THE CREATION OF BARRIERS AND ISOLATION FOR SENIORS THROUGH THE
INCREASED SOCIETAL DEPENDENCE ON TECHNOLOGY
DURING THE COVID-19 PANDEMIC

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A Research Paper submitted to the Graduate Program in Critical Disability Studies in partial
fulfilment of the requirements for the degree of

Master of Arts
Graduate Program in Critical Disability Studies
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September 28th, 2021

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<u>Abstract</u>

In this master's Research Paper, the topic of how technology has isolated and created barriers for seniors is explored, especially during the COVID-19 pandemic. This research drew inspiration from the concept of the "COVID-19 Connectivity Paradox" from Smith et al. (2020) that basically outlines the difficulties that come with physical distancing as "it negates the ongoing efforts to reduce social isolation and improve connectivity among older adults" (Smith et al., 2020, p. 2). Even before COVID, social isolation was a major public health issue for seniors, and it only grew increasingly worse "during the COVID-19 pandemic because of the risks posed to older adults based on physical distancing" (Smith et al., 2020, p. 1). While everyone had to obey social distancing and lockdown mandates, it was even more detrimental to seniors because of the lack of technology adoption in their lives. They lost access to some of the most basic resources and services, and they were even more susceptible to the health risks of social isolation because they were unable to see their loved ones. This all stems from the growing digital divide that exists between the younger cohorts and the older cohorts that has been allowed to persist for so many years. Seniors (aged 65+ for the purposes of this research paper) have proportionality less access to digital devices and the internet, which also discriminates them from participating in so many other aspects of society. Within Canada, legislature such as the Charter of Rights and Freedoms and the Accessibility for Ontarians with Disabilities Act (AODA) has been put in place to ensure that no individual is discriminated against, particularly because of their age. If this province and this country are truly committed to making a more accessible environment for everyone, then the digital landscape must also be considered and examined.

By looking at common modern-day technologies in the financial, mobile, and digital health sectors with an ageist lens rooted in critical disability scholarship, an analysis of the

research done in the past on senior technology and of the newer research done on the effects of the COVID-19 pandemic provides deeper insights into the functional, structural, interpersonal, and intrapersonal barriers that seniors face when dealing with technology. Not only have devices and platforms not been made user-friendly for seniors with age-related declines, but the continuous attempts to push seniors into using the newest technologies have only built-up fear, anxiety and negative attitudes in seniors. Both society and seniors themselves need to address the ageist assumptions that they have about the limitations and behaviours associated with old age. The results and suggestions from this research will further advance the pre-existing research and add a relevant COVID-19 lens. Hopefully, it will also advance the field of critical disability scholarship and draw more attention to the discrimination seniors face because of their age.

<u>Introduction</u>

  Throughout the COVID-19 pandemic, social distancing and lockdowns have become a regular part of everyday life. As social beings, many people have begun to feel the negative effects of prolonged isolation on both their physical and mental well-being. In fact, its influence is so great that social isolation is now recognized as a social determinant of health (Smith, Steinman, & Casey, 2020). Therefore, it has become an increasingly important issue for society to address as COVID-19 and its new variants continue to spread, creating the need for extended lockdowns. "Even before COVID, social isolation among older adults was a major public health issue that was slowly gaining international recognition as being detrimental to quality of life and premature mortality", and it only grew increasingly worse "during the COVID-19 pandemic because of the risks posed to older adults based on physical distancing" (Smith et al., 2020, p. 1). Social isolation has been equated to being as much of a predictor of mortality as smoking, obesity, and high cholesterol (Klinenberg, 2016). It has even been recommended for clinicians to regularly assess if their patients are vulnerable to isolation (Klinenberg, 2016). Not only are they isolated from family and loved ones, but now, seniors are also discouraged from physically going to businesses, community centres or healthcare facilities.

  Now that the public has experienced the dangers of isolation firsthand, many have turned to digital and online platforms as the common, quick-fix method to maintain a connection. Video calling with loved ones and shopping online have become normalized parts of society, and despite the efficiency and convenience of these digital methods, the benefits of the internet and digital devices can only be obtained by those who have unlimited access to them. Even the decision to not adopt internet or mobile technology can form a sense of self-isolation that can lead to greater social exclusion (Nikou, 2015). With COVID as its catalyst, many aspects of

society and everyday life moved online, and many businesses and institutions have created websites or apps to deliver their services and products to consumers virtually. On top of that, important day-to-day activities such as booking doctor's appointments and banking have moved online as well. Even vaccination sign-ups were completely done online, leaving many seniors dependent on family members or volunteers to help them secure their appointments. Despite being thankful for the assistance, it will likely have an impact on their sense of self-efficacy and independence. Although many volunteers have done amazing work to assist seniors with technology during these times, the number of available volunteers will dwindle as the pandemic begins to lessen. The virus itself may be slowing down, but the pre-existing and newly created barriers formed between seniors and technology will not simply disappear with it. There have been many reactive methods that have been employed by the Canadian government and various other organizations to address the emerging issues as efficiently and effectively as possible. Unfortunately, the deeper underlying ableist thinking that created this situation cannot simply be fixed using these methods. There is no vaccine for the digital divide that is so deeply ingrained in our culture and in our minds. Now more than ever before, in our living memory, the world has become inaccessible to the older cohort. Not only is physical access limited, but individuals who do not own digital technologies or who may not be comfortable with using them are excluded from society. To most, it seems like moving online is the safest and most efficient way to carry on daily life amid the pandemic, but seniors face a jarring new barrier that restricts them from every corner of the socio-economic sphere. Unfortunately, not much has been done to combat this large digital divide over the years, and not enough accommodations have been employed to make technology more user-friendly for seniors. Even though this issue may be more obvious to the public now, it is far too late to start accommodating now. Trying to suddenly immerse seniors

(or anyone for that matter) in the newest technological advancements can lead to fear and anxiety. As most digital products have not been designed with seniors in mind, access to technology and the internet have remained uneven all these years (McMurtrey, Downey, Zeltmann, & McGuaghey, 2011). In comparison to younger cohorts, the elderly have gotten far less attention from practitioners and academic researchers because they are not the main consumers of mobile and digital technology (Nikou, 2015). Even if their needs are not currently being met, there are very few avenues that allow seniors to provide feedback or suggestions. A lot of the newest technology does not have a universal design that accommodates visual, auditory, or cognitive impairments, so improving user-friendliness could increase accessibility for many other groups with disabilities. Much like other physical or mental impairments, age is often treated as a limiting impairment in relation to technology use, somehow disqualifying senior users from being the target consumer. These ageist and ableist beliefs often intersect and become an even more potent barrier than any actual physical factors. Many people (including seniors themselves) become convinced that seniors are incapable of adopting digital technology into their lives, despite the benefits it may bring. Perceived barriers often contribute even more to the technology anxiety seniors may experience than physical limitations do (Nikou, 2015). Even if the public finally realizes the severity of it all, COVID has adversely affected this country's ability to provide meaningful access to technology, community activities and long-term care services during the pandemic, which has negatively affected the senior cohort (Chen, 2020). Without any alternative plans or programs in place, older cohorts will experience a "greater risk for functional declines, loneliness, depression, cognitive impairment, social isolation and other health risks" (Chen, 2020, p. 1). If nothing is done now to remedy this inequality, it will only become more and difficult to deal with the widening gap in the future. Considering that various

digital health and wellness applications can provide practical support to ageing adults more independence in their daily lives, the adoption of technology should be promoted amongst elder cohorts (Nikou, 2015). That is why this research seeks to explore the question of: "How has an increased societal dependence on technology impacted the health and meaningful participation of seniors by isolating and creating barriers?" By exploring the ways older adults have been excluded, this research attempts to suggest ways that society can change now to ensure that the digital divide does not worsen and examine the ways that technology can actually be beneficial to older adults, other disabled groups and capitalist markets.

Purpose

This research aims to fill the COVID-19 gap that currently exists in the research that has been previously done on the topic of seniors and technology while also tying in ageist theory to target the deeper problems that have left these gaps unattended. Many of the methods that had been used by organizations and governments to remedy this issue have become obsolete during these unprecedented times. Libraries and senior centres that once offered access to free wi-fi and computers are closed, and families cannot meet with seniors to assist them with technical questions or difficulties. During this pandemic, even more barriers have been created for seniors and other minority groups alike, and critical disability scholarship must continue to research and critically analyze in the name of inclusion and accessibility. Of course, the ultimate goal is to research ways to increase technology adoption and confidence in computer literacy of seniors, as there are promising benefits that digital health and technological tools can offer.

As the digital divide has been a long-standing issue experienced by seniors, there have been various research done on the relationship between older adults and technology; however,

with COVID-19 compelling most businesses and institutions to move to online platforms a new re-evaluation is needed to assess the extent that these new technological barriers have excluded and isolated seniors during this global crisis. This pandemic has even further amplified "the need for more responsive and timely platforms for health care information, delivery and management" which most often come in the form of digital health technology (i.e., mobile health tools, wearable devices, health information technology, etc.) (Ronquillo, Meyers, & Korvek, 2021). Considering that there are a lot of potential benefits that digital health tools can bring to senior cohorts, it is even more pertinent to investigate the methods to best support the adoption and integration of digital technology into the lives of older adults.

Although a large part of decreasing the divide involves making digital devices and platforms more user-friendly and more applicable to the needs of seniors, this research hopes to point out the ways in which the general population can also change to better support the adoption of technology into the daily lives of seniors. More so than physical barriers, psychological and social barriers that stem from ageist norms and expectations also have a very strong impact on the anxiety or stress the elderly may experience when thinking of or dealing with newer technology. There are fundamental ageist thoughts and norms that need to change in order to address the deeper issues that created this type of disparity in the first place. If these systemic disabling thoughts are allowed to perpetuate, it will continue to affect every cohort as we age, and younger cohorts will come to believe these ageist stereotypes about themselves when they age into the older cohorts.

Hopefully, it serves as a starting point for more future research to be done after the pandemic passes, and it may inspire different organizations, leaders and businesses to develop new methods of allowing seniors to gain confidence and freedom in using technology. It

ultimately means "that we need 'senior-geared technical training and support of older versions of hardware and software," but this will undoubtedly help give many other groups (outside of the senior cohort) more meaningful access to technology as well (Simpson et al., 2010, p. 178). Those that have certain visual, auditory, sensory, motor, and cognitive impairments may also need similar accommodations as older adults who struggle with age-related impairments (McMurtrey et al., 2011, p. 22). These are all accessibility and justice issues this research will concentrate on to provide insights on how to better create positive attitudes and willingness to adopt new technologies in senior citizens.

Methodology

This research paper will mainly be employing the method of critically analyzing both current and past literature regarding the experience and relationships of older adults with technology with a particular focus on how the pandemic may have altered or shaped that relationship. The COVID-19 pandemic has changed how everyone interacted and functioned within their communities, and as the pandemic and its variants have continued to plague this entire world for over a year now (which may be longer than many had first anticipated), the need to continuously analyze and relate it to the current situation and climate is vital in ensuring that any exclusion or oppression is reflected in relevant research. As this is a research paper conducted with a critical disability lens, there will also be an analysis of the ageist theories and assumptions that may be perpetuating the exclusion of older cohorts and the fears seniors may experience themselves that encourage self-exclusion. Furthermore, this research will also be employing secondary data analysis as another method. Unfortunately, the COVID-19 pandemic also entails that doing any type of in-person interviews or surveys will not be possible, and

considering that this research discusses the exclusion of seniors because of technology, using online methods would once again perpetuate the disenfranchising of the most marginalized groups. Only using digital and online surveys and interviews will leave out the experience of those in the periphery. By critically comparing and combining the data and discussion from previously conducted research, this research will still be able to benefit from larger-scale data which will bring practical benefits such as "a decrease in cost, time-saving, anonymity, and extending access to participants" to name a few. By employing larger sets of data, it is more likely that the findings and outcomes of this research paper can be applied to a larger audience and population (Sum, Matthews, Pourghasem, & Hughes 2008. P. 206).

Without the use of actual human participation, there will be no danger of having any identifying information or any direct negative effects on participants, as the research will mainly focus on secondary literature and data. However, the researcher is aware that the work produced must uphold respect for persons (especially those belonging to the target age group) and would like to locate herself in the fact that she personally does not belong to the senior cohort of 65+. No research is ever free from bias, and despite the researcher's best effort to be open-minded and objective, previous experience and subjective insights of the researcher can still have an impact on the literature chosen and the analysis done. Fully knowing this fact, an extensive effort will be made to keep personal biases to a minimum. Based on the limitations and expectations of this master's research paper, there will undoubtedly be certain groups that will not be as thoroughly researched and represented in this research, especially with the amount of intersectionality that plays into this topic. This research will exclude those that do not belong to the senior cohort. The analysis and ideas presented may produce discomfort or anxiety in readers as it will discuss the topics of exclusion and isolation.

Theoretical Framework

Ageism

      The main theoretical framework that this research will be founded on is the concept of

ageism, which was first introduced by Robert N. Butler. Even in his 1969 article, he already

defined it as a "serious national problem" (Levy & Macdonald, 2016, p. 5). It describes this

"deep seated uneasiness" that manifests in younger cohorts towards older adults which stems

from a "personal revulsion to and distaste for growing old, disease and disability, fear of

powerlessness and uselessness and death" (Levy & Macdonald, 2016, p. 5). The fear of one's

own mortality leads younger individuals to despise being equated to those they view as

vulnerable. By excluding and keeping these unwanted bodies segregated, this fear

simultaneously allows younger individuals to keep the idea of mortality farther away from their

minds as well. These prejudices and fear of ageing permeate into all areas of workplace and

public life for ageing adults (Angus & Reeve, 2006). Just like all the other discriminatory "-

isms" (such as racism, sexism, or ableism), ageism is culturally constructed and founded upon

hegemonic stereotypes that decide on the ideals that define which bodies are fit, healthy, and

"normal" and which ones do not fit the mould. There are three aspects of ageism that will be

considered: the prejudicial attitudes towards ageing, the discriminatory practices towards seniors

and their roles, and the institutional practices and policies that perpetuate these stereotypes about

the elderly (Levy & Macdonald, 2016, p. 7). The worst part is that people are often unaware of

where their assumptions and beliefs originate from, yet they have formed common sense realities

to legitimize ageist behaviours that go unquestioned (Angus & Reeve, 2006). These same ageist

assumptions are perpetuating the idea that seniors are unwilling to or incapable of handling

modern technology, thereby making their participation or inclusion in it somehow invalid. There

is an underlying assumption that their age somehow connects with their usefulness and value as a citizen.

<u>Intersectionality – Critical Disability Studies</u>

When speaking on ageism, it is especially pertinent to consider the intersectionality that exists among marginalized groups. Often, the ones being oppressed belong to more than one minority group, so the discrimination that occurs cannot be studied separately from all other aspects of an individual's identity. Ageism and ageist assumptions exhibit the most intersectionality, considering that anyone and everyone will eventually age. People of all races, genders, and socioeconomic statuses are subject to the social and physical effects of ageing on their health, well-being, and social role. Ageism has even been described as the "ultimate prejudice, the last discrimination, and the cruelest rejection," as ageing is something no one can control (Angus & Reeve, 2006, p. 139). Many older adults are led to believe that they are the "dependent liability" that ageist attitudes and stereotypes paint them to be. These myths connect old age with traits such as the following: "physical and mental decline, social isolation, asexual behaviour, lack of creativity and economic and familial burden" (Angus & Reeve, 2006, p. 139). Eventually, everyone will age and will have to face the very same assumptions and stereotypes they had imposed on older cohorts. If they themselves had once harboured ageist and broader ableist thoughts about disability groups, having to face their new, ageing realities will have an even more toxic effect. They will be imposing these same ageist stereotypes and expectations on themselves, restricting their willingness and initiative to break free from those assumptions to live a life that they find is meaningful and fulfilling. That is why an ageist lens must be applied to the barriers being created by the increased integration of technology into daily life, as it stems far deeper than just a digital divide. By further exploring this relationship between seniors and

technology, it may also, in turn, reveal some aspects of the complexities of ageism and how it manifests in Western culture. As often discussed, Western, capitalist cultures tend to prefer and invest in the people they see as productive and effective (Angus & Reeve, 2006). Considering that many other disability groups also face discrimination based on similar assumptions, it is important for critical disability scholars to examine age as well. Seniors have been painted as burdens by Western capitalist thinking, and this is reflected in various industries, especially in the field of technology. This research paper seeks to point out the hidden ageist assumptions underlying the exclusion of seniors from technology use and showcase how age should not be used as a determining factor to gauge willingness to use or purchase digital devices.

As much as ageist assumptions have led to the exclusion and discrimination of seniors from the technological field as well as many other aspects of this Western society, it is important to keep in mind that there are also age-related assumptions being made about younger people that have had a very strong impact on an older adult's willingness to adopt technology into their everyday lives. Seniors could also hold assumptions that these new types of mobile and web 3.0/4.0 devices are ultimately made for the younger cohorts who are always only seeking entertainment and distractions instead of paying attention to the situations and people around them. Perhaps, "a senior's hesitance to use computer technologies might be related to their distinctive perceptions of technology from younger generations who often perceived it as a device for more leisure opportunities" (Lee, Chen, & Hewitt, 2011, p. 1232). Perhaps, seniors have also come to believe that technology cannot possibly bring any real worthwhile benefit to them when they are only bright screens that the younger age groups use for escape from reality. The actual benefits that digital health information and technology can bring to their everyday lives are overshadowed by the little seeds planted by ageist thought. During the research process

and examination of sources, the underlying presence of ageist beliefs will shape the analyses and discussions regarding the relationship between seniors and this technologically dependent world.

<u>Theories of Inclusion and Exclusion</u>

Other theories that this research paper will employ are the theories of inclusion and exclusion with an emphasis on its relations to older adults. Much like there are idealized bodies and idealized citizens that are often more included in society than those that do not fit the mould, there are also unwritten definitions on what "type" of senior can and will be included and praised by the rest of society. Basically, "being healthy was presented as a requirement for maintaining social status and involvement" (Raymond & Grenier, 2013, p. 122). Older adults who were seen as healthy and active are made to seem like they are the majority, and in turn, any senior who is ill, impaired or just does not fit those ideals are left excluded as the troublesome minority that requires additional care or attention. It implies that older people with impairments are probably not as interested in contributing to society, therefore eliminated themselves from accessing certain resources. These expectations slowly become seen as "normal ageing," and when older adults start experiencing abrupt physical declines, these deeply rooted assumptions create anxiety and emotional strains in the seniors who now also have these preconceived notions of how they are supposed to age. Within the past decade, there has been an increasing concentration on the idea of "ageing successfully," which translates more into being useful, productive, and independent <u>despite</u> the limitations and declines that are associated with ageing (Raymond & Grenier, 2013). In countries that are considered to be capitalist democracies, being able to meaningfully and actively participate in society is a very central theme. Participation was even "considered a means for seniors to combat ageism and to achieve more respect" (Raymond & Grenier, 2013, p. 122). In the past few decades, "the portrait of aging in international policy

shifted from the acceptance of aging as a gradual process of decline and dependency to the reconfiguration of aging as individual achievement and social contribution" (Raymond & Grenier, 2013, p. 118). The responsibility is pushed onto the seniors themselves to ensure that they do not become a burden to their loved ones and to the rest of society. It is exactly this type of thinking that continues to isolate seniors from the technology field, leading to a loss of autonomy when so many basic services and resources have moved to online platforms. If they require too much assistance from loved ones, there is a loss of independence which also seems to be linked to a loss of "their status as social actors…and their relationship to participation" (Raymond & Grenier, 2013, p.124). This criterion of "ageing successfully" just works to perpetuate the norms and expectations that continue to feed into the image of being a burden that society has already prescribed to them.

Literature Review

Since the main methodology of this research paper revolves around analyzing and re-examining past and current literature, this literature review will focus on some of the specific sources and authors that helped to shape the foundation of the critical analysis lens that was used throughout this research process.

Digital Divide

In the source by McMurtrey and colleagues, they discuss the concept of the "digital divide" which has existed and been maintained between younger and older generations over time, and it has only grown as the world became more digitized and dependent on technological devices. Technology has penetrated almost every single sector of the social/public sphere, yet a large portion of the senior cohort are still unable to fully benefit from the technological

revolution. Considering that the senior cohort is rapidly increasing in size and expected to double in size within the next few decades, technology should follow suit and have a more inclusive, universal design that allows for easy operation (McMurtrey et al., 2011). Making adjustments to the accessibility and user-friendliness of technology will not only benefit ageing adults but also many other people that may have different impairments. With COVID-19 serving as a catalyst, many basic services and online resources have moved online to reach as many consumers as possible while complying with safety protocols. While the general population probably found it much more convenient to do everything online, there were definitely minority groups, much like the senior cohort, that suddenly lost access to some of the main aspects of their lifestyles. Lockdowns created physical barriers, and online solutions did not provide any relief to the groups that seem to be constantly left in the periphery. Unfortunately, there is an assumption that the elderly tend to buy and spend less, which leads businesses to leave senior-centred discussions and designs on the backburner. The digital platforms promoted by this pandemic are likely here to stay, and in combination with ageist stereotypes that paint seniors frugal and unwilling consumers, it is very unlikely that this divide will merely disappear on its own. It needs to be actively addressed now. To better prepare for all future senior citizens (i.e., the younger cohorts of the present), the assumptions surrounding older adults and the use of technology need to be discussed, especially as life expectancy is increasing. This research hopes to critically analyze these ideas with a COVID-19 lens to further add to the conversation.

COVID-19 Connectivity Paradox

As the research itself concentrates on bringing attention to the effects of COVID-19 on the existing digital divide, it was vital to look into the new barriers and health concerns for older folks that the pandemic had produced, particularly through the creation of what Smith and

colleagues would call the "COVID-19 Connectivity paradox" (Smith et al., 2020). This paradox describes the difficulties that come with physical distancing as "it negates the ongoing efforts to reduce social isolation and improve connectivity among older adults" (Smith et al., 2020, p. 2). Older adults were urged to socially isolate themselves for the sake of their own health and safety, but it simultaneously placed seniors at a higher risk of suffering from the negative physical and psychological effects of isolation and loneliness. The authors note that seniors that had been previously measured as having a low risk of social isolation before COVID now reported having medium to high social isolation risk because of the stay-at-home orders (Smith et al., 2020). On top of that, the constant reminder that the virus may pose a greater threat to their health because of their age only adds to their stress. Now, they are facing "limits [to] their social mobility and connectivity while [also experiencing] fear and anxiety" (Smith et al., 2020, p. 3). Technology has the potential of decreasing the negative effects of prolonged social isolation, but it is also fully capable of isolating seniors even further. Smith and colleagues point out that access to reliable internet is not always possible for older persons. During the pandemic, many of the community centres and institutions (i.e. senior centres, libraries, etc.) that had originally helped seniors with connectivity and access to computers and the internet could not be opened for health and safety reasons. Once again, the same paradox exists. Even though technologies such as these could have greatly reduced the extent of isolation for seniors, the digital divide that had been left to fester all these years proved too wide to bridge. This source gives a lot of insight into the severity of social isolation especially during this pandemic and expands on the ways technology and the internet have not been utilized effectively to increase connectivity for seniors.

Social Isolation

"Living alone is among the most significant social changes of the modern world" (Klinenberg, 2016, p. 786). For various cultural and social reasons, single households are a lot more prevalent and accepted than in the past, and never had this been more detrimental to public health than during the multiple lockdowns of the COVID-19 pandemic. Klinenberg highlights the fact that living alone, being socially isolated and feeling may all be correlated, but these are distinct conditions. Many people can probably agree that they have experienced feelings of loneliness even in a room full of people, so social isolation goes a lot deeper than just being physically alone. It is the perception of being socially isolated that seems to be so distressing. Older adults have always been at risk for social isolation even before lockdowns and social distancing became the norm, especially because of the death of their social networks as they aged together. Social isolation is a lot more detrimental than it might sound. It has been listed as a predictor of mortality and is considered just as deadly as smoking or high blood pressure (Klinenberg, 2016).

What many may not realize is that "negative self-perceptions of aging…may be associated with loneliness and distress caused by the pandemic crisis" (Losada-Baltar, Jimenesz-Gonzalo, Gallego-Alberto, Pedroso-Chaparro, Fernandes-Pires, & Marquez-Gonzalez, 2020, p. e10). On the other hand, those with positive perceptions of ageing showed to be more resilient during the pandemic (Losada-Baltar et al., 2020). It is interesting to see how feelings of loneliness can be related to the ageist thoughts and assumptions that have permeated our society and the minds of even the seniors themselves. "…a Negative view of aging, such as perceiving oneself as less capable of facing stressful situations adaptively, or maladaptive ways of communicating with other relatives" is related to loneliness and psychological distress (Losada-

Baltar et al., 2020, p. e15). Because of the required lockdowns and social distancing, many

seniors also faced more psychological distress because of the loss of support, which placed even

more pressure on an individual's personal resources (Losada-Baltar et al., 2020). If ageist ways

of thinking already damaged their self-confidence and self-efficacy in their own abilities, having

to completely depend on their own resources during this pandemic must have been distressing.

This could easily make seniors feel even more alone when they felt that there was no one to

depend on to assist them in tasks that they already felt incapable of accomplishing because of

their age. This could definitely have negative effects on the mental state of seniors now, but it

may also have long-lasting effects on seniors in the future even after COVID-19 has lessened.

Senior Digital Literacy Paradox

Other than just physical barriers to accessing technology, a significant part of the digital divide

stems from what Jacobson and colleagues call the "senior digital literacy paradox." It speaks on

the ways that media discourse has created an atmosphere of doubt and self-doubt around older

adults' use of technologies (Jacobson, Lin, & McEwen, 2017, p. 335). When faced with the

overwhelming amount of information available online, it can lead to anxiety, which can

adversely affect their attitudes and perceptions of technology in general. What this article does a

good job of is shifting the responsibility and blame from the individual to the larger society and

the cultural development of technology. In the past decade, digital devices have been advancing

more rapidly than ever before, and those that did not have the time or resources to adjust to the

newer models or methods were simply left behind. In the early 2000s, everyone was still using

flip phones, but now, people are carrying mini-computer-like smartphones in their back pockets.

Information from all around the world is available with the click of a button, and people can

communicate instantly from opposite sides of the globe. Even in the United States, seniors have

had a relatively low adoption rate of smartphones in comparison to younger cohorts, so expecting seniors to suddenly catch up with the newest technology is just not feasible (Jacobson et al., 2017, p. 345). (Unfortunately, older models of technology do not work with the latest platforms or services.) Many people want to immediately immerse seniors with the newest and best models, but this can often create even more anxiety for seniors. During this pandemic, many people tried to introduce seniors to new platforms like video calling in an attempt to connect physically distancing older adults with loved ones. Trying to suddenly make up for years of exclusion simply does not work, as with various other sectors without our society. Jacobson et al. also discuss the idea of the "leapfrogging effect" which addresses the issue that comes with making late adopters start with the newest technologies. For many seniors, owning laptops or having unlimited/reliable wi-fi was already not common, and now, society is suddenly urging them to get on video calls or sign up for vaccines online. In fact, the ones without access to familial and community supports are the ones that are most at risk, and this research seeks to bring light to these issues that have existed and continue to worsen for the older cohorts in our community. This expectation can lead to an information overload, and the older adults that may not have support systems nearby to assist them with the transition may experience anxiety. As the internet is filled with unverified user-created content, it can also be difficult for older adults to distinguish which sources are reliable or not.

Web 3.0

In this research paper, web 3.0 is the main type of technology that is focused upon when discussing the isolation seniors have faced. The biggest distinguishing factors that make web 3.0 different from the previous generations are the increasing amount of user-created content and the intelligence of self-teaching website algorithms (Lassila & Hendler, 2007). Regular people are

now able to create and share their own content, and on top of that, the algorithms also work to recommend other content from like-minded people. Now, the web data is consumed not only by users but is also being processed by machines (Lassila & Hendler, 2007). Users now shape the web as much as the web also shapes the users. The isolation of seniors from joining web 3.0 entails missing out on an entire cohort's knowledge, content, and opinions. The representation of this age cohort is disproportionate, and when the content on this web-based information system can have such a strong effect on the physical world, the isolation that seniors experience becomes far more detrimental than in previous web 1.0 and 2.0 eras. However, there are some big challenges that come from web 3.0 that definitely contribute to the connectivity paradox and digital literacy paradox mentioned earlier in the literature review. The authors emphasize the ubiquitous nature of web 3.0 that allows it to exist everywhere at the same time. The vastness of the internet and the other web 3.0 products is exactly what might cause confusion and anxiety in seniors when they first begin trying to use web 3.0 technology. Along with user-generated content creation, there will always be a sense of uncertainty about whether the information being provided is actually trustworthy. For newer users, it can be difficult to traverse and distinguish between reliable and unreliable sources. Any inconsistencies can lead to even more confusion, and if seniors had tried to search up digital health ICTs, the contradictions may lead to more stress and anxiety. This article demonstrates how the "leapfrogging" immediately into the newest web 3.0 tools could do more harm than good, as the complicatedness might deter seniors from even attempting to learn.

Canadian Acts and Charters

In the Canadian Human Rights Act 3(1), it states that "the prohibited grounds of discrimination are race, national or ethnic origin, colour, religion, age, sex, sexual orientation,

gender identity or expression, marital status, family status, genetic characteristics, disability and conviction for an offence for which a pardon has been granted or in respect of which a record suspension has been ordered" (The Parliament of Canada, 1976). The purpose of this act is to ensure that "all individuals…have an opportunity equal with other individuals to make for themselves the lives that they are able and wish to have and to have their needs accommodated…without being hindered in or prevented from doing so by discriminatory practices based on race, national or ethnic origin, colour, religion, age, sex, sexual orientation, gender identity or expression…" (The Parliament of Canada, 1976). As age has been included, that is why this research does not take discrimination based on age lightly. Of course, today's advancing digital technologies are not actively discriminating and excluding seniors, but as this world continues to become more dependent on online platforms, the barriers will only multiply and grow. As more services and resources become technologically dependent, this will seriously impede seniors' ability to "make for themselves the lives that they are able and wish to have and to have their needs accommodated" (The Parliament of Canada, 1976). If this digital divide is left unaddressed, the effects of inequality will likely worsen and seriously impede the access of seniors and other disability groups (not to mention the people that may have difficulty getting access to a physical device even if they are fully capable of using it). In section 15 of the Canadian Charter of Rights and Freedoms, it notes that treating every individual equally and "with the same respect, dignity and consideration" is an important part of this country's mandate (Canadian Charter of Rights and Freedoms, 1982). This section of the Charter is meant to protect a person who may be denied opportunities or suffer disadvantages because of a personal characteristic like age. "Groups who suffer social, political and legal disadvantage in society" must be protected in the name of equality (Canadian Charter of Rights and Freedoms, 1982). As

the extent of the digital age continues to spread at an exceedingly fast pace, the creation of new barriers at this rate should be a genuine concern to all that hold accessibility and equality in a place of importance. If this country truly is as dedicated to inclusivity and equality as the Act and Charter describe, the Canadian government, developers, institutions, and citizens must work now to accommodate seniors before the divide becomes too wide to bridge.

As ageing does naturally come with some physical and mental declines, disability becomes an increasingly real part of an ageing adult's life, which is why accessibility standards in this country also apply to older cohorts. The definition for disability provided by the Accessibility for Ontarians with Disabilities Act (AODA) includes "visual impediment, deafness or hearing impediment…or physical reliance on a guide dog…or on a wheelchair or other remedial appliance or device," and these are some common physical declines that people experience as they age (Meilleur, M., 2006). This also means that as life expectancy increases, more and more people will have to face the realistic limitations that come from ageing. The debilitating barriers that once isolated previous cohorts of seniors will also become an obstacle for the newer generation of seniors. The AODA recognizes the effects of physical barriers, information or communications barriers, attitudinal barriers and technological barriers that all have a part to play in isolation that older adults have experienced because of this digital divide. Therefore, exploring the ways that these barriers have grown during this COVID-19 pandemic is part of the duty that comes with "developing, implementing and enforcing accessibility standards in order to achieve accessibility for Ontarians with disabilities…" (Meilleur, M., 2006).

Examples and analysis of the barriers imposed by technology

The purpose of this research paper is to examine the barriers and the isolating nature of society's dependence on technology, and it really boils down to two main issues. The lack of integration of technology has restricted seniors from meaningfully accessing basic resources and services (especially during the COVID-19 pandemic) and has limited the potential benefits that they could gain from adopting more technology into their lifestyles. In this next section, we will be examining specific types of technology and how they have excluded seniors from meaningfully engaging with and benefitting from them.

Financial Banking

As mentioned in previous sections, many day-to-day activities like shopping or making doctors' appointments have all moved online during the pandemic, and it is likely that these digital platforms are here to stay even after the pandemic lessens. Now that they have been set up and functioning since 2020, most of these online methods will probably stay up and running, which further adds to the technological dependence that our society was already heading towards. For the general population, these online platforms that can be accessed from the safety of their homes on their portable devices increased accessibility, but at the same time, they completely blocked out certain minority groups such as seniors. A good example of a common service that had been moving online but really moved forward their digital platforms during this pandemic was the banking/financial sector. Of course, online banking and cashless payment methods had been on the rise for the past few years, but when physical branches had to be closed during lockdowns, many of those who had resisted going virtual had no choice but to join their bank's online services. In fact, there are even branchless banks that are starting to take form where every single aspect of their services will be done completely online. Originally, non-cash

payment strategies were developed with the purpose of reducing exclusion, yet it became

apparent that those who were not ready to use modern technologies faced even more financial

exclusion and self-exclusion (Warchlewska, 2020). In fact, it is "the continuous development of

and technological processes in the banking sector [that] hinders certain types of banking and

deepens the level of financial exclusion of the oldest generation" (Warchlewska, 2020, p. 87).

Financial exclusion can be defined as "the exclusion of individuals or households from using

financial services in the realm of consumption, production and social cohesion" (Warchlewska,

2020, p. 87). Before this pandemic, the effects of these modern technologies were not as

disabling because seniors could still choose to go in person and bank as they always had, so no

real effort was made to bridge the digital divide and the lack of digital literacy that has existed.

Senior citizens often had realistic concerns about online identity theft or digital threats

contributed to the anxiety they probably had about using technology like this in the first place

(especially with something as important as money). These are very rational fears as theft via the

internet does happen, and if seniors have less experience dealing with this scenario, it may be

more difficult to tell the difference between real and fraudulent. In actuality, these are very real

concerns that every internet user has or should have, yet most people choose to take the risk in

the name of convenience and efficiency. The truth is that these innovations were not made with

everyone in mind, even if their original purpose was to reduce exclusion. "The development of

new technology in the banking sector does not make adjustments for age or (dis)ability of the

recipient" (Warchlewska, 2020, p. 88). The author cites Rousseau's explanation that throughout

the history of humankind, injustice and inequality have been perpetuated through the progress

and development of human civilizations. If nothing is done to actively change that, this injustice

will continue to exist in our society as it always has and will continue to marginalize peripheral

groups. Seniors are not the only minority group that is left out by these new innovations in the

banking sector. There are individuals that cannot have credit or non-cash payments because they

have a lower income or a lower social status to begin with, which greatly restricts the extent of

access they have to various financial services (Warchlewska, 2020). Unfortunately, there are

seniors that also fall into those categories as their changing roles in society (i.e. going from the

workplace to retirement) intersect with the age-related declines they may be experiencing. The

ageist assumption that seniors tend to spend less because they earn less leads to more seniors

being left out of the banking industry. On the surface, it may seem like older adults lack access to

online banking because they choose to reject technology, but there are also broader barriers that

prevent seniors from having meaningful participation and access in our community. There are

much larger social issues that seem to negatively affect the oppressed and marginalized groups in

our society. Our Western society and culture only cater to those that fit in the ideal mould, and

those that cannot fit are left out. As the author explains, standardizing products and services in an

attempt to target all consumers will undoubtedly create negative emotions in buyers that are

pushed and convinced into buying products or packages that do not actually fit with their

lifestyles or needs (Warchlewska, 2020). This can translate over to many different types of

technology as well, where seniors may feel that they are expected to use the design or the

package labelled specifically for their age group.

In this way, the financial sector has shown that there are functional and social barriers at

work when it comes to isolated seniors. These newer methods of accessing banking services can

definitely prove to be useful and allow more people to access their money and financial

information from anywhere at any time. However, what is done in the name of providing "better

service" to the majority can seriously hinder and harm those that have already been suffering in

the periphery in many other areas of society. There is already a very interesting relationship between banks and seniors. The ageist thoughts of how retired seniors will be making substantially less money than the young adults that are still working may unconsciously (or maybe more intentionally than it might seem) affect how banks and their policies treat seniors. In the Western capitalist mindset, financial exclusion from participating meaningfully in the economy and their communities, which can have some very adverse effects on seniors' views of their own identity and self-efficacy. Having full control over one's own finances seems relatively normal and expected, but if seniors suddenly require assistance from their loved ones in order to access their banks online, then they lose their independence in yet another aspect of their lives. Another problem that arises from the vast difference in technology usage between age groups is the fact that seniors also lack the opportunities to give feedback on troublesome or difficult-to-use platforms. Many of the surveys that are distributed for the purpose of getting feedback are all completed online, leaving out those that probably have the most trouble with the service. It would be understandably difficult for an older adult who has difficulty dealing with a web portal to find out where to submit a complaint or complete a survey. How could businesses understand the needs of seniors when there are fewer opportunities for them to give feedback in the first place? Even many research studies lack older participants, so they just group all older adults into one final category. However, as the oldest cohort continues to grow, research, in general, will require smaller and more specific age groups within the 65+ cut-off. There is quite a difference in the experience of younger seniors and older seniors, especially when considering the gradual nature of age-related declines.

<u>Mobile technology</u>

       The mobile industry is quickly growing and radically changing as smartphones become more and more advanced. With phones being as powerful as computers these days, mobile devices have the potential of making a lot of businesses accessible from anywhere and making a lot of lives more convenient. Considering that both mobile technology and the older populations are growing so quickly, it would only make sense to look into how mobile technology can be best used by the ageing populations (Nikou, 2015). The author believes that not enough attention has been given to studying seniors with mobile technology because researchers are still too immersed in studying their relationship to computers or the internet. Mobile phones have the potential to be much more accessible, as it is not only cheaper than buying a personal computer or internet service but also easier to carry around. "If adopted in time, the regular use of mobile health and wellness applications can support lifestyle change" (Nikou, 2015, p. 294). People can literally monitor themselves in real-time, and they can access their previous records that are all saved on their phones. They could call, video call, and message members of their social circle anywhere and anytime, allowing for more contact with loved ones even during physical isolation. Much like in other research done on the relationships between seniors and technology, mobile adoption is also attributed to determinants other than age or the physical and functional challenges that come with ageing. Sociodemographic factors and psychological barriers have a part to play in mobile health as it does in many other forms of technology. A lot of what goes into a senior's willingness to adopt mobile technology is their perception of the device and what perceived benefits they think they can gain from it (Nikou, 2015). "An elderly's intention to continue using [mobile]health technologies is mainly influenced by his or her level of satisfaction" in that their feeling of satisfaction is actually affected by the expectations they

initially had (Jaana & Pare, 2020, p. 3761). If seniors perceive the technology as useful and had a relatively easy experience while using it, then it leads to an intention to continue using that technology and adopting it into their lives (Jaana & Pare, 2020). When smartphones are advertised and introduced as a health-related instrument that was both practical and discrete, it was way more widely accepted and allowed "the older people to live a normal life without noticing that they are using it" (Nikou, 2015, p. 299). Seniors were way more willing to adopt mobile applications with simple and familiar designs as an overwhelming amount of functionality and designs may actually do more harm than good (Nikou, 2015). This makes a lot of sense in relation to Jacobson et al.'s digital literacy paradox, as too many features may create feelings of doubt or anxiety when approaching the application. It has been seen that seniors are more than willing to incorporate technology into their daily lives, but where they find difficulty and anxiety is with the continuous advances that are hard to catch up with (Warchlewska, 2020). Instead of creating a sense of failure to learn all the various functionalities, it would be better to limit it to the few functions that seniors actually found a use for. In a user-centric approach to designing mobile apps and technologies, part of the process is actually providing proper training for the potential target groups in order to assess whether or not the application actually accomplishes what it was meant to do (Nikou, 2015). This is an important step to ensure that the needs of users are met. In Roger's diffusion of innovations theory, he notes that older individuals (which he would dub "laggards") are "the most difficult market segment when it comes to the adoption and use of mobile technology" (Nikou, 2015, p. 299). Not only do their interests and sociodemographic factors differ from the younger cohorts, but seniors also tend to be more physically spread apart as well (Nikou, 2015). The social networks surrounding the elderly also have a large effect on their perception of applications. Often, support from that social network

makes it a lot more likely that seniors will more frequently and willingly use mobile apps. An obvious explanation for that would be the support from loved ones. It allows seniors to approach mobile technology more confidently and frequently, fully knowing that they will easily have assistance if any technical difficulties or confusion appears. Another less noted explanation would be the fact that seniors may not have a lot of people to use those apps or platforms with. Other than health-related mobile apps, there are also plenty of other apps use for conversing, but if they do not have a social circle to use it with, the likelihood of adoption is much lower. However, opting to not adopt mobile technology in today's day and age becomes a form of "self-isolation [that] can lead to social exclusion" (Nikou, 2015, p. 296).

When looking at mobile technology, some of the barriers that it reveals are the physical barriers of overly complicated applications and a seniors own psychological barrier on how they perceive technology in the first place. It is important to note that a perceived benefit and a perceived barrier are equally important when researching this topic. Much like it is for social isolation, how a situation or a device is perceived by a senior will have a strong effect on the likelihood of acceptance, that is why it is important to design tools in a way that minimizes technology anxiety while highlighting the benefits of the app. Even though physical barriers are not the only things that need to fix, changing the layout and design of apps can have an equally strong effect on other types of barriers as well. Whether it be taking the time to point out the potential benefits to seniors or debunking any pre-existing negative emotions or thoughts they may harbour towards technology in general, time must be taken to train and work with seniors to change their perception of a technological landscape that has spent so may years marginalizing and excluding that entire age group. If the perceived benefits of adopting a new device and new mobile application do not outweigh the perceived risks that a senior already believes in, it is only

natural for someone to be reluctant to change. It is the perceived risk and the lack of perceived benefits combined with technology anxiety that works to potently to keep seniors from fully opening up to the idea of incorporating technology like mobile phones into their daily lives.

<u>Digital Health</u>

The type of technology that seniors seem the most interested in and can benefit the most from are the various devices that can be used for digital health. Digital health can be defined as "the use of information and communication technologies in medicine and other health professions to manage illness and health risks and to promote wellness" (Ronquillo, Meyers, & Korvek, 2021, para. 1). Some examples of digital health would include wearable devices, mobile applications, and health info technology (Ronquillo et al., 2021). Moving certain aspects of the healthcare system online would help to reduce inefficiencies and lower the overall cost of healthcare. It will be significantly easier for healthcare professionals to log and locate past records of patients even from different clinics. It will also allow participants to better track their own health, which can be very useful for managing blood pressure/sugar or setting reminders for taking medication or getting in some physical activity every day. Many mobile apps have been created for digital health purposes, so many of the same barriers apply to digital health devices as well. The most noticeable one would be "the lack of computer or mobile equipment and access to the internet," and this would definitely pose some issues for the individuals who may have wanted to register for digital health interventions (O'Conner, Hanlon, O'Donnell, Garcia, Glanville, & Mair, 2016, p. 8). However, there are a few more barriers to consider when speaking specifically about the health side of technology. One aspect to consider is whether the individual is actually interested in maintaining good health behaviour. Health behaviour can be defined as "any activity undertaken by an individual, regardless of actual or perceived health

status, for the purpose of promoting, protecting or maintaining health, whether or not such behaviour is objectively effective" (Nikou, 2015, p. 296). Without being trained in the actual digital health tool, seniors cannot be expected to realize the number of benefits that these newer technologies can bring, especially if they do not see how it could possibly be that much better than what they are already doing. "A barrier to engaging for some was poor awareness of technology or seeing no value in the DHI offered or lacking the motivation to understand and improve their health through electronic data; this was often seen to be the role of their healthcare provider" (O'Connor et al., 2016, p. 6). For seniors that may no longer feel confident in their own abilities nor in their skills with technology, suggesting digital health intervention may seem very daunting. Ageist thinking tells seniors that they are gradually succumbing to their mortality, and those that have not "aged successfully" in the eyes of that ideology are labelled as burdens to the rest of society. There is not much encouragement to work hard in improving one's health when an ageist society just constantly reminds you that you are getting closer to death, and the resources and assistive programs they offer are dependent on technology that you either do not own or do not fully know how to use. Just because digital technology has been widely diffused and distributed in this country, it does not guarantee equal access to said technology (Jackson, Trivedi, & Baur, 2020). In a worst-case scenario, DHIs can even become "a constant reminder of their failure to meet health goals and was thought to be discouraging" (O'Connor et al., 2016, p. 6). Without the proper training and guidance, the stress and confusion that stems from a DHI that is hard to work with could taint the image of technology in general and reinforce ageist and disabling thoughts that seniors may have about their age-related declines of ability. It would feed into ageist thoughts that continue to affect seniors in their everyday lives and restrict technology

to being viewed as "potentially disruptive by some or purely for entertainment purposes by others and not for health needs" (O'Connor et al., 2016, p. 6).

On the other hand, digital health literacy is a completely different term that can be defined as "the degree to which an individual can access, process and comprehend basic health information and services and thereby participate in health-related decisions" (Smith & Magnani, 2019, p. 280). It also involves being able to apply the obtained health information from an e-source into one's lifestyle or when trying to solve a health problem. This requires the individual to not only have great computer literacy to use the internet to search for specific information but also medical information literacy to truly get a grasp on the information they are encountering. "When people have poor health literacy skills and encounter complex, unfamiliar materials and devices, a fundamental mismatch occurs, and people have trouble using [both] information and technology" (Jackson et al., 2020, p. 2). In this case, it is even more important to be able to distinguish between trustworthy sources and the user-generated content that just about anyone can write and distribute. Perhaps, the vastness of the information available online can once again create that sense of anxiety when it comes to digital health information and communication sources. It is "this abundance of information without sufficient guidance and explanation [that] could lead to confusion and stress" (Smith & Magnani, 2019, p. 281).

Seniors that were facing the dangers of social isolation during this pandemic would definitely also lack the kinds of guidance and support they would need to traverse newer forms of digital health. Even if using digital health methods or technology, in general, are the best ways to overcome health risks (including social isolation), the need for social distancing is restricting the amount of assistance seniors can get for these new devices. The same disparities that had been prevalent in the other forms of technology are also deeply routed within digital health.

Apparently, "individuals with poor eHealth literacy tend to be significantly older and suffer more chronic health conditions" (Smith & Magnani, 2019, p. 281). They also tend to be "lacking healthcare coverage [and] need health information because they are more likely to have multiple chronic conditions or be at a higher risk for preventable health" (Jackson et al., 2020, p. 5). It is like a never-ending cycle of disparity. Once again, the intersectionality of age with other factors like socioeconomic status, education level, and disability are seen in relation and correlation with each other, despite being completely different factors. The seniors that probably would benefit the most from digital health tools are also the ones that have been the most excluded and isolated because of their age and age-related declines. However, it was also "found that use of the patient portal was significantly lower among racial minorities including Blacks and Latinos compared to referents of white race, even when adjusting for educational attainment" (Smith & Magnani, 2019, p. 281). It happens to be the same groups that face troubles with health literacy. It is clear that the disparities, discriminations and marginalization that occur in many areas of our society have also penetrated technology. The barriers found in the digital and technological fields are merely an extension of the barriers that have existed and persisted in our culture before the world became this digitized and before this pandemic hit. If anything, this pandemic has revealed just how important it is for efficient and responsive health care information and services (Ronquillo et al., 2021). Yet again, those that are the most in need and would benefit most are the ones left out; therefore, the ongoing cycle of disparity, inequality and discrimination continues. It may be too late to suddenly implement new digital health into the lives of seniors during this pandemic, but as the field continues to grow and advance, the barriers that have been identified in the field currently should be taken into consideration as more digital health products are continually being developed and tested to prevent the creation of new barriers.

Much like the other technologies that have been discussed so far, digital health information and communication technologies have created similar structural barriers because of how difficult they may be to use or how costly they could be for ageing adults (Jackson et al., 2020). It was ultimately found that the lack of perceived benefit of adopting the internet into their lives was the most significant reason behind not having an interest in technology (Jackson et al., 2020).

On top of being incapable of using the technology, one of the main complaints against Digital Health Interventions (DHIs) is that they will be extremely impersonal (O'Connor et al., 2016). Having support and encouragement from social networks is extremely important in process of getting seniors to adopt technology, so creating more engaging and personalized strategies should be a main goal in the DHI field moving forward. There is no doubt that digital health can bring a lot of benefits to older adults, allowing them to live more freely while also maintaining their health. Unfortunately, those that often require the services the most are inadvertently disqualified from participating because they are a minority or in the periphery.

Since digital health technology would need to be clinically validated before it can spread and diffuse into the public sphere, it has taken a lot longer for products and services to become available to all patients. It is also difficult to estimate whether the product or tool is doing everything it needs to. Although the user's experience is important in gauging the success of a tool, it is important to remember that digital health is still an industry and a market (Ronquillo et al., 2021). There are many stakeholders that go into the production of a digital health product, and the investors and production companies are still looking for the most return for the least amount of risk (Ronquillo et al., 2021). With a relatively young industry, there are still many uncertainties with what kinds of patients, investors and clinicians will actually choose to support

and use a product. At the same time, a young field with newly forming products also means that there is still a chance to prevent the clear barriers and exclusionary factors that are already prevalent in the ICT field.

Having discussed the types of barriers that exist in everyday technologies that seniors will likely come across, this research paper seeks to make suggestions on how to best address these barriers to decrease the isolation and exclusion seniors have experienced because of the technology industry. Not only does this research paper hope to enhance computer literacy in seniors (so that they can combat their social isolation with technology), but it also hopes to help improve the quality of life that seniors have. With the convenient and efficient benefits that the technology of this day and age has to offer, leaving seniors excluded from accessing this resource is an extension of the inequality and discrimination that stems from an ableist and ageist mindset.

Discussion on Ways to Address the Barriers

The following discussion section will be organized into the four factors/dimensions of constraints that were described in the source written and researched by Lee, Chen, & Hewitt (2011). As the contents of this research paper have shown, the barriers found in today's technology are far more complicated, multilayered and deep-rooted than they might appear. In order to best address the ways that various barriers need to be changed, functional factors, structural factors, interpersonal factors, and intrapersonal factors will all be discussed to bring to light some of the ways that we as a society can work to increase senior adoption of technology and their participation in the greater community.

<u>Functional Factors</u>

Functional factors refer to the physical and skill-based barriers that continuously plague seniors. This factor is probably the most recognized factor out of the four factors because it is the most visible. It is hard to deny that there are age-related declines that make it a lot harder for seniors to use technology as freely as younger cohorts do. Many of the devices and platforms are not user-friendly, so ageing adults that may be experiencing declines in their vision, hearing, dexterity, etc. will have a difficult time simply using the actual tool or website. The best way to address these types of barriers is for key actors in the industry (i.e. developers, investors, manufacturers etc.) to place accessibility at utmost importance to ensure that users and audiences can access it with ease. "Accessibility is about a more sensitive approach to people with a disability, awareness of the person's needs and feelings, understanding and acceptance, and the creation of an inclusive environment" (Callari, Ciairano, & Re, 2012, p. 363). More specifically for technology, accessibility involves ensuring that information and devices are meeting the needs and abilities of older people while making sure that the intended purpose and functions of the product are still being accomplished. Some practical changes that can be easily made would be ergonomic designs that can be taken into consideration or even something as simple as making the font size larger and the website simpler for users with impaired vision. Sometimes, too many functions may overwhelm seniors and inadvertently make usability even more confusing (Nikou, 2015). Reducing the functionalities available may allow seniors to concentrate on the ones that will actually be beneficial for them and allow them to feel a greater sense of success when they master them. Making websites or interfaces easier to understand for low-literacy users will not harm the users with higher digital literacy and will allow more people to access and interact with the ICT. If there are too many different aspects that need to be learned to

use an application or a device, it may become a turnoff for seniors that already are not fully committed to adopting technology into their lifestyles. Considering that Canada is so dedicated to accessibility and creating a more inclusive space for everyone within our borders, there should be a consensus on the importance of accessibility in technology. It is disappointing that so many new barriers have been formed even when so many provinces have taken the initiative to set up acts like the AODA. By intentionally taking the time to assess the needs of seniors, a lot of other disability groups would also benefit from a more universally accessible design. Key actors in the mobile industry such as device manufacturers and developers play an important role in the strategies for investigating the potential benefits that technology can bring to the senior population.

A one-size-fits-all approach will only work for a portion of the population, and inclusivity is becoming the new mandate. With the senior cohorts rapidly growing in size, it would make sense to name older adults as one of the main, target consumers. The growth of this age group will naturally trigger cultural shifts, and every business should follow the shifting tides, even if it is only in the name of profit. It could involve designing technology that is geared towards caring and supporting more independent elderly living in the community (Jaana & Pare, 2020). Keeping up "with the development of mHealth technologies and the changing demographics and expectations of patients and their caregivers" is an important and necessary process that developers need to partake in (Jaana & Pare, 2020, p. 3766). The target consumer is evidently no longer just one standardized type of person, and creating digital technology that is user-friendly and accessible for everyone from the beginning is a lot more reasonable and advantageous than trying to make accommodations as an after-thought. Likewise, digital health developments will shape how this country views and deals with disparity, equity, and health

literacy (Jackson et al., 2020). "This shift cannot come along without paralleled changes at the Canadian health system level, in relation to existing policies, reimbursement modalities, and the structure of health care services delivery" (Jaana & Pare, 2020, p. 3766). It does not make sense for every other industry to strive for inclusiveness and universal design while new technologies continue to create new barriers as more advancements are made. More so than just trying to comply with laws, policies, and acts, the technology field should strive to fit the realities of the consumers that it serves.

It is important to note that there are already businesses and fields that concentrate on designing technology specifically for seniors, especially as the older cohorts are becoming one of the fastest-growing age groups. What many of these sources showcase are the benefits that technology can bring to an ageing adult's life and demonstrates that seniors do not despise the idea of technology at all. Chen and Chan (2014) define gerontechnology as "electronic or digital products or services that can increase independent living and social participation of older persons in relatively good health, comfort and safety" (p. 636). Its purpose is to help older people deal with the difficulties that come with ageing, so they can live more independently (Chen and Chan, 2014). They found that older people actually have relatively positive attitudes towards technology, but where the digital divide comes from is the lack of enthusiasm seniors have for actually adopting new technologies. More so than age, technology adoption and acceptance seemed to depend more on other sociodemographic factors such as culture, available support (from social networks), education level, financial status, etc. (Friemel, 2016). This is where the concept of intersectionality sticks out even more clearly. Older adults are not the only disability or minority groups that lack access to technology, but because of the intersectionality that exists within ageism, many seniors tend to fall within the categories of those that are excluded. As

many of them are retired, they naturally have a lower income, and with the ever-advancing

nature of technology, the older adults that no longer have to keep up with technology in the

workplace become obsolete. Their education would not have required them to use these newer

models and functions that exist in the web 3.0 era. A large portion of today's elderly did not

grow up being surrounded by web 3.0-type technology, and the rate of advancement has

increased exponentially.

The main issue with only looking at gerontechnology as a sign of senior inclusion is that

this field also supports the idea of "successful aging" (Chen, 2020). It focuses on designing

prototypes and tools specifically for seniors, and although this is very important and practical

work, it does not solve the problem of the deeper exclusion of seniors from the platforms and

resources that younger cohorts engage with every day. This field produces many amazing

products that allow seniors to live more fulfilling, but it does not address the issues that lead to

the isolation of seniors and the creation of barriers when it comes to technology in general.

Seniors still remain segregated from the rest of the population and the types of technology they

normally use to communicate and participate in their communities and in the world around them.

As much as changing the inaccessible designs and tearing down physical barriers will

help seniors with some of the age-related difficulties they may have with physically engaging

with devices and services, the isolation they experience from this newfound societal dependence

on technology is far more multilayered and complicated, which is why other factors still need to

be discussed and evaluated.

Structural Factors

Structural factors deal with issues such as the cost to own computer/mobile devices and

the time and effort it would take to learn to use these devices. In other words, it is a matter of

whether the perceived benefits outweigh the perceived risks. The keyword here is "perceived". The perception of technology and how it can be used is more important than what it may be like in actuality because perception shapes our reality. Unlike the younger generations that grew up with these types of technology everywhere, the older age groups have experienced what life is like without this dependence on computer technology. Many dangers come with interacting and using services and platforms online (i.e. fraud, identity theft, etc.), but younger cohorts would much rather be subjected to the perceived risks than to sacrifice convenience and the other perceived benefits that they have known all their lives. "The most common reason for non-use among Canadian seniors was a combination of no need, no interests and a lack of perceived utility" (Davidson & Schimmelle, 2019, p. 10). The amount of effort and stress that come with learning how to use complex devices and platforms may not be worth it for older adults. It is not so much the inability but the inconvenience that prevents the full adoption of technology. Even if they could afford the devices, seniors may not think that the purchase and adoption of the newest devices are worthwhile. They may not have enough motivation to want to spend their time picking up the newest trend when newer and trendier models are being developed every day. Perhaps, the "innovation may be too rapid for their comfort" (Davidson & Schimmelle, 2019, p. 10). Seniors may choose to self-isolate themselves for this reason, but as COVID-19 has pushed so many essential services online, this self-isolation has become much more damaging than many people may have first believed. At first, older adults may not have seen the relevance of technology in their lives when all services were still open to the public, and motivation was low to make up for their unfamiliarity with technology. No one could have imagined how long this pandemic and its sanctioned lockdowns could last, and who knew social isolation could have so many negative effects on both our physical and mental well-being.

Since neither society nor seniors felt the urgency to immerse older generations, there had not been enough of an effort made to change the perceptions they may have about the risks or complexities of the Internet or of technology in general (Davidson & Schimmelle, 2019, p. 10). Their willingness to adopt may be greatly impeded because of it, and there were very limited ways of changing those assumptions during the pandemic when even loved ones could not be there to assist them. Now that the older generations have gone through this time of social isolation, they may now see the growing relevance of technology in this digital world. Not only is technology viewed as beneficial to health, but the fact that the Internet would allow them to interact with their communities and loved ones proves how beneficial it can be for their general well-being (Callari, Ciairano, & Re, 2012). Of course, this goes hand in hand with tearing down the functional barriers as "the elderly are keen to use technological devices with greater motivation when they perceive them as user-friendly and when they actually believe that the technology will improve their health and safety" (Callari et al., 2012, p. 367).

The best way to change these structural barriers would be to introduce and educate seniors on the ways that ICT and the internet can be beneficial to them. Creating public and community demonstrations where seniors could try out different types of technology first-hand while having someone to guide them along the way. It is the lack of familiarity and opportunities to interact with technology that has kept this divide going for so long and has allowed seniors to build up their own assumptions about the complexity and usage of technology. Once the COVID-19 pandemic lessens and it is safe again to interact openly with the world around us in person, more initiative should be taken by companies, community centres and government organizations to give seniors a chance to learn and become acquainted with various devices and platforms in a non-pressuring atmosphere. "The perceived value of the electronic health service

interaction or the information people can convey and received through digital means is a critical element that must be better in one or more ways than the current standards of care to encourage people to register for it" (O'Connor et al., 2016, p. 11). It does come down to proving to seniors how much more beneficial digital methods can be than their current preferred methods because no one would waste their time learning a new method if it is not better than the methods they had already been using.

That is why there is a very important party that needs to take part in debunking perceived risks and convincing seniors of the potential benefits. These people are the medical practitioners and the healthcare professionals that the seniors already currently trust to deal with their health and mental well-being. A lot of the technology seniors will most likely end up benefitting from the most are digital health devices, so it may be even more reassuring for older adults to hear of the benefits from the individuals certified and licensed to give medical advice. That is why they have a very important role to play in shaping the perceptions that seniors have about digital health and their willingness to use it (O'Connor et al., 2016). Many people would prefer to go to trusted and certified professionals when dealing with something as important and confusing as digital health. It makes sense for older adults to want to turn to professionals to get advice and guidance, especially if they struggle with digital literacy and medical literacy. "A lack of clinical endorsement was a clear barrier for others who felt that if their healthcare provider could not promote digital health or use it themselves, then it was probably of limited value" (O'Connor et al., 2016, p. 8). Since the field itself is still so new, it is extremely important for healthcare organizations and professionals to normalize, approve and promote engagement with digital health devices. If their healthcare practitioner opts not to take part in digital health methods, most patients would not go out of their way to spend their time learning how to adopt these newer

methods. Digital health tools will only be fully incorporated into the lives of patients when they gain recognition from medical professionals and are actively promoted. If the professionals themselves do not even use electronic health record systems, then it is highly unlikely that their patients would get offered access. Similarly, medical professionals from poorer regions will have less access to digital health tools, and this most likely means that their patients will have even less access and will likely miss out on all the potential benefits (Jackson et al., 2020).

In fact, having friends, family, and other people from their social circles introduce and encourage the use of technology tends to have the most effect on convincing seniors to adopt new technologies. Their social circle may be the most reassuring and supportive people to a senior, so it is extremely vital for loved ones to take the initiative to enlighten seniors and to familiarize them with the functions that digital devices have the ability to accomplish. This is why it is also important to look at the interpersonal factors of technology adoption and the types of barriers that can be built up.

Interpersonal Factors

Interpersonal barriers usually come from having no one to assist seniors in learning how to use technological devices and from having no one to use them with. Family and friends are usually the people that seniors depend on and trust the most, and without those people to give them support or to answer their questions, acquiring the skills and knowledge needed to use newer technology may be a very daunting task. Notably, offline help is necessary for an individual who has yet to grasp how to use online tools. It has even been reported that "support from acquaintances and their respective expectations [or opinions on digital technology] determines Internet use to a great extent" (Friemel, 2016, p. 316). In terms of just general technology use in their day-to-day lives, having encouragement from their own social circle is

even more relevant than the opinions from professionals or volunteers. "Even among those seniors who have taken computing classes in local colleges or municipal libraries, there is more confidence in family support networks" (Charmarkeh & Lagace, 2017, p. 191). Social isolation is one of the main reasons why adopting communicative technology is so beneficial for seniors, but if there is no one for them to interact with on these platforms, then learning how to use platforms like zoom or facetime loses its potential benefits. Many older adults start to see their social network shrinking as they increase in age, either from their changing roles from being employed to retired or from the passing away of loved ones (Lee, Chen, & Hewitt, 2011). If a senior's entire friend group stays away from technology, then there is no one to email or to video call in the first place. That is why digital technology and "computer self-efficacy in general seems to be influenced by usage patterns within and encouragement by one's social network" (Friemel, 2016, p. 317). This also means that the more seniors that start adopting technology regularly, the more they can convince their friends (who are most likely dealing with the same stage of life) to do the same. The social networks surrounding seniors need to realize their importance and be convinced of the usefulness of technology in assisting seniors with a more healthy and independent life. This is why interpersonal barriers can be the hardest to tear down, yet it is also valuable to concentrate on interpersonal factors as the convinced seniors themselves can become a solution to this digital divide.

Although there is a lot that society and the technology industry must do and must take responsibility for in order to solve the problems associated with this divide, seniors themselves need to be willing to take the first step and open up themselves and their lives to the proposition of using technology regularly. This is why there are internal barriers that must be addressed, and oftentimes, those are the ones that are the hardest to change and break down.

<u>Intrapersonal Factors</u>

Intrapersonal factors can be associated with older adults believing that they are too old or too useless to learn how to use new tricks at their age. Perhaps, they have fully convinced themselves that no amount of help from a digital tool can overcome their difficulties with health or with loneliness. The ageist beliefs and assumptions that have been upheld for so long in our culture have embedded themselves so deeply into the minds of everyone that even seniors themselves have come to believe them. Seniors may come to inherently believe what society has been telling them. They may begin to think that there are so many things that they cannot do because of their age. They may start to believe that they are useless burdens that should not waste too much of their loved one's time in attempting to learn about a new and expensive device that they should not waste money on. This can lead to self-exclusion to avoid the hassle and trouble of even attempting to pick up confusing and inaccessible technology, and with a society that now prefers to meet and converse online, this self-isolation can lead to a level of social exclusion that can be extremely detrimental for seniors. Every individual has the responsibility to change the ageist assumptions they may harbour deeply in their thoughts, including young and old alike. There must be solidarity between the generations, and we must not divide ourselves into age-divided societies (Ayalon, Chasteen, Diehl, Levy, Neupert, Rothermund, Tesch-Romer, & Wahl, 2021). This pandemic is the time we need social and intergenerational solidarity the most, and it has also been the best time for all of us to reflect on the amazing things that other cohorts had to offer. We must all take up the "responsibility to participate in the current public discourse to correct misperceptions, over-generalizations, and ethically questionable suggestions" (Ayalon et al., 2021, p. e52). Our society often attributes certain behaviours, thoughts, and characteristics to different age cohorts, so never has it been more important to remember that age is just a number.

Even within critical disability scholarship, attention must be given to this digital divide that not only affects those that are advancing in age but to anyone that struggles with accessing technology because of their disabilities or socioeconomic factors. By refocusing on the intersectional nature of everyone's identity and remembering the effect that so many different factors (other than age) can have on technology availability and adoption, it becomes increasingly clear that this digital divide should not be allowed to perpetuate, especially when age is often enough to disqualify seniors from equal access. One of the methods that can be employed to overcome ageism and categorization based on age is "by stressing that we are all in this together rather than emphasizing age as the critical variable, but individualizing communication and interaction, by drawing on personalized rather than generalized messages and by invoking references to individual people" (Ayalon et al., 2021, p. e51). People and their behaviours are complex, so it does not make sense to attribute an individual's abilities or lack thereof only to their age. Many people tend to internalize the external factors at play that affect their abilities and their situations.

Action needs to be taken to make changes to ageist and intrapersonal barriers that have prevented seniors from being able to meaningfully participate with their communities and the rest of society because of the digital divide. In order for this level of systemic thinking to change, everyone in every corner of this society needs to change the way they think and perceive ageing. The ageist assumptions that are continuously used to attribute certain characteristics and behavioural tendencies need to be changed. The younger cohorts need to change the way they view ageing because they will eventually be facing the same discriminations and age-related declines, and if these ageist thoughts are not changed, they will believe the same things about themselves when they are older.

In older adults, their view on technology (and its uses and functions) and their views on their own abilities to navigate a digital world need to be changed. The usage and dependency on technology and the internet will not decrease in anyways, so the best way to address the digital divide is to give seniors more experience with technology. The reasons older adults tend to experience a "higher level of personal anxiety or stress and had limited self-confidence in dealing with new technologies" is because the lack of experience in actually dealing with technology hands-on left them with no real experience to pull from (Lee, Chen, & Hewitt, 2011, p. 1235). With more opportunities to work with devices hands-on, they will feel more comfortable with navigating them, and the greater sense of autonomy will help to shape their beliefs and perceptions about technology and the internet (Charmarkeh & Lagace, 2017). This would also mean that there need to be workshops, training sessions and displays more readily available for seniors to freely engage with technology in a low-pressure environment. Families and friends will also have to be prepared to provide seniors with the assistance and support they need during the process. Of course, the expectation here is not to push all the newest devices and technologies at seniors to incorporate into their lives. Instead, this is an attempt to decrease the levels of "frustration and anxiety on older adults when learning to use new computer-based technologies" because there are certain apps, devices, and platforms that do really have the potential of increasing the well-being and independence of seniors (Lee, Chen, & Hewitt, 2011, p. 1232). Instead of purely trying to increase the education level of seniors, the goal should be "to appeal to and attempt to increase general technical interest" (Friemel, 2016, p. 325). Friemel suggests promoting the benefits of technology through "persuasive messages" in order to change their perception of the functionality and applicability of digital devices and the internet. Society needs to work on changing ageist attitudes, and everyone needs to realize that seniors and

technology can and should mix. Basically, "the impact of technology anxiety, resistance to change, perceived benefit, and perceived barrier" are the aspects that must be considered when trying to change the ageist assumptions regarding technology (Nikou, 2015, p. 301). Any hope of changing these disparities in the long run needs to begin with targeting these deeper issues first. We cannot merely wait until the next global crisis to suddenly worry about these inequalities and discriminations in society, as it will be far too late to try and address it then. If nothing is done to combat the ageist thoughts that run rampant in this society and the digital divide that it has created, the same trouble discriminations will occur to future generations of seniors. These are ideas that are so deeply engrained in our minds that media and culture need to drastically change to actively address these issues. They will not merely go away as younger, tech-savvy cohorts become seniors because this type of discrimination stems from a much more profound and deep-seated disdain for ageing and mortality that will continue to isolate new generations of seniors for years to come.

Limitations

As it is with most research, there are limitations to the extent that this study could fully and comprehensively explore this topic of the digital divide and the ways seniors have been isolated because of technology. For one, no surveys or interviews could be completed for this research paper due to time constraints and pandemic regulations. As this was a relatively short research period, it would have been difficult to thoroughly analyze the collected data and code everything. On top of that, the COVID-19 pandemic that has built up so many barriers also restricted any chance of doing in-person interviews or survey distributions. As mentioned in the methodology section of this research paper, doing those types of methods purely online would leave out an

entire section of the senior population that is not comfortable using online and digital devices, eliminating them from sharing their experience. Considering that this research is looking at the ways technology has created barriers and isolated senior citizens, choosing to use a method that restricts the individuals who would probably experience the most isolation would be hypocritical and counterproductive. In the future, it would be useful to do research using those methods in person to get a better grasp of the experiences and opinions of present-day seniors. It would allow the individuals in those age cohorts to have a voice and point out their needs and suggestions, which would be the most productive way of identifying the most disabling barriers.

Another limitation of this research would be that the researcher is not a member of the senior cohort. Naturally, the research will also contain biases and pre-existing beliefs held by the researcher as no research can be fully free of bias. Without doing surveys and interviews, it is missing the voices of seniors that are currently experiencing COVID-19. Along with doing in-person methods that can actually get the voices and opinions of seniors, it would be beneficial to have a group of senior advisors that can critique the analysis and discussions being made by the research team.

As COVID-19 is an ongoing problem, the world is still rapidly changing and adapting to the pandemic. Throughout the past year and a half, so many adjustments have had to be made as to the severity and presence of variances came and went. There was research done during the pandemic but not nearly as much as what was done before, so as more statistics and research is done about a post-COVID world, the discussion and information are bound to change. As we are still in the midst of the pandemic, it is hard to gauge just how wide the digital divide has become during the pandemic in comparison to a pre-COVID society, as we know that the digital divide has existed long before this pandemic. For future research, it would be interesting to look into

how much the world has really changed when the pandemic is finally over. At this point in time, there is no telling what the "new normal" will be like even when society opens up again and social isolating will no longer be necessary.

<u>Conclusion</u>

In conclusion, this MRP research sought to explore the ways that seniors have been isolated and excluded because of the barriers created by society's dependence on technology. Especially in light of the COVID-19 pandemic, even more services, businesses and products have moved online to comply with social distancing and lockdown mandates. Seeing loved ones and other members of their social circle became increasingly difficult during this time, and since many older adults could not autonomously access online video calling platforms, the social isolation that had already been plaguing seniors grew exponentially worse. The digital divide that had existed since technology began to progress and advance at such a fast pace has never been wider. Digital technology and online platforms that had not been made accessible or user-friendly for disability groups naturally became some of the most unyielding barriers in this digital age. During that pandemic, the inequalities that had been so deeply rooted in our societies became glaringly obvious, and the minority groups that had been left in the periphery suffered the most. Unfortunately, the pandemic also greatly limited the methods and tactics we could use to combat the aspects of inequality that were now too clear and too striking to ignore. As the world begins to slowly regain control over this virus, the urgency to fix disparities and the responsibilities of every single one of us to make the necessary changes remains the same.

By looking at the different types of modern technology and barriers that they create through a critical disability lens, this research paper investigated the disabling nature of digital

divide and the ageist assumptions that fuel it. The barriers that were formed by technology were categorized into four factors: functional factors, structural factors, interpersonal factors, and intrapersonal factors. The intersectionality of so many other sociodemographic come into play when it comes to accessing technology and other digital platforms, and seniors tend to fall into many of the categories of people that face the most barriers when it comes to technology. The isolation of seniors takes part in many other sectors of our society as a whole, which is why the responsibility to fix this divide falls on everyone's shoulder. It is not purely up to one specific party to correct the divide, and as it intersects with many other factors, such as education level, financial level, or ethnicity, there are many other areas that need to be addressed. There are many other disability groups that could greatly benefit from more inclusive and universal designs. Being accommodating to the users of services or platforms is in-line with the views of accessibility and the essence of human rights in this country, which is why there should be no excuse to ignore the digital divide experienced by seniors any longer. There is a paradox that comes with the technology that has been discussed in this research paper. Yes, technology has isolated seniors greatly during this pandemic, but technology also has the potential and capacity to solve the issue of isolation as well. It is a matter of how and where we as a society go from here and whether we choose to decide to include or exclude the very cohort we will all one day grow to be a part of.

References

Angus, J. & Reeve, P. (2006). Ageism: A threat to "aging well" in the 21st century. *The Journal of Applied Gerontology, 25*(2), 137-152. doi:10.1177/0733464805285745

Ayalon, L., Chasteen, A., Diehl, M., Levy, B. R., Neupert, S. D., Rothermund, K., Tesch-Romer, C., & Wahl, H. W. (2021). Aging in time of the COVID-19 pandemic: Avoiding ageism and fostering intergenerational solidarity. *Journals of Gerontology: Psychological Sciences, 76*(2), e49-e52. [Editorial]. https://doi.org/10.1093/geronb/gbaa051

Callari, T. C., Ciairano, S., & Re, A. (2012). Elderly-technology interaction: Accessibility and acceptability of technological devices promoting motor and cognitive training. *Work 41*, 362-369. doi:10.3233/WOR-2012-0183-362

Canadian Charter of Rights and Freedoms, Part 1 of the Constitution Act, 1982, being Schedule B to the Canada Act 1982 (UK), 1982, c 11.

Charmarkeh, H. & Martine, L. (2017). Seniors and technologies: Issues of inclusion and exclusion. *Canadian Journal of Communication, 42*(2), 189-191. http://doi.org/10.22230/cjc2017v42n2e3277

Chen, L. (2020). Gerontechnology and artificial intelligence: Better care for older people. *Archives of gerontology and geriatrics, 91*, 1-2. https://doi.org/10.1016/j.archger.2020.104252

Davidson, J. & Schimmele, C., 2019. Evolving internet use among Canadian seniors. 11F0019M-427. *Analytical Studes Branch Research Paper Series.* 5-17. https://www150.statcan.gc.ca/n1/pub/11f0019m2019015-eng.htm.

Friemel, T. N. (2016). The digital divide has grown old: Determinants of a digital divide among seniors. *New Media & Society, 18*(2), 314-328. doi:10.1177/1461444814538648

Jaana, M. & Pare, G. (2020). Use of mobile health technologies for self-tracking purposes among seniors: A comparison to the general adult population in Canada. *53rd Hawaii International Conference on System Sciences,* 3760-3768. https://hdl.handle.net/10125/64202

Jackson, D. N., Trivedi, N., & Baur, C. (2020). Re-prioritizing digital health and health literacy in *Health People 2030* to affect health equity. *Health Communication,* doi:10.1080/10410236.2020.1748828

Jacobson, J., Lin, C. Z., & McEwen, R. (2017). Aging with technology: Seniors and mobile connections. *Canadian Journal of Communication, 42*(2), 331-357. http://doi.org/10.22230/cjc2017v4n2a3221

Klinenberg, E. (2016). Social isolation, loneliness, and living alone: Identifying the risks for public health. *American Journal of Public Health, 106*(5), 786-787. https://doi.org/10.2105/AJPH.2016.303166

Lassilia, O. & Hendler, J. (2007). Embracing "Web 3.0". *IEEE Computer Society, 11*(3), 90-93. doi:10.1109/MIC.2007.52

Lee, B., Chen, Y., & Hewitt, L. (2011). Age differences in constraints encountered by seniors in their use of computers and the internet. *Computers in Human Behavior, 27,* 1231-1237. doi:10.1016/j.chb.2011.01.003

Levy, S. R., & Macdonald J. L. (2016). Progress on understanding ageism. *Journal of Social Issues, 72*(1), 5-25. doi:10.1111/josi.12153

Losada-Baltar, A., Jimenez-Gonzalo, L., Gallego-Alberta, L., Pedroso-Chaparro, M. D. S., Fernandes-Pires, J., & Marquez-Gonzalez, M. (2021). "We are staying at home." Association of self-perceptions of aging, personal and family resources, and loneliness with psychological distress during the lock-down period of COVID-19. *Journals of Gerontology: Psychological Sciences, 76*(2), e10-e16. [Editorial]. doi:10.1093/geronb/gbaa048

McMurtrey, M. E., Zeltmann, S. M., Downey, J. P., & McGaughey, R. E. (2011). Seniors and technology: Results from a field study. *The Journal of Computer Information Systems, 51*(4), 22-29. Retrieved from: https://search-proquest-com.ezproxy.library.yorku.ca/docview/884811386/fulltext/F5D52DC207904822PQ/1?accountid=15182

Meilleur, M., & Ontario. (2006). *Accessibility for Ontarians with Disabilities Act, 2005 (AODA): 2006 annual report*. Toronto: Ministry of Community and Social Services.

Nikou, S. (2015). Mobile technology and forgotten consumers: The young-elderly. *International Journal of Consumer Studies, 39*, 294-304. https://doi.org/10.1111/ijcs.12187

O'Connor, S., Hanlon, P., O'Donnell, C. A., Garcia, S., Glanville, J., & Mair, F. S. (2016). *BMC Medical Informatics and Decision Making, 16*(120), 2-14. doi:10.1186/s12911-016-0359-3

The Parliament of Canada. (1985). Consolidated federal laws of Canada, Canadian Human Rights Act. Canadian Human Rights Act, R.S.C., 1985, c. H-6. https://laws-lois.justice.gc.ca/eng/acts/h-6/page-l.html.

Raymond, E. & Grenier, A. (2013). Participation in policy discourse: New form of exclusion for seniors with disabilities? *Canadian Journal on Aging, 32*(2), 117-129. doi:10.1012/S0714980813000135

Ronquillo, Y., Meyers, A., & Korvek, S. J. Digital Health. [Updated 2021 May 9]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing: 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470260/

Simpson, R. L., RN, C, DNAP, & FAAN. (2010). Technologies enable seniors to age in place. *Nursing Administration Quarterly, 34*(2). 178-182.

Smith, B. & Magnani, J. W. (2019). New technologies, new disparities: The intersection of electronic health and digital health literacy. *International Journal of Cardiology, 292*. 280-282. https://doi.org/10.1016/j.ijcard.2019.05.066

Smith, M. L, Steinman, L. E., & Casey, E. A. (2020). Combatting social isolation among older adults in a time of physical distancing: The COVID-19 social connectivity paradox. *Frontiers in Public Health, 8*(403). 1-9. doi:10.3389/fpubh.2020.00403

Sum, S., Matthews, M. R., Pourghasem, M., & Hughes, I. (2008). Internet technology and social capital: How the internet affects seniors' social capital and wellbeing, *Journal of Computer-Mediated Communication,* 202-220. doi:10.1111/j.1083-6101.2008.014337.x

Warchlewska, A. (2020). Will the development of cashless payment technologies increase the financial exclusion of senior citizens? *Acta Scientiarum Polonorum, Oeconomia, 19*(2), 87-96. https://doi.org/10.22630/ASPE.2020.19.2.21