also emphasize their reliance on their family members. Therefore, older adults feel compelled to adopt video surveillance systems to avoid stereotyping. Courtney (2008)'s study on the use of monitoring technology in residential care also stated that using monitoring technology could lead to a feeling of frailty in which it significantly affects older adults' self-esteem (Courtney, 2008). Therefore, the use of surveillance cameras could be conceptualized as a factor that magnifies the loss of autonomy rather than an aid for older adults' independence

3.2. Ethical Principles in health and healthcare

Several ethical principles are developed in underpinning best ethical practices and served as the guideline for ethical decision-making (Beauchamp & Childress, 2001). Under the health domain, Beauchamp & Childress (1979) identified four fundamental ethical principles that can be applied to surveillance technology: autonomy, beneficence, non-maleficence and justice (Beauchamp & Childress, 2001). These four ethical principles underpinning any decision-making process in elderly care for older adults who are ageing in place. Understanding the following principles helps families decide how they ought to act in their caregiving roles.

Autonomy refers to the right of patients to make their own decisions. When older adults are subjected to video surveillance systems classification, they should have the capabilities to make their own decision without any interference from other parties. Voluntariness is vital to autonomous life. Voluntariness refers to the ability to make decisions without other people's manipulative and coercive influences. In other words, being autonomous should be free from coercion, persuasion and manipulation. Coercion defines individuals who take action or decide to please someone (e.g. family members) rather than making their own choices (Mendina & Britz, p.144, 2004). Individuals might compromise their decision to meet the favours of the others. For example, older adults who require ADL assistance are forced to relocate to a new environment due to their incompetence. For persuasion, older adults are convinced to take action with the reasons that are proposed by another person. For example, older adults might be encouraged by family members to install video surveillance cameras in their homes for financial benefits (lower healthcare costs).

Manipulation refers to information and the purposes of the action are altered to manipulate an individual's understanding of a situation (Mendina & Britz, p.144, 2004). Menon et al. (2020) stated that autonomy should not be viewed as an individual choice but a choice influenced by their interpersonal relationship and social background, including cultural and societal norms (Menon et.al, 2020). Unlike medical ethics, relational autonomy emphasized older adults' relationships (with family and community) and how it influences older adults in decision-making capabilities and how they express autonomy. From a family ethics perspective, relational accounts highlight the potential significance of autonomy of relationships between family members and the older adults and their expression and experience of respect and trust.

Beneficence refers to the duty to do more good than harm. In other words, the decision should act in the patients' best interests (Summer, p. 49, 2009). For example, the install of video surveillance cameras should maximize the security of the house environment.

Non-maleficence refers to avoiding harm. In a health care setting, intervention should not cause any harm; neither should it prevent the good nor limit the potential of reaching beneficial outcomes (Summer, p. 47, 2009).

The last principle is **justice**. Justice refers to patients who should be treated fairly and equally. In other words, fairness should come into play at every phase and design and implement video surveillance technologies. Bias and discrimination should be eliminating when implementing surveillance systems.

3.3. Kitchener's fifth ethical Principles: Fidelity

To extend the Beauchamp & Childress (1979)'s ethical principle, Kitchener added fifth ethical principle **fidelity**. Unlike the other four ethical principles, fidelity is focused on the relationship of the individual rather than the outcomes of the decision making. Kitchener (2000) referred fidelity as the notion of loyalty, faithfulness and promise binding between patients and clinicians. In other words, one should keep his/her promises and be faithful and true to their promises and responsibilities that they made with others. Fidelity is an important ethical principle to ensure that family members are being committed and faithful to the older adults when they help them to make the decision. In an environment which is permeated with assistive technologies, the element of trust is often transferred to these technologies and relationships between family members and older adults are often ignored. In fact, the principle of fidelity is crucial when making the decision for older adults because a trustful relationship can influence the outcomes of the actions. Although the element of trust is an important factor when making a decision, fidelity is considered by many family members to be the most common source of ethical conflict. Family members often find themselves caught between what they believe is right is in conflict with what the older adults want. In addition, the promises developed by the video surveillance system might not meet the actual needs and desires of the older adults(Courtney et.al, 2008). For instance, maintaining independence is cited as one of the main goals of video surveillance, but the achievement of this goal is complicated by the fact that the term "independence" could be embedded with different meaning and interpreted differently from different disciplines.

3.4. Health ethic in navigating family involvement in decision making for older adults

Digital technology is increasingly embraced to strengthen the healthcare system. It provided remarkable opportunities to increase the efficiency and quality of patients'

care and safety by monitoring, preventing and managing their health. The concept of incorporating technology into elderly care practice has attracted increasing attention over the last decade. However, it has come to be challenged with an increasing understanding of the limitation of available evidence in the face of the complexity of the process of decision-making.

The complexity of decision making for older adults is increased by the presence of multiple chronic health conditions, higher prevalence of cognitive impairment and lower capacity for self-management (Bunn et al., 2018). In particular, decision making can become more challenging for older adults living with dementia due to their inability to communicate their preferences or participate in decision making. Often, decision-making for older adults with dementia requires the involvement of surrogates. Older adults usually appoint their immediate families to serve as their surrogates. Roberto (1999)'s study found that surrogates were most commonly daughter (33%), then spouses (26%) and sons (16%) (Roberto, 1999). Families act as a surrogate allows them to make the decision and provide support for the older relatives on their behalf. Therefore, family involvement in the decision-making of older adults is viewed as essential rather than an exception.

Although older adults appoint their families to be their surrogates, many of them did not discuss the end of life preferences with their family or put their wishes in their living wills (Roberto, 1999). As a result, the process of decision-making for older adults can be stressful for families due to their uncertainty about what to do and how to behave (Tree, Ohs & Murray, 2017). Tensions may arise between family members and older adults for balancing the benefits and harms of both parties. To help families navigate decisions and ensure that the care provided is consistent with older adults' values and preferences, health ethics offers protection for both older adults and families by serving as the moral guideline in deciding on implementing surveillance technologies.

Through health ethics, it allows family members to assess whether surveillance technologies yield the most significant benefits (e.g. autonomy and independence) for older adults as well as minimize the the harms. In fact, health ethics is necessary for surrogates for moral justification in making the decision for older adults with dementia. In addition, health ethics serves as the moral judgment that can be used to resolve ethical dilemmas and justify the family members' decision and action (Limentani, 1999). For

example, family members are frequently faced with the dilemma of deciding whether they should install surveillance cameras in the home of older adults living with dementia. On the other hand, it is important to respect older adults' preferences and values living with dementia. The preferred health decision (installing surveillance cameras) should appropriately protect older adults' safety without disempowering, excluding and discriminating against older adults living with dementia (Sixsmith, Sixsmith, Fang & Horst, n.d.).

Applying health ethical principles in health decision-making allows family members to evaluate the situations and implement the most appropriate care for older adults. In this example, these ethical principles are: the principle of autonomy, installing surveillance cameras should address the values and preferences of the older adults living with dementia; non-maleficence, not causing any harms to the older adults (installing the surveillance cameras against older adults' expressed wishes); beneficence, wishing to promote independence for older adults living with dementia produce the best health outcomes. Justice, ensure older adults' preferences and values put into consideration.

The moral process resulting from this method weighs the concerns and benefits of the health decision, on balance, the best course of action. An important benefit of applying principles in family ethics is putting together a common core of issues which loosely unit ethical concerns in applying surveillance technology, in particular, using surveillance cameras to monitor older adults' behaviour and health. Although each ethical principles provide a statute of the morally sounded idea, these principles together can create conflict with each other and require different judgment in making an ethically acceptable decision for all involved parties. Therefore, family members need to make an ongoing assessment of the health care decision and apply each principle that addresses the moral, religious, and values that older adults may hold. Besides, these principles act as a duty for family members in balancing between the preferences and needs and the safety of the older adults (Sixsmith, Sixsmith, Fang & Horst, n.d; Tannahill & Douglas, 2012).

Figure

3.5. Challenges in applying principles in Family ethics

Although ethical principles served as a guiding tool for making moral decisions, problems begin to emerge when balancing the conflicts between these principles (autonomy, beneficence, non-maleficence and justice). For instance, should family members prioritize the safety of older adults (non-maleficence) over the preferences of older adults (autonomy) to yield the greatest health outcomes (beneficence)? It is challenging to make an appropriate decision when the ethical principles are only applied to justify the decision without considering the views of all involve parties, as well understanding the reasons of why they support or against the decisions. In the scenario of installing surveillance technology in older adults, there can be tension between respecting older adults' autonomy while addressing the family interests (e.g. reduces caregiving burden). While there is no clear extent to indicate whether the decision made by the family is morally justified or unethical, family dynamics such as the undue family influence can affects how the decision was reached. As a result, it might lead to bias outcomes that generate more benefits for family members rather than the older adults.

3.6. Ethical consideration for older adults with dementia

Dementia affects older adults' ability to perform their daily tasks and self-care, thus they often relied on their family members to act as a caregiver. For older adults living with dementia who lived alone, family members have to take extra measures to ensure their safety at home. Surveillance technologies can promote safety and quality for older adults with dementia, and enable them to continue to age in place. At the same time, surveillance technologies may also provide new mechanisms for limiting privacy and restricting their movement.

One of the main purposes of installing a video surveillance system in the home of a person living with dementia is to support their independence and reduce the potential risks that may occur at home (Mulvenna et.al, 2017). However, older adults living with dementia might not be noticing the existence of the cameras nor do they understand that they are being monitored by their family members. Eltis (2016) stated that older adults living with dementia are often left out of the dignity-based right paradigm because of their incapability to think rationally. Placing a tracker or using technological devices to monitor older adults living with dementia without consent raises some ethical issues.

However, there is a lack of awareness of such issues, and our society viewed it as standard or rules to protect older adults with dementia. This is problematic because the rationale behind a health decision making is emphasized on safety rather than the rights of the older adults (Eltis, 2005).

Health decision making involves older adults and their family members' value, preferences, needs, goals, abilities and perceptions. However, older adults living with dementia are often assumed to be difficult to communicate with due to the decline of communication abilities (National Academic of Sciences, Engineering, and Medicine, 2016). Therefore, families are responsible in decision making for older adults living with dementia. Making decisions for older adults living with dementia can be challenging for family members, especially for those who do not have discussions about their care situation as well as making plans for the future. In addition, family members may face considerable difficulties in balancing both the preferences of older adults living with dementia as well as enhancing safety. To enhance safety for the older adults living with dementia, obtrusive intervention may be placed in their home. This sparks ethical debates on policymakers and ethicists regarding the moral and practical acceptability of the surveillance cameras in the home of older adults living with dementia (Niemeijer et.al, 2010).

Although surrogate consent is often provided by family members to make the decision for the older adults with dementia, family members find it difficult to balance the benefits and risk when they make the decision. Furthermore, another ethical issue of whether family members should override a wish previously expressed by the older adults to enhance their safety. Mulvenna et.al (2017) suggested that family caregivers support the use of video surveillance in the home of people living with dementia if the system taken into the account of privacy and consents are obtained appropriately (Mulvenna et.al, 2017).

Chapter 4. Literature Review

The previous chapter has enlisted some of the ethical issues raised by the increasing use of surveillance cameras by family members. An exploration of these will help develop more vital ethical guidelines for implementing smart home technology in particular sensors. In this section, a literature review will address three interrelated questions:

- 1.) How do older adults perceive the use of surveillance cameras in their house?
- 2.) What ethical issues are associated with the use of video surveillance? Older adults who live with their partners? Older adults living with dementia?

4.1. Method

I conducted an extensive search across gerontology, technology and health discipline to cover empirical studies that reported on the ethical issues to the adoption of surveillance technology (specifically with cameras as the sensor) by older adults from 2000-2020. Additional articles were identified through a bibliography search from the selected papers

4.1.1. Search Strategy

An electronic journal article search was conducted in multiple databases Springerlink, Sciencedirect, and PubMed. From the three databases, there are a total of 122 resources from the initial finding. After removing all the duplicates journal articles and screening for their relevance to my objective, there are a total of 19 studies included in the literature review. A detailed description of the search strategy and outcomes can be found in Appendix 3.

4.1.2. Keywords

The following key terms were used in combination in the database search “surveillance cameras”, “Surveillance” , “ older adults” , “ethics” and, “ in-home

monitoring”, or “smart- home technologies”, ‘family caregiver’. The search focuses on articles that have the key terms in the title or abstract.

4.1.3. Inclusion and exclusion criteria

Articles were selected when they reported on ethical issues associated with the use of video surveillance/ surveillance cameras in-home with the aim of independently living and ageing in place. Articles will be excluded when they focus on the influence of the activity of daily living (ADLs) and improving older adults’ health conditions. Since this project explores the ethical issues in the lens of family ethics, studies focused on the target groups of family members/family caregivers/ ageing parents/grandparents were chosen in this literature review. All the articles must be written in English and published within the last 20 years to ensure the relevance of the sources. Both qualitative and quantitative researches are included in the literature review

4.1.4. Study selection

The list of articles is first filtered by removing duplicate titles. Then the abstracts will be assessed and screened. The initial literature search generated 122 hits: 57 from ScienceDirect; 62 from Springerlink and 3 from PubMed. . After carefully reviewing the articles and removing duplicate articles, only 19 articles are included. Appendix A presents an overview of the study selection process.

4.1.5. Data Extraction

All of the selected articles were shown to define the types of video surveillance, the targeted population, the purpose of the study, study design, as well as the outcomes of the study.

The types of surveillance: Define the type of video surveillance that is used in the study. Understanding the types of surveillance provides a comparison of how different types of video surveillance influenced older adults’ effect to age in place.

The target population: Define who the target population of the study is. It helps us understand different perspectives of the family members/family caregivers and older adults on video surveillance at home.

Study design: The types of study design (qualitative/ quantitative/mixed-method). By understanding the study design, it helps us to identify the limitation of the design.

Outcomes: study outcomes in terms of the positive/negative influences on the end-users.

4.2. Results

A total of 122 articles were returned during the initial search of databases. After a combination with Google searched papers, 19 met the inclusion criteria of exploring the related ethical concerns of using surveillance technology. Table 4 in the appendix summarizes their characteristics, types of technology they examined, study design and findings. The following sections will present the review findings on older adults' perceptions of video surveillance, the ethical issues associated with video surveillance, and measures that can be adopted to minimize ethical risk.

Figure 4.1 illustrates the flow chart that summarizes the process of relevant article title identification in the electronic literature searches from the three databases (Springerlink, Sciencedirect and PubMed), screening, article selection and exclusion. The number of articles included vs. excluded, and the reasons for exclusion are explained. The characteristics, methods, and results of each of the selected articles are given in Appendix A.

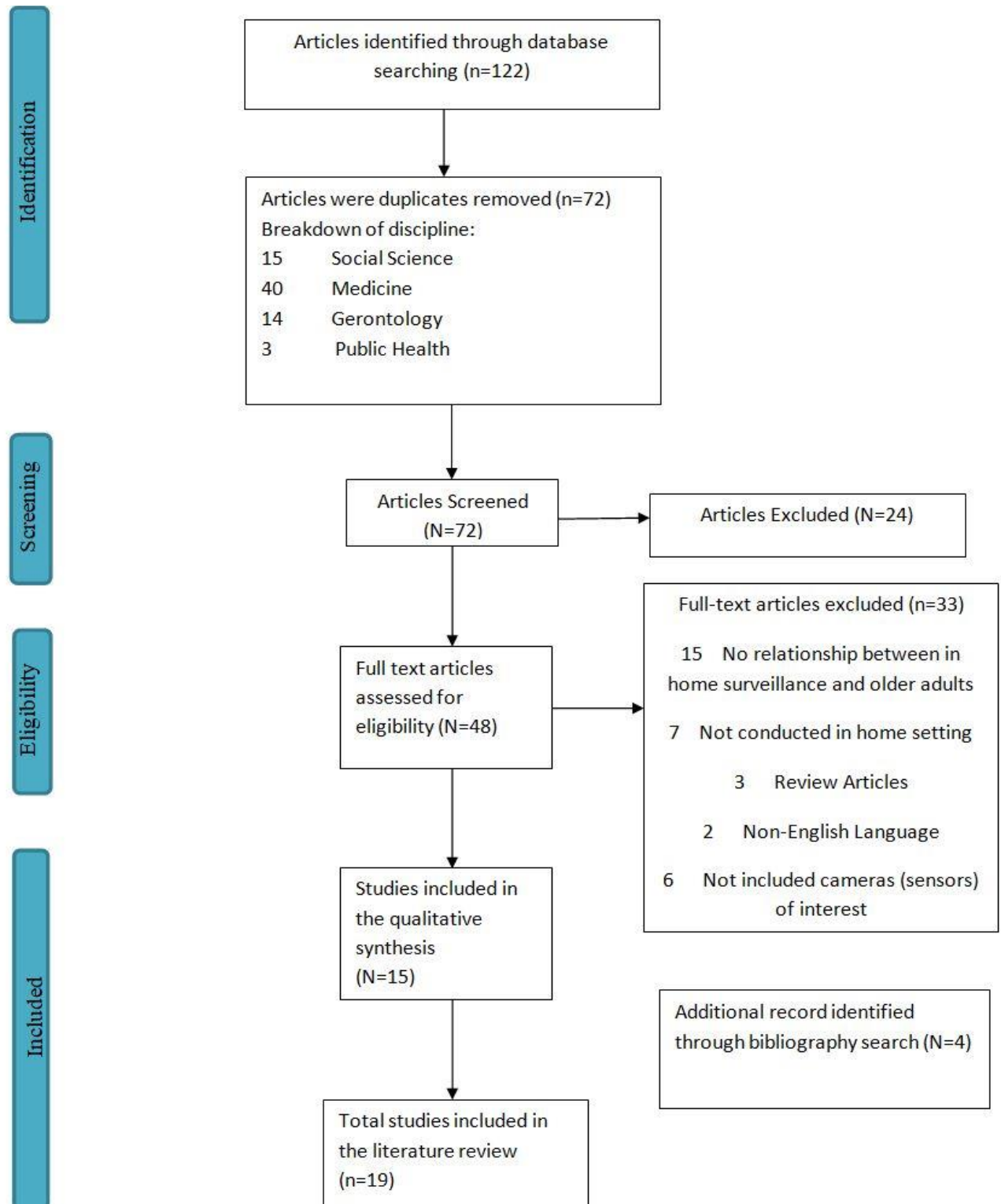


Figure 4.1. Literature Review Process

4.3. How do older adults perceive the use of video surveillance in their house?

Previous literature studies indicated that using surveillance technology in home settings can compromise the privacy of individuals. There are two types of privacy, the first type is personal privacy, and the second type is data privacy. Personal privacy defines as free from intrusion from a third party. Home is more than the physical living environment for older adults. It represents older adults' identity in social, cultural and personal perspectives (Mortenson, Sixsmith & Beringer, 2016; Wiles et al., 2011). Although privacy can be a barrier for older adults' adoption of video surveillance, older adults' desire to age in place overrides their privacy concerns. Courtney et al. (2008)'s study on older adults' perspective using smart home technology found that older adults are willing to trade off their privacy for being independent and autonomous (Courtney et al., 2018). In addition, Fisk & Rogers (2006) found that older adults with higher functional status are more likely to be concerned about their privacy than ones with low functional status. Both studies indicate that the level of social capital, allocation and the amount of support older adults received influences their decision making (by adopting surveillance technology). In this regard, it explains that older adults who require a higher level of support will prioritize the perceived benefits from the practice (by accepting the use of surveillance cameras) than the risk associated with it.

The perception of using video surveillance correlates with individuals' computer literacy skills and technological knowledge. Several research studies found that older adults with higher computer literacy skills are more likely to adopt surveillance [1] cameras in their homes (Van Hoof et al., 2010; Cournety et al, 2008; Boise et al., 2013; Steele et al., 2009; Czaja et.al, 2006). Computer literacy skills correlates with the age of the elderly, with 86 % of older adults under the age of 74 are willing to adopt and learn new technologies compared to older adults aged 75 and above (Czaja et.al, 2006). Foster et al. (2014) highlighted some of the common perceived barriers associated with the use of telehealth technologies in their study. These common barriers included the system's poor design (e.g. small fonts with low color contrast), the lack of computer literacy skills, inaccurate and misleading data collected from the

systems, and incompatibility with the older adults' physical environment (Foster et.al, 2014).

Steele et al. (2009) also found that training sections are essential for older adults to adopt monitoring technology (Steele et al., 2009). Given demonstration or training regarding the use of surveillance technology helps older adults understand better the purpose of technology, the functions of the cameras, and how they can be beneficial from it. Thus, they are more confident and comfortable to have the cameras to install in their home. Misstelstad et al. (2014) also found that training on how to operate the technology has significant impacts on the continuity of technology adoption. One of the main concerns of adopting surveillance technology is the acceptance and adherence to its optimizing usage.

Video surveillance technology can lead to over-reliance on automation and creates a medicalization in the home environment. (Demiris & Hensel, 2009). Personal health monitoring systems, such as surveillance cameras, should not be emphasized only on older adults' health outcomes. It is necessary to understand that the purpose of ageing in place is to allow older adults to stay independent and remain in their homes as long as possible. Other personal domains, such as their experience and home meaning, need to be included when adopting video surveillance. Misstelstad et al. (2014) stated the importance of incorporating the lifeworld concept in personal health monitoring. The health monitoring system should respect older adults' values, traditions, and cultural norms (Misstelstad et al., 2014). Furthermore, the use of surveillance cameras should not be obtrusive to older adults' identity and autonomy. Steele et al. (2009) also found that individuals' preferences are necessary when adopting surveillance technology (Steele et al., 2009). Older adults are more willing to continue to adopt surveillance if they can alter the systems based on their preferences (e.g., the alarm's volume, turning on/ off of certain features). Boise et al. (2013) found that 60 percent of participants with intact cognition reported privacy concerns of in-home activity monitoring, and these concerns increased after one year of participation. In particular, these privacy concerns are regarding the potential risk of information given to the wrong people (Boise et.al, 2013). Zeissig et al. (2017) noted that in-home monitoring systems addressed with privacy protection (the ability to set restrictions in assessing the data) are the primary facilitator for older adults in home surveillance practice (Zeissig et al., 2017).

4.4. The ethical issues associated with video surveillance

Despite the potential benefits that video surveillance systems provide, these systems still raise some critical ethical issues.

- **Issue 1:** Informed Consent. The value of older adults' autonomy entitles them to accept or refuse any healthcare decision. However, consent often has difficulties delivering clear and concise information compatible with the older adults' expectations, level of education, personality, understanding and ethics.
- **Issue 2:** Privacy. Current system available in the market often ignores privacy, and many of them rely on a centralized approach to store and analyze the data, which can impose potential points of misuse
- **Issue 3:** Conflict of interests and needs. The current surveillance technology failed to address the perceived needs and interests of both elderly users and their family members.
- **Issue 4:** Stigmatization. Older adults perceived surveillance technology as a sign of disabilities and were given a message that they are vulnerable.
- **Issue 5:** Homogeneity among older adults. The design of the surveillance technology failed to address the different needs in support older adults to age in place.
- **Issue 6:** Maintaining the balance between duties of care and controlling behaviour. How do we draw the line between the duty of care and abuse of power when adapting video surveillance in older adult's homes
- **Issue 7:** The influence of Family involvement in the decision. Their relationship with family can influence older adults' acceptance of surveillance technology and their views of autonomy.
- **Issue 8:** The implementation of technology in the elderly's homes should respect their values, experiences and needs rather than the functions of the technological systems.
- **Issue 9:** Changes the behaviours of older adults based on the social norm. Facilitate socially acceptable behaviours (e.g. exercise) and prohibit sensitive activities such as the sexual activity of older adults.

For further insight into each ethical issue, the following section will analyze each issue with respect to the ethical principles of autonomy, beneficence, no maleficence, justice and fidelity

4.4.1. Autonomy

Autonomy and independence are important when considering placing surveillance cameras supporting older adults who want to age in place. Research has shown that the use of surveillance cameras can promote independence and contribute to a risk of hampering the experience of autonomy (Winkler & Rinner, p.7; Demiris & Hensel, 2016; Bowes et al., 2012). Although surveillance technology is intended to support older adults and enhance their safety within their home environment, it can quickly become controlling and dehumanizing if older adults' behaviours are being observed daily (Astell, 2006). Furthermore, older adults should not be restricted in risk-taking. Brownsell et al. (2000) found that older adults preferred to take a risk and cope with the risk on their own rather than rely on their family's support (Brownsell et al., 2000).

The issue of autonomy and the use of surveillance cameras increases when older adults have disabilities (e.g. dementia) that restrict their ability to provide consent for using the surveillance camera. Ideally, older adults should first be asked for consent before the surveillance system monitors them. However, a full disclosure of video surveillance systems may be hindered since the risks associated with surveillance cameras are not always identified before using the technology (Winkler & Rinner, p.7). Technology like video surveillance systems often requires constant updates and patches to reduce the risk of potential harm, such as cyber-attack and confidential data escaping (Marston & Van Hoof, 2019).

In addition, older adults' possible lack of technical familiarity is less likely to be fully informed in the contexts of the application (Demiris & Hensel, 2016). For example, consents regarding the reliability and accuracy of the sensors often require a basic understanding of networking and data transfer. Therefore, it is not easy to determine when older adults are fully aware of all the possible benefits and harms that can occur using video surveillance. Mittelstadt et.al (2014) found that older adults are familiar with personal health monitoring benefits but not fully understanding how they are being assisted with these technologies (Mittelstadt et.al, 2014). Furthermore, Drape & Sorrell (2017) found that participants unfamiliar with the technology worried about coercion regarding the use of social care robots and suspect that the robot will force cooperation from its users (Drape & Sorrell, 2017). Although the adoption of surveillance technology

can vary among older users, Kang et al. (2014) found that older adults are more likely to accept the technologies that serve a clear purpose and offer easily perceived benefit (Kang et al., 2014).

Relational Autonomy

Relational autonomy is derived from the traditional medical ethics concept of self-governing. It suggested that autonomy is socially constructed by the individual, their interpersonal relationship, and their cultural background and societal norms (Gómez-Vírseda et al., 2019). As technologies become a choice of service and lifestyle to avoid the typical characteristic of institutional setting, it changes the social norms and attitude toward using surveillance technology for elderly care (Pirhonen et al., 2019; Vermeer et al., 2019).

With the political and economic trend emphasized on the benefits of technology use in elderly care, surveillance technology is viewed as a coping strategy to address the challenges associated with ageing in place rather than its intrusive nature. Pirhonen et.al (2019) found that robots could strengthen the sense of autonomy in older adults by broadening their social spaces (connecting virtually with their family members), maintaining their capacities, and assisting them in developing future expectations (Pirohen et. al, 2019). However, they also suggested that robots can be deceiving and undermine autonomy as older adults do not necessarily understand the purpose and the implication of the technology (Pirohen et al.,2019). On the other hand, Vermeer et al. (2019) found that older adults with dementia are more likely to accept surveillance technology in their houses if they are cohabiting with their family members. Therefore, it suggested that interpersonal relationships and living arrangements significantly impact older adults' acceptance of surveillance technology (Vermeer et al., 2019).

On the other hand, the meaning of home can be interpreted differently based on the older adults' cultural backgrounds, their interpersonal relationship, and their experiences. Home represents the older adults' identity and serves to preserve independence in the face of declining health (Rowles and Bernard 2013). Understanding the meaning of home helps family members make appropriate decisions for older adults, particularly with the aims of ageing-in-place.

The presence of technology can influence older adults' experiences in their homes. Lee & Kim (2020) found that older adults believe in smart home technologies' effectiveness in promoting independence; however, the acceptance of smart home technology is low. They further explain that smart home technology's perceived usefulness and benefits do not correlate with older adults' acceptance of smart home technologies (Lee & Kim, 2020). Lee et al. (2013) explained that IT developers for smart home technologies should consider the needs, the behaviour, and the lifestyle of the older adults rather than the functions and services they provided (Lee et al., 2013). These studies stated the importance of understanding the meaning of home and older adults' needs when implementing technology, particularly video surveillance systems in their homes.

Many smart home environments for older adults to age in place are designed to monitor the more senior's behaviour and protect them from the risk of the living space. Smart home technologies can facilitate or prohibit older adults from interacting with their living environment (Miller et al., 2010; Lee et al., 2013). For instance, Miller et al. (2010)'s study suggested that interactive voice response systems with remote health consultation services reduce hospital visits for older adults (Miller et al., 2010).

4.4.2. Benefits

The primary benefit for older adults of using surveillance cameras is independent (Berridge & Wetel, 2019; Parrette & Scherer, 2019; Berridge, 2015). Research has found that family members report higher levels of satisfaction with the use of surveillance technology than older adults (Berridge & Wetel, 2019; Kang et al., 2010; Parrette & Scherer, 2019). Gelonch et al. (2019) found that older adults perceived less comfort, efficacy and control over the use of technology relative to their family members (Gelonch et al., 2019). Boise et.al (2013) found that older adults are more concerned about the potential risk and hazards of surveillance technology than the perceived benefits from it (Boise et.al, 2013).

Surveillance technology, in particular surveillance cameras, is designed specifically for families to remotely monitor the movement and activities of older adults. Since surveillance cameras are accessed mostly by family members or caregivers, the design often without the input of older adults and explicit consideration of

their values and their perceived needs (Meiland et.al, 2017; Berridge & Wetle, 2020). Therefore, the design of surveillance technology should be proactive and user-centered to address the different needs and preferences.

4.4.3. Non-maleficent

In many articles on monitoring technology, obtrusiveness is named as one of the negative aspects of video surveillance devices. Hensel et al. (2006) develop a framework to describe the seven factors (physical, usability, privacy, function, human interaction, self-concept, routine sustainability) that influence user perception of obtrusiveness. In particular, several articles have expressed the concern of privacy in the use of video surveillance (Demiris et.al, 2004; Climent-Pérez et.al, 2019; Hall et.al, 2019; Draper et.al, 2017; Misttelstadt et.al, 2014). Demiris et al. (2008) found that older adults perceived greater privacy concern about the use of video surveillance than other technologies (Demiris et al., 2008).

In video surveillance, privacy can be identified as a subset of confidentiality. Privacy from a technology perspective refers to the protection of data against unauthorized users of the system (Winkler & Rinner, p.3). For example, it is illegal to place surveillance cameras for older adults in places where guests, family members, and caregivers expect privacy, such as bathrooms. Older adults perceive that video surveillance emphasizes more on health and safety than their privacy (Plastow, 2006). For instance, several studies showed that participants highlighted their fears of their sensitive information shared with others (Climent-Pérez et al., 2019; Hall et al., 2019; Draper et al., 2017; Misttelstadt et al., 2014). Draper & Sorell (2017)'s study found that participants enjoy their privacy when there is restricted access to information about them, including information that can be gained through video surveillance, in particular, accessed by or passed to family members. Since health status and medical information are sensitive data, it is necessary to confidentiality (Draper & Sorell, 2017). On the other hand, Beach (2014) found that older adults with lower quality of life are more willing to relinquish control to technology for their autonomy (Beach et al., 2014). Therefore, it implies that there are prospects for older adults to use video surveillance to address their needs.

Stigmatization has also been suggested to be associated with video surveillance usage for older adults with acquired disabilities in later life. Several research studies have referred to the protection of dignity related to surveillance technologies (Kang et al., 2010; Cook, 2009; Astell, 2006). Perception and the use of surveillance technology by older adults are embedded in their personal, social and physical context. Parrette & Scherer (2004) suggest that confidence and self –esteem play a key role in determining older adults' acceptance of video surveillance technology.

The use of surveillance technology can stigmatize older adults by making them appear less functional and over-reliance on their family (Cook, 2009). Niemeijer et al. (2015) found that older adults felt discriminated against under surveillance technology as they are criticized for their activities and behaviours rather than health status (Niemeijer et.al, 2015). In addition, Berridge (2017) found that older adults reported the adoption of passive monitoring systems would diminish older adults' self-identity by taking away their freedom to be non-compliant (Berridge, 2017). Besides self-identity, older adults also reported concern about the possibility that surveillance technology could invade their interpersonal relationships and social interaction with friends and family (Berridge & Wetle, 2019).

Monitoring the daily activities and behaviour patterns of older adults in their home environment is critical in promoting ageing. Although monitoring technology that records movement is a good indicator of disease progression based on elderly behaviour changes, certain individual behaviours and activities are considered inappropriate from a social standard. Since the presence of surveillance cameras enhances the risk of being caught, older adults are forced to change their behaviours and interaction with their home environment to meet their cultural and social groups expectations (Caine et al., 2012; Mulvenna et al., 2017; Kenner, 2008; Fisk, 2015). For instance, Caine et al. (2012) found that older adults reported decreased comfort level of performing sensitive or private household activities (e.g., engaging in sexual activity with a partner, doing personal finances) with the addition of surveillance devices in the home.

Furthermore, they found that older adults are more likely to engage in privacy-enhancing behaviour (e.g. covering up the camera with an object, hide from the monitor) when monitored by a surveillance camera (Caine et al., 2012). Other than affecting older adult's behaviours, Mulvenna et al. (2017) found that surveillance cameras impact

the quality and the duration of care provided by the family caregivers (Mulvenna et al., 2017). In this regard, the adoption of a surveillance camera can decrease family members' undesired caregiving behaviour. The presence of a surveillance camera acts as a social force that changes older adults' behaviours to present a socially desirable image to their families. When older adults are being observed through video surveillance cameras, they evaluate their behaviour and subject it to their family's norms and values. Therefore, older adults are pressure to change their behaviour to fit within their families.

4.4.4. Distributive Justice

In the context of surveillance technology within the field of ageing in place, justice is about fairness and respecting the needs and opinion of the older adults. Therefore, it is important to ensure consents are obtained from older adults before the implementation of surveillance technology. Although the ethical principle of justice ensures that each individual has the same level of material goods and services, the assumption that all older adults have equal needs failed to capture the diversity and heterogeneity of older adults. The process of ageing can vary depending on the older adult's experience, cultural background and economic status. In addition, older adults with chronic conditions can influence their needs required from the technology. In the area of fall prevention, for example, there is a range of needs from home modification to equipped with sensible shoes to implementing assistive devices. All serve the same basic need of reducing the risk of fall, but each places different demands on the older adults to satisfy their needs. To ensure fairness and equity, Perry et.al (2009) suggested that the adoption of technology use should respect older adults' wishes and opinion to reduce conflicts between older adults and their family (Perry et.al, 2009).

When referred to equal distribution, it raises an ethical concern on whether surveillance cameras are considered as a technology to be consumed by older adults who need it or a benefit only available to family members when they provide care for the elderly. As long as older adults with disabilities are viewed as the recipient of care or dependent, the distribution will not be equal as it focuses on the health outcomes of the elderly rather than their needs. To avoid unequal distribution, reciprocity between older adults and their family members is important to reduce the risk of marginalization of elderly (Perry et.al, 2009).

4.4.5. Fidelity

The ethical principles of fidelity ensure that the actions taken by the family members are in respect of older adults' will. Trust is a critical concept for understanding older adults' perception of surveillance technology and determining their acceptance of technological devices (Li et al., 2008). Family members involved in decision making should always prioritize the needs of the older adults and avoid abuse of trust from forcing older adults to adapt the technology. This raises the issue of paternalism, which is the interference of an individual with another person, against their will and defended by a claim that the individual interfered with will better off or protected from harm (Fernández-Ballesteros et al., 2019). For instance, if families gain access to monitoring data, they can force older adults to follow their advised treatment (e.g. taking medication), thereby disrespecting the elderly's rights to privacy and autonomy (Berridge & Westle, 2019).

Despite the fact that informed consent can reduce the risk of individual privacy violation, it is difficult for family members to obtain informed consent for older adults with cognitive impairment (Frederiks et al., 2010; Mulvenna et al., 2017; Mahoney et al., 2007; Demiris & Hensel, 2016). Mulvenna et al. (2017) investigate ethical consideration of using video surveillance in the home of people living with dementia and the access of data only given to their family. They found that participants mention the necessity of obtaining consent from older adults living with dementia. However, their lack of capacity is a significant issue (Mulveena et al., 2017). It raises a debate about whether caregivers and family members should be taken full responsibility for decision making when older adults are incapable of making their own.

The priority of video surveillance tends to be placed on the potential harms and benefits of the technology to support older adults to age in place. Ethical issues as the boundaries between the duty of care and over abuse of power are often less explored. The use of surveillance technology in a home required a family member or caregiver to be the first respondent in which they are the first ones to be contacted when incidents occurred. Sanchez, Pfeiffer & Skeie (2017) stated that family members have a sense of duty to reduce harm for older adults. They may place safety over dignity and autonomy when they make the decision (Sanchez, Pfeiffer & Skeie, 2017). Also, Berridge (2017)

found that family members force older adults to adopt the passive monitoring system for their convenience (Berridge, 2017).

Chapter 5. Discussion and Conclusion

5.1. Summary/Conclusion

Deploying video surveillance cameras in-home care treatment brings new ethical challenges that policymakers need to address. In this project, a literature review has served as a vehicle for identifying the potential ethical issues with the use of surveillance cameras as an ageing technology. From the literature review, nine ethical considerations are outlined to explain the challenges experienced by family members and older adults at the adoption of video surveillance cameras. These nine ethical considerations violate privacy rights, stigma and obtrusiveness, conflict of interest, treating older adults as a homogenous group, the reciprocal imbalance in relationship and allocation, and complication of family involvement in the shared decision-making process. Examining this ethical issue of the current surveillance technology brings insight into which ethical issues can influence older adults' experience and their perceived benefits from the technology and serves as a foundation of guidelines to assist family members and older adults in making decisions.

When making the decision for the elderly, family members should avoid making the assumption about their older loved one regarding their health status, behaviours, and needs. In the particular case of older adults with dementia, family members must be cautious with surveillance cameras' ethical issues. As older adults with dementia experience a gradual decline of their mental capacities, their ability to make autonomous decisions is jeopardized. Thus, they may not fully understand the implications of technology, making it difficult for them to give full consent. It can be challenging to support the balance of interests and needs in elder care as adequate support of shared decision-making requires supporting family members in understanding the needs and preferences of older adults.

It is important to note that supporting older adults with dementia does not imply that they should be freed from all responsibilities. In fact, older adults with early stages of dementia are encouraged to participate in decision making and avoid paternalism. Advance care planning is crucial for older adults with dementia; it helps family members make decisions that respect the older adults' wishes and preferences.

5.2. Strength and Limitation

This project identifies the relevant literature that was not limited to any specific study design. Although the keywords for searching the database address the objective of this project, some key literature are identified through personal contacts, indicating the limited available literature for this topic. In addition, there are very few studies that emphasized the use of surveillance technology, in particular for surveillance cameras to assist older adults to age in place. This project has merit in contributing to the understanding of ethical issues faced by family members when they implement video surveillance cameras at the older adults' home. The results will support future research in that there is a better understanding of the factors that mediating older adult's willingness to use surveillance cameras in the context of ageing in place.

5.3. Four Steps in supporting family involvement in decision making for older adults

Recent years have seen a proliferation of specialist and off-the-shelf technologies that could be used for surveillance in the context of family caregiving. For example, basic video cameras and smart home systems are now readily available to a general consumer for a relatively low cost. While the technology may be available, ethically sound principles for adopting and using these devices and systems have not been clearly articulated. In this section, I outline a decision-making framework to assist older adults and caregivers in this process.

The nature of decision making for older adults is complicated by the availability of social resources, their decision-making capacity, their physical health, and their support networks. It is challenging to prioritize older adults' preferences and needs if their families are involved in the decision-making process. Family involvement in decision making can put pressure on older adults' decision and expression of their needs. Therefore, it is necessary to develop a framework to assist family members during the shared decision-making process. The framework is used to help family members make an ethically justified decision that meets the older adults' needs without violating their rights (referred to table 3 for the framework model).

The first step is to identify older adults' aims and preferences. To implement appropriate health decisions, family should identify the fundamental issues and barriers to prevent the older adults in optimizing their wellbeing (e.g. preventing them to age-in-place), their goals (e.g. being independent), and their best interest in (e.g. living in the same community). This step in the framework directs family members' thinking toward older adults and makes decisions that are more suitable for older adults' needs. Suppose the family member is making the decision for older adults living with dementia. In that case, they should put the elderly' former wishes and interests into consideration and incorporate them into the decision making process.

The second step is to plan and evaluate the intervention by applying ethical principles. Evaluating the intervention allows family members to determine whether the intervention meets the goal and preferences of the older adults. To serve as a guideline, family members should apply the ethical principles when planning intervention and identify whether there's any undermine ethical issues they need to be consider when implementing the intervention.

The third step is to rationale and feedback on the decision that has been made. This step is to ensure that the most appropriate course of actions is taken by the family members after they make the decision. Family members should explain the rationale of the decision, including how this decision can support older adults' wellbeing while meeting their needs of preference. Documenting the decision-making is important for families making the decision for older adults living with dementia as they can reflect on the intervention and decide whether or not the best possible outcome is consistent of the older adults' preferences and needs

The fourth step is to review and reflect on the current intervention plan with the older adults. Older adults' perceived of needs and their view of autonomy can change based on their health, their social allocation as well as their social networks. Therefore, it is important for family to review and reflect the decision they make with the older adults to ensure that the decision is addressing the current needs.

Figure 5.1 illustrates the four steps of making ethical decision for older adults that integrates continuous of reflection. As the family member engage in the 4 steps decision-making process, consideration of older adults' values and preferences are

taken into account. These 4 steps allow family members to assess on the health intervention details with attention to identify the ethical issues associated with it.

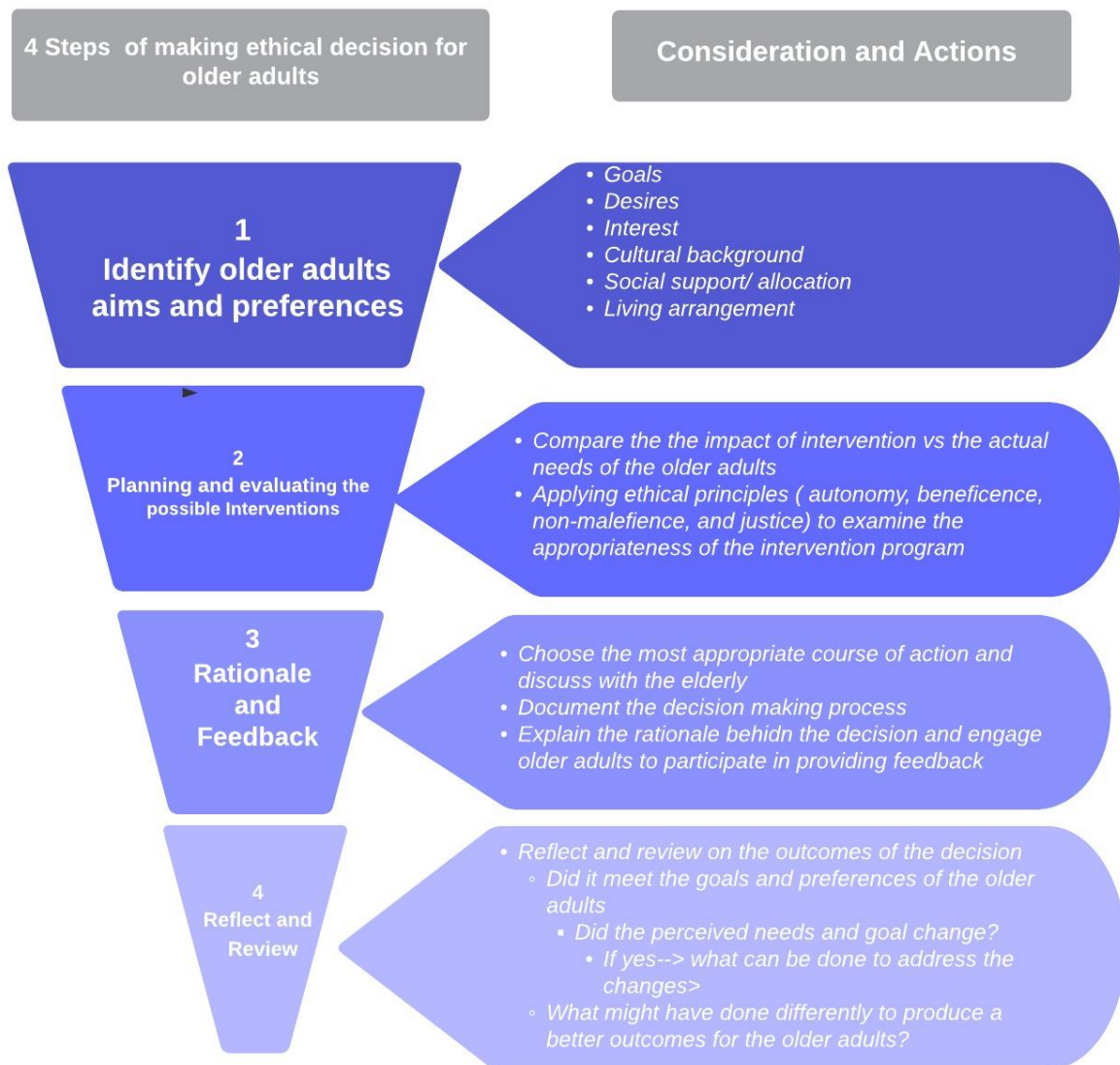


Figure 5.1. 4 Steps of making ethical decision for older adults

5.4. Additional measures to avoid violation in human rights in the use of surveillance camera

Despite video surveillance cameras' intrusiveness, well-grounded ethical thinking and proactive response can protect older adults' basic rights. For the ethical issue in obtaining consent from older adults, family members should go through the consents with the older adults and provide clarification if needed. If the consent is still unclear, family members can demonstrate the use of a video surveillance camera to explain the potential of the devices and the consequence of their use.

While privacy is one of the main concerns of surveillance cameras, consent should clearly explain how service providers use the data and how their data will be handled and processed. Personal data should be collected only after the older adults gave explicit informed consent. Although obtaining consent can be challenging for older adults with dementia, family members should focus on older adults' best interests and consult health professionals if needed (by adopting the use of surveillance cameras). Suppose the use of surveillance cameras is without the consent of service users (older adults with dementia).

In that case, family members must justify using surveillance cameras to be beneficial and without harm to the elderly. Paternalism should be viewed as a last resort if older adults with dementia have not discussed or expressed their preferences and needs for later life with their family members.

5.5. Implication in Policy

In Canada, users' personal data of video monitoring technology is protected by the *The Personal Information Protection and Electronic Documents Act* (PIPEDA). The PIPEDA prohibits organizations from collecting, using and disclosing personal information without consent. Consent is the cornerstone of this act, and users are expected to fully understand what personal information is collected, for what purposes and with whom it is shared. However, as mentioned above, consents are often too vague and fail to legitimate the purpose of the technology.

In addition, studies have found that older adults relied on their family members to help with setting up the system (installing the software or setting up the devices) (Wang

et al., 2019; Berridge & Wetel, 2019). It is questionable whether older adults have fully understood how their personal information is used from these technological devices. Since this act relied on knowledge and consent, it marginalized older adults with severe dementia since they don't have the mental capacities to understand the consent. The current PIPEDA should incorporate guidelines to ensure that privacy policy and consents are short and concise with the use of easy words and images so older adults with dementia can easily understand.

Although the healthcare system is universal in Canada, each province and territory has its own set of legislation regarding health policy. It creates a conflict over equitable contribution for older adults across the provinces and territories. For instance, the Alberta special needs assistance for seniors program provides financial assistance for older adults with lower socioeconomic status to purchase appliances and assistive technology for their health support.

Older adults with impairment or the lack of financial resources may lead to unequal capability to address their own needs. This program reduces the equality gap of older adults with different economic status and ensures they receive the same treatment/intervention (the technological systems). In order to incorporate equity into health policy, policymakers should acknowledge that the presence of disabilities can influence the resources older adults received. For instance, older adults with disabilities might require more features/functions from the surveillance technology system (e.g. fall detection), making the intervention more expensive than it should be compared to older adults without disabilities. To avoid the discrimination in resource allocation, policymakers must focus on older adults' values and beliefs and ignore the differences in life expectancy and health status when they implement a new intervention for older adults.

As the technology unlocks healthcare management's potential, many smart devices in the market are incorporating health monitoring functions. For instance, the Samsung watch and apple watch have the function of heart rate monitoring as well as fall detection. The increasing popularity of these health monitoring features creates new legal issues regarding privacy and product liability. The privacy of third parties sensitive and personal concerns as they have not provided informed consent for these technological devices to collect their personal data. Since many of the warble devices collect information about the environment that the user is present, they can record the

third person's data. For example, Google Glass can record the real-time image of the user's environment; therefore, it increases the risk of collecting third parties information. Another legal issue of incorporating health monitoring features for commercial, technological devices is product liability. As many wearable devices are not designed explicitly for health purposes, the products' validity and liability are in question. Policy should implement to regulate these products' health monitoring features of these products and how they are presenting in the market.

5.6. Guiding principles for the use of video surveillance systems of older adults

The literature review highlighted several ethical issues concerning the use of video surveillance systems at home, especially when these are intended for use by older adults with a disability. The following will list three principles in guiding the use of in-home surveillance technology, particularly video surveillance systems to support older adults to age-in-place.

- 1.) Accountability: Organization should provide a thorough explanation and justification to the users of how their data are collected and used.
- 2.) Integrity: The use of video surveillance technology should be limited to the identified purpose (ageing in place). Access and authorization of personal information should be prohibited for any other purposes.
- 3.) Respect: The implementation of video surveillance systems should always respect the users' values, dignity, autonomy, interests.

Accountability plays an essential role in the use of video surveillance systems for older adults. Accountability ensures that the users fully understand the practice's actions and purpose (video monitoring of their daily activities). Through transparency and openness, it encouraged all the involved parties (family members, the organization, and the older adults) to be fully aware of their responsibilities and what they are accountable for. Since accountability is based on the need to explain and justify the decision, it helps older adults to get involved in the decision making process. Other than transparency, the design of the system can reduce the ethical challenges associated with the practice of video monitoring. As mentioned in the previous section, the adoption of in-home surveillance systems depended on older adults' perceived needs and requirements, their mental and physical capabilities, as well as their social and physical environment.

One of the major barriers in developing in-home surveillance technologies is to meet the needs and desires of the users (older adults and their families) and effectively incorporate them into the design process. When developing a new in-home surveillance system, developers should focus on users-centred design during product development. The user-centred design ensures older adults' feedback and their experience with the technological systems is taken into account by the developers. The involvement of older adults in product design helps developers develop ethically appropriate products that can address users' needs without violating their rights. Fisk et al. (2004) noted the importance of user-centred design. It helps developers balance between the users' requirements and desires and the demands imposed by the technological devices (Fisk et.al, 2004). When the video surveillance technology design respects individual values, preferences, and choices, it increases the adoption and satisfaction of the technological devices. For instance, Draper & Sorell (2017) suggested that older adults are more willing to adopt video surveillance technology if they are provided with the option of access control (Draper & Sorell 2017).

5.7. Response to the ethical challenges of video surveillance systems

Based on the ethical issues discussed in the literature review, a national policy framework for the practice of in-home monitoring is required. Due to the disintegration of different in-home surveillance technologies and services, there are many cases where the lack of a unified framework increases users' dissatisfaction and compromises usability. Although there is a regulation to control the practice of surveillance in public spaces, there is still a lack of policy to regulate video surveillance cameras in private spaces, particularly the user's homes. The national framework for the practice of in-home monitoring guides policy makers in developing strategies that support the responsible conception, development and use of video monitoring devices at home. Several key goals of the framework are described below.

5.7.1. Raising Awareness of the ethical issues of video surveillance technology

The framework can assist users (family members and older adults) to learn about and understand the video surveillance systems that are available to support ageing in

place. Although there are many video surveillance systems available in the market, its application for use in assisting older adults to age-in-place is often not recognized. Therefore, it is necessary for the framework to increase awareness among older adults and their families regarding the potential of this technology for supporting the care of older adults. Public awareness campaign for in-home monitoring practice is an example to help older adults and their family members to understand the potential benefits and drawbacks of the use of the in-home monitoring systems. In addition, the information must be easily accessible.

5.7.2. Develop a platform for collecting feedback from family members and older adults who have experience using in-home monitoring technology.

In order to reduce the ethical dilemma associated with the use of video surveillance technology, it would be useful to collect feedback from their family members. There is minimal understanding of the experience of family members who have chosen to adopt this technology. Neither is there any longitudinal study to understand the long-term effect of in-home monitoring technology, particularly video surveillance cameras in assisting older adults to age in place. To achieve the goal of user-centred design, video surveillance systems do not necessarily need to be designed specifically for older adults who want to age in place, as many mainstream systems can

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In order to reduce the ethical dilemma associated with the use of video surveillance technology, it would be useful to collect feedback from their family members. There is minimal understanding of the experience of family members who have chosen to adopt this technology. Neither is there any longitudinal study to understand the long-term effect of in-home monitoring technology, particularly video surveillance cameras in assisting older adults to age in place. To achieve the goal of user-centred design, video surveillance systems do not necessarily need to be designed specifically for older adults who want to age in place, as many mainstream systems can be adapted to meet the changing needs. Instead, video surveillance systems should

focus on a universal design that is easily accessed and used by a spectrum of older adults without specialized adaptation. The advantage of the universal design of video surveillance cameras is to provide accessibility to older adults without stigmatization and marginalization.

5.7.4. Provide financial support of in-home monitoring technologies for older adults with lower income

Another political agenda that needs to be focused on is equality. As mentioned in the earlier section, the cost is one of the significant barriers to preventing older adults' adoption of surveillance technologies. To meet the demands and needs of older adults with multiple chronic conditions, surveillance technologies with numerous functionalities can be costly. Also, family members might meet ongoing costs in maintaining these devices in the demands of daily practices. In terms of accessibility, current assistive technology funded programs are operated with a limited selection of assistive technology and suppliers. Therefore, it limits the ability of older adults and family members to actively participate in the decision-making process regarding the healthcare and technologies they use (Schreiber et al., 2017). To enhance the equality of access to surveillance technology, policy should not limit the scope and flexibility of product choices and maintenance.

5.8. Implication for Future Research

As mentioned in the previous chapter, relationships play a key role for older adults to adopt surveillance cameras. Future research is needed to examine the different types of dynamic relationships (active/passive) and their influence on the older adults' experience from the use of technology. From the literature review, some articles have discussed incorporating artificial intelligence in surveillance technology and its effect on assisting older adults ageing in place. A comparison between real-life monitoring (monitored by family members) and using AI for in-home monitoring can better understand how technologies change the meaning of human rights, such as trust issues and the perception of ethical risks. In addition, several literatures have suggested the acceptance of smart home technology is influence by older adults' experience and their lifestyles in their home (Vermeer et.al,2019; Lee et.al,2013; Miller et al., 2010). Future

research is needed to identify the characteristic of the products that can improve older adults' acceptance of smart home technology.

5.9. Recommendation for future research

This project found 4 potentially promising areas for future research. First, there is a lack of literature studies exploring the influence of social factors and the adoption of video surveillance systems.

As suggested in the literature review, out-of-pocket expense is one of the major barriers to adopting video surveillance systems. However, there is a lack of literature to explore if there is a correlation between socioeconomic status and the adoption of video surveillance systems. To better understand the role of socioeconomic on older adults' adoption of in-home monitoring technologies, interviews with older adults with different ethnic and cultural backgrounds are needed.

The second area of future research will be to examine if living arrangement impacts video surveillance technology perception. As this project focuses on the influence of video surveillance technology for older adults to age-in-place, many of the selected literature studies are conducted on older adults who live alone. All the suggested ethical issues from this project are based on the assumption that the elderly are living alone. However, suppose the elderly are living with another family member. In that case, the practice of video monitoring might raise other ethical issues, such as who has the right to implement the devices and who has access to the devices.

The third area for future research would be to examine how video surveillance technology influences home meaning. The literature review section suggested that older adults refused to use video surveillance technology due to institutionalization, which could be explored in more detail in an interview to compare the perception of older adults who lived at home to those who lived in institutional care.

Future research will emphasize how smart home technology or sensors can be integrated into living space to control certain behaviours of older adults. For example, Amazon Alexa and Google Home have demonstrated the possibility of actively incorporating voice –active sensors to assist older adults in managing their home, including such cases such as weather reporting or to control the thermostat. The

interaction between older adults and smart home technology should be examined to understand better the role of technology on the lifestyle of older adults.

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Appendix A.

Literature Review Matrix

Study	Authors	Study design /Study Population	Types of Monitoring devices	Outcomes
In-Home monitoring of persons with dementia: Ethical guidelines for technology research and development (2007)	Mahoney, D., Webbe, P.M., Alwan, M., & Adlam, T, D.	-Literature Review on the ethical issues associated with the design of in-home monitoring -Older adults with dementia	Home monitoring technology	-The design of in-home monitoring should emphasize the 4 ethical principles: respect autonomy (users' relationship with their family member, privacy), Justice (technology should meet the needs of the users), non-maleficence (data protection) -Ethical guideline of technology should also explore other attributes such as cultural, legal system and regulatory environment

Elderly person' perception and acceptance of using wireless sensor networks to assist health care (2009)	Steele, R., Lo, A., Secombe, C., & Wong, Y.K.	-Qualitative research(focus group) to understand the perceptions and attitudes and concerns of older adults toward wireless sensor network technologies to assist healthcare - Older adults who perceive WSN-Based technologies	Wireless sensor network (WSN) based system	-Older adults preferred to age in place and relocation to nursing home viewed as a sign of loss of independence -Older adults are concern about the use of camera and viewed it as a sign of breach of privacy - Users should have their preferences and control when they use the WSN system
Views of caregivers on the ethics of assistive technology used for home surveillance of people living with dementia (2017)	Mulvenna, M., Hutton, A., Coates, V., Martin, S., Todd, S., Bond, R., Moorhead, A.	-Qualitative research (Interview) - Older adults with dementia and family members who are involved in the care of people with dementia at home	Video Surveillance system	-Family members are willing to use camera technology to monitor older adults' behaviour -The design of video surveillance should focus more on older adults with dementia and their family members' preferences and needs -The use of cameras in the home of a person living with dementia are viewed as useful, ethical and moral(with provided protocol and gain consent) to family caregivers

Enrichme: Perception and Interaction of an assistive Robot for the Elderly at home (2019)	Cosar,S. , Fernandez- Carmona, M., Agrigoraie, R., Pages, J., Ferland, F., Zhao, F., Yue, S., Bellotto, N., Tapus, A.	-Case study to identify the health outcomes of using Enrichm' robot to monitoring health of older adults - Older adults who live at home	-Elderly-care Robots (TIAGo) à contains thermal cameras, RGB-D cameraà multiple application assist older adults to manage their daily life and health monitoring (e.g. physical activities, find objects)	- Wearable health devices are not reliable as contract-free devices for older adults with cognitive impairment -RFID is useful to in object mapping and user monitoring but only in a limited area
Ageing-in-place with the use of ambient intelligence technology: Perspectives of older adults (2010)	Van Hoof, J., Kort, H.S.M, Rutten, P.G.S., & Duijnste, M.S.H.	-a qualitative study (interview) to examine the needs and motive of the user of ambient intelligence technologies in the home environment -	-Unattended Autonomous Surveillance (UAS) system à support aging in place	- The motive of using ambient intelligence technologies to support aging in place - Safety and security are the most important indicator for aging in place -Technology contributed to an increased sense of safety and security among older adults (especially for fall incidence) -Older adults are willing to trade off their privacy for increase of safety and autonomy

A review on video-based active and assisted living technologies for automated life logging (2019)	Climent-Pérez, P., Spinsante S., Mihailidis, A., & Florez-Revuelta, F	-Qualitative study (analysis of previous review) -older adults who required the use of assistive technology	-video-base intelligent lifelogging system à used as a retrospective memory aid for older adults	-AAL should not be based on the medical effectiveness of the system -Privacy should be considered when using AAL in private environment (older adults' home)
Home Telehealth and paediatric palliative care: clinician perceptions of what is stopping us? (2014)	Bradford, N.K., Young, J., Armfield, N.R., Herbert, A. & Smith, A.C.	-Qualitative study (semi-structure interview) - Palliative care clinicians	-Home Telehealth Program à deliver scheduled consultation paediatric palliative care services	-Telehealth might not be able to deliver the same services as the traditional models of palliative care -Telehealth has the potential to provide a solution to inequity in access of care, facilitate peer support and maintain continuity of care with families

Moving beyond 'safety' versus 'autonomy' a qualitative exploration of the ethics of using monitoring technologies in long term dementia care (2019)	Hall, A., Wilson, C.B., Stanmore, E., Todd, C.	<ul style="list-style-type: none"> -Case study used with three dementia specialist care facilities in England -175 hour observation practices/ semi structure interview -older adults in long term care home 	Monitoring technology	<ul style="list-style-type: none"> -Use of monitoring technologies are associated with the ethical obligation to fulfil a duty of care to residents -Design of monitoring technologies are not universally suitable and they should be designed to meet the needs of the users -These technologies are emphasized on helping staff to reduce harm rather than focusing on helping residents independence, freedom and privacy -Little attention are placed on the privacy of other staff in the workplace
Ethical values and social care robots for older people: an international qualitative study (2017)	Draper, H.,& Sorell, T.	<ul style="list-style-type: none"> Qualitative study (Focus group) -Older adults aged 75 years and older 	Robotics companions for aging years (ACCOMPANY)à robotic companion provide service to older adults in a motivating and socially acceptable manner	<ul style="list-style-type: none"> Robot care may increase social exclusion -Privacy still is one of the main ethical concerns for robotic care compare to human carers

The ethical implications of personal health monitoring (2014)	-Misttelstadt, B., Fairweather, B., Shaw, M., & McBride N.	-Qualitative research (literature review) - Older adults who use personal health devices to manage their health	-Personal health monitoring	-Medicalization is the keystone for the framework to make sense of the ethical implication for personal health monitoring → increase medical awareness into user's private physical and physiological space -1 ethical issues with PHM including privacy, autonomy, obtrusiveness, identity, social isolation, safety and medicalization. -health , illness, disability and treatments constitute a significant elements of a person's identity.,
Needing smart home technologies: the perspectives of older adults in continuing care retirement communities (2008)	Courtney, K., Demir, G., Rantz, M., & Skubic, M.	-qualitative study (Focus group) -Community-dwelling older adults aged 65 or older adults	-Smart home technology	-Although privacy can be a barrier for older adults adoption for smart home technology , their own perception of their need for the technology can override its privacy concerns -Acceptance of the technology is viewed as the acknowledge of frailty and older adults who might benefit the most from smart home technology would be the persons least likely to adopt it

Willingness of older adults to share data and privacy concerns after exposure to unobtrusive in-home monitoring (2013)	Boise, L., Wild, K., Mattek, N., Ruhl, M., Dodge, H.H., & Kaye, J.	-Qualitative (survey) à participants are selected from the Intelligent System for Assessment of Aging Changes (ISSAC) -Older adults who wants to age in place	-home based motion and computer monitoring	-Respondents did not mind being monitored unobtrusively in their home (except of being video recorded) - Majority of participants reported willingness to share their own personal data with family members or doctor -Privacy concerns raised over a year of unobtrusive in home monitoring
The Use of Computer Vision in an Intelligent Environment to Support Aging-in-Place, Safety, and Independence in the Home (2005)	Mihailidis, A., Carmichael, B., & Boger, J.	-Qualitative study (Description study) -older adults with cognitive impairment	-Pervasive health care system à sensors to detect human behaviour and determine the what health actions should be provided for the users	-vision-based sensing agents can help to develop intelligent environments to support aging in place - ethical issues become more confounded when developed vision systems for people with cognitive impairments (difficult to provide consent)

Benefits and Privacy Concerns of Home Equipped with visual sensing system: A perspective from older adults (2006)	Caine, K.E , Fisk, A.D., Rogers, W.A.	-Qualitative study (face to face interview) - Age between 65 to 80	-Visual sensing devices – 3 types : Video camera, point-light image, Blob Tracker	-Surveillance technological devices with lower recognizable image type (e.g. Point –light image/blob –tracker) are viewed as less invasive -Older adult with higher functionality report higher level of privacy concern than older adults with low functionality
Scenario-based smart services for single-person households.	Lee, H., Park, S. J., Lim, H. W., and Kim, J. T	-Qualitative Study (scenario based research method)	-examining the smart living services for single living individuals	- For single-person household, management of the house and personal health is more negligent compared to 2 people households -Smart home technologies should emphasized on the preference and requirement of the individuals rather than its versatile
Improving Older Adults' Experience with Interactive Voice Response Systems	Miller et.al, 2010	Qualitative Study (Focus group	Interactive Voice Response system	Poor acceptability of IVR systems due to the confusion of operating the system - Older adults prefer to share sensitive information to a live person than to IVR system
What do we require from surveillance technology? A review of the needs of people with dementia and informal caregivers	Vermeer et.al , 2019	Qualitative study (literature review)	Surveillance technology	Acceptance of surveillance technology is accomplished by the perception of usefulness The most expressed needs of surveillance technology is “user friendly” design → the design interface has to be simple to use The acceptance of surveillance technology is higher if older adults are cohabiting with another family members

Could robots strengthen the sense of autonomy of older people residing in assistive living facilities – A future-oriented study	Pirhonen et.al , 2019	Qualitative Study (Ethnography)	Care robots specifically used in assistive living	3 aspect of autonomy for AL residents → interaction-based sense of autonomy, Coping based sense of autonomy potential based sense of autonomy -Robot helps to strengthen the sense of autonomy by sustaining their capacities, improving their independence and helps older adults to maintain and create future expectation
Older Adults Engage in Privacy Enhancing Behaviors in a home monitored with robots or Camera	Caine et.al, 2012)	Observational Study (Interview, Scenario and task)	Surveillance Camera	-Participants used to enhance privacy while being monitored - The level of comfort with performing activities decrease with the addition of monitoring device in the home