Studying the Accessibility and Use of Digital Literacy Among Older Adults During a Global Pandemic

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ABSTRACT

Background: The COVID-19 global pandemic has demanded many individuals remain indoors and isolate from friends and family to keep safe. These long periods of isolation have led to loneliness and an overall shift in the way individuals communicate with each other. Digital media sources have become predominant forms of interaction and entertainment – but how are different age groups, specifically older adults managing this major digital media shift?
Objective: The purpose of this research is to identify digital literacy rates, uptake, and comfort levels within different demographic groups of the older adult population during a global pandemic.
Methods: The study was done using a survey designed using Google Forms. Digital copies (pdf files) of the survey were also emailed and hard copies were mailed in or filled in at local pharmacies with physical distancing measures in place. The survey took about five minutes to complete and consisted of demographic-based, knowledge-based and overall satisfaction-based questions.
Results: A total of sixty-five individuals completed the survey. The results of the survey were analyzed by conducting Chi-square tests using Microsoft Excel and RealStatistics. Six chi-square tests were conducted and analyzed. Three of the six chi-square tests resulted in statistically significant results where $p<0.05$. The three chi-square tests which resulted in statistically significant results were the associations between gender and level of comfort with technology ($p=0.02$), using a smart phone and level of comfort with technology ($p=0.09$), and level of education and level of comfort with technology ($p=0.019$).
Conclusions: Based on the results, there are different variables which make older adults more or less comfortable with technology use. Findings from this research will help incorporate techniques to educate and implement strategies to promote the use of digital media sources within the older adult population, especially in times of need such as during a global pandemic.

Keywords: older adult(s), digital literacy, COVID-19, pandemic, comfort, internet

INTRODUCTION

COVID-19 marks the largest pandemic since the 1918 H1N1 pandemic. Sources of information and media during the 1918 H1N1 pandemic were as simple as photographs, newspapers, speeches, books and art (Badsey, 2014). Whereas, with COVID emerging almost exactly a century after the last major pandemic, there has been significant development, acceptance and use of technology. Simple technologies such as basic Internet and cable, as well as more complex social media platforms such as Instagram and Facebook were not developed until after 1950s (Cuthbertson, 2019). The norm in 2021 has shifted from face-to-face in person interaction to video-calling, instant messaging, and meeting virtually with friends, families and colleagues. These forms of communication and media have become more prevalent now than ever before, due to the physical distancing measures that are in place to reduce the spread of COVID as well as the increasing need to maintain social interactions for good mental health. There has been a complete societal shift to stay safe where many individuals are staying home, relying on technology for work, school and virtual doctor's visits (George-Cosh, 2020).

An interest in this topic arose during practical experience at a pharmacy with the development of a new pharmacy phone application and working with a range of age groups. The phone application was developed to help patients refill their prescriptions and contact doctors virtually, which would ultimately save patients time waiting at the pharmacy. The application was developed as a convenient tool for patients as well as to help increase safety measures during the pandemic. The application would ensure there was less direct contact with patients. However, from practical experience, there has been much witnessed frustration, stress and lack of understanding around how to use the phone application, specifically in the older adult population and when compared to the general adolescent and middle-aged groups.

LITERATURE REVIEW

The importance of this research is to understand the challenges faced by the older adult population in relation to digital literacy, how these challenges effect their lives and most importantly how to implement change in the older adult community in relation to health promotion strategies and digital literacy in a developed world during a pandemic.

It is important to note, that much of the current literature that exists on digital literacy in older adults is focused on general health-related measures or relates to the general acceptance of information and communications technology (ICT) networks within the senior population. Whereas literature specifically relating digital literacy, pandemics and older adults is virtually non-existent. The possible reason for the lack of information related to pandemics might be due to the quick and very recent transitions to primarily online platforms.

Study Population

From 2000 to 2020, the proportion of total Canadians aged 65 and older increased from 12.6% to 18% (Statistics Canada, 2020). These statistics represent an aging population

where the senior Canadian group is growing as the other age groups proportionately represent less of the total Canadian population over the years. Similarly, in China in 2018, individuals aged 65+ represented 26% of the total population (Sun, 2020). These statistics highlight the importance of looking at the older adult population for the purpose of this research as they may be a good representation of the general global older adult population.

COVID-19 and Isolation

With the emergence of COVID-19 pandemic in the last year, there have been a number of challenges, specifically related to mental health and overall quality of life (WHO, 2020). For the older adults, social participation and the number of friends they have are important reflectors of their quality of life, and these social interactions can be increased with the use of Internet (Sun, 2020). Public health actions to physically distance and reduce physical contact with friends and families has been an adjustment for everyone, specifically for the older adults who may have only had social interactions via physical connections or meeting with friends prior to the pandemic (CDC, 2020, July). Many seniors also live alone due to the loss of family members and face other health factors such as hearing loss and chronic illness, which further increases their risk for loneliness and social isolation (CDC, 2020, November). It is also important to note that individuals may feel lonely without being socially isolated from their friends and family (CDC, 2020, November). In addition to this, older adults have been considered to be a vulnerable group for COVID-19 as they are at increased risk of severe disease outcomes (Government of Canada, 2020). Therefore, this vulnerable group is more likely to spend more time being isolated for longer periods than the general population during a pandemic, which could lead to further social disconnection, loneliness, depression, and anxiety (ABC Life Literacy Canada, 2020). During the pandemic, some seniors have reported that the loneliness itself feels like a disease as they have "nothing to look forward to" (Welsh, 2020). It is important to recognize that during stressful times such as a pandemic, everyone will cope with stressors differently (CDC, 2020, July).

Older Adults and Internet Use

According to Statistics Canada, from 2007 to 2016, internet use doubled from 32% to 68% among Canadians aged 65 and older while in comparison, internet use in middle-aged and younger seniors was much higher (Schimmele, 2019). These statistics may be an indication that Canadian seniors are willing to learn and uptake Internet use as part of their lives. A study conducted in 2020 in China found that 38.6% of seniors used the internet (Sun, 2020). Interestingly, global rates of social media usage, specifically with Facebook, had also increased by 20% for the 65+ age group and this made up about 5% of total users of social media (Dascălu, 2018). However, has there been more or less uptake of digital literacy in the general senior population, and has it enabled them to maintain their social interactions and quality of life prior to the pandemic? Are digital sources of communication and information easily accessible to the older adults, and if not, who is there to help them? These are all questions that will be examined throughout this research.

Using ICT for health services was seen as being more cost-effective for older adults as opposed to in-person services (Heart, 2011). However, the use of ICT in the older adult population in the literature overall did not seem to be well-adopted, and this may be due to a multitude of factors. One study found that "although there (had) been some increase in adoption of modern technologies, including ICT, most of the barriers… are still valid" (Heart, 2011). The main reason individuals in this study did not adopt to modern technology was non-use due to 'no interest' or 'no need' (Heart, 2011). Similarly, in a study conducted in Sweden, older adults and people with functional limitations were increasingly recognized as not participating in mainstream usage of ICT (Melander-Wikman, 2008). A trend found in the study conducted in China was that low economic development resulted in lower rates of Internet use within the older adult population (Sun, 2020). Along with this, greater Internet usage was also correlated to higher education and income (Sun, 2020).

Eurostat reports indicated that age and level of formal education also impacted Internet usage patterns and that there was a major divide between generations (Dascălu, 2018). This information suggests that there was a gap between which digital literacy tools are available and how they are made accessible to people of different ages and education levels and is also known as the "digital divide". The term "digital divide" is scholarly debated and may seem stereotypical where younger people are described as being digital natives and older adults are described as digital immigrants (Kania-Lundholm, 2015). This term can have negative implications on the older adult population, who may then perceive digital literacy as intimidating which could ultimately restrict how much they are willing to learn. This term may be a good representation of Canadian seniors and is a factor that will be explored further.

As also described by Statistics Canada, there may be a variety of reasons why older adults have lower rates of Internet use such as sociodemographic differences in exposure to information communication and technology (ICT), differences in educational attainment, as well as a function of the aging process such as age-related declines in interest in using the Internet or health problems (Schimmele, 2019). This would be an area to explore during surveying as it would be interesting to understand other reasons why there are lower rates of internet use among senior groups from their perspective. A better understanding of why seniors do not use the Internet or other ICT services could help implement health promotion programs.

It is important to note that differences between older adult age groups may show different levels of uptake and comfort with technology and internet use. In a study conducted in the United States, the percentage of seniors aged 65 and up that own smartphones increased from 18% in 2013 to 42% in 2016 (Anderson, 2019). Even more interesting to note, is that "smartphone ownership among seniors varies substantially by age", where 59% of 65- to 69- year-olds owned smartphones, versus only 17% of those aged 80 and older (Anderson, 2019). The reason for this difference in older adult age group uptake of smartphone use is a gap in the literature that will be explored further

for this study – whether occupation plays a role in level of comfort or knowledge of internet services.

After review of the literature, some of the reasons why older adults enjoyed using ICT from the study in China was that they were able to chat with their friends, watch the news and listen to music (Sun, 2020). Older adults were also more likely to use Internet if they were motivated through peer support and encouragement (Sun, 2020). From the study conducted in Sweden, older adults were accepting of ICT measures as empowering tools such as mobile safety alarms (Melander-Wikman, 2011). The older adults also used the Internet to obtain health-related information about food, drugs and diseases (Sun, 2020).

Most of the studies conducted used surveys or questionnaires as a means of collecting the data. The study conducted in China used a multitude of survey questions included demographics and socioeconomic status, situations around older adults and the use of the Internet, as well as assessed the need for digital health technologies for older adults (Sun, 2020). Although a lot of information was covered in the surveys, a gap in the literature would be how all these survey questions relate to current times, during a pandemic.

One of the most important benefits of older adults being able to use technology, especially during a pandemic is the ability for them to stay connected to friends and family because it allows them to socialize without risking their health (Dascălu, 2018). Higher levels of internet use were also significant predictors of higher levels of social support and reduced loneliness (Sun, 2020). Overall, there was great potential for improving seniors' quality of life by implementing ICT services that are built specifically for them (Dascălu, 2018).

In 2019, Statistics Canada reported that "Canadian seniors were less likely to report that technology makes their life better and less likely to use ICT to communicate with people, make informed decisions or save time" (Schimmele, 2019). It would be interesting to understand if there has been a shift in acceptance of ICT since the start of the pandemic, especially with individuals being forced to adapt to new forms of communication other than physical contact, with the quick emergence of COVID. This lack of information related to the pandemic is currently a major gap in the literature, most probably having to do with the quick and recent emergence of the pandemic as well as the adaptations that individuals made respectively.

A review of the literature ensured a thorough understanding of the benefits as well as limitations faced by seniors in relation to ICT use and where the gaps are currently. As a review of the literature presented, the main gap that exists in the literature is that there is no current research on the topic of digital literacy/ICT in senior populations during a global pandemic. The main focus of this study is digital literacy uptake and comfort within the older adult age groups.

MATERIALS AND METHODS

Materials

The materials that were used for this study was a computer for data collection and

for statistical analyses. The computer stored data on a password-protected hard drive. Other materials that were used was a cell phone, paper and printer. The statistical analyses were conducted using Microsoft Excel and RealStatistics. A free online survey platform, Google forms, was also used for this research.

Methods

The standard methods used for this study created by the author using Google forms was a survey using Google Forms (https://forms.gle/zPK2caganBKkdCFQ6). Other methods used were emailed pdf digital copies of the survey as well as hard paper copies (mailed in/filled at the pharmacy). The Google Form Survey was open for three weeks from January 26 to February 16, 2021. The survey was distributed via email to pharmacies, former colleagues' friends and families and senior/care homes in Vancouver and Ottawa. The majority of participants completed the survey online (about 85%), five hard-copy surveys were filled in at the pharmacy (7.5%) and five surveys were submitted via hard copy and mailed back to the researcher (7.5%).

The survey was voluntary and conducted on randomly selected older Canadian adults aged 65 years and older. The survey consisted of demographic-based, knowledge-based, and overall satisfaction-based questions. The demographic-based questions were collected to assess whether there were differences of level of digital literacy uptake between different age groups, education level, gender or ethnicity.

Inclusion and Exclusion Criteria

Participants were Canadians aged 65 and older. No friends and family of the researchers filled out the survey.

Ethical Considerations

According to the BCIT Research and Ethics Board, all surveys that involve human participants require Research Ethics Board approval (BCIT, 2020). All data that was collected for this survey was kept confidential and anonymous. A cover letter which includes a brief introduction to the study and its purpose was read by each participant prior to initiating the survey. A consent form was filled out by each participant prior to initiating the survey. In order for the participant to continue on with the survey questions, consent was first required. Individuals had the choice of skipping questions or not answering. Information was gathered by the researcher and kept on a password-protected hard drive.

Survey questions were approved by the BCIT Research and Ethics Board before the Google Form survey was published and before the electronic and paper surveys were distributed. The issues which were considered for this research include beneficence ("Do Good" or "Protect from Harm"), respect and autonomy ("informed consent") and confidentiality and anonymity (BCIT, 2020).

RESULTS

Description of Type of Data Collected

The demographic section included binary and multichotomous questions. Survey questions included multichotomous nominal

(non-numerical) questions. These types of questions were close-ended and specific, where the respondent must choose only one of two or more possible alternatives. There was also open-ended multiple select questions in which individuals were asked to "select all that apply". These questions also allowed the participant to explain their answer if they wished to (either within the question or in a separate "please explain" section) with a space for comments. Multichotomous ordinal questions were asked as a means of measuring knowledge and comfort levels with Information and Communication Technology (ICT). These questions were scaled (for example, not comfortable, low comfort, moderate comfort, high comfort level). All questions that included numbers (i.e., age) avoided overlapping and were mutually exclusive. All questions included a "prefer not to answer" response to ensure individuals were aware they did not have to answer every question.

Statistical Test Used

Chi-square tests were completed on six null and alternative hypotheses as part of the inferential statistics. These tests were used to determine whether there were associations between multiple dependent and independent variables.

Statistical Package Used

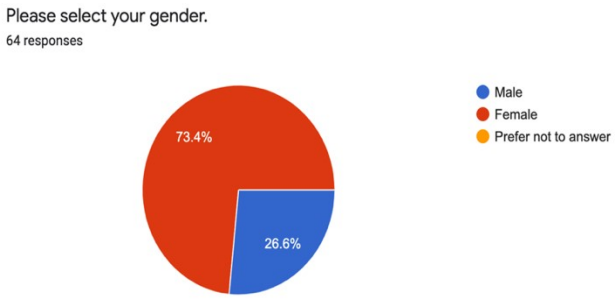
The statistical package used for data analyses was an Excel add-on, Real Statistics.

Descriptive Statistics

All descriptive statistics were generated using Google Forms. Demographic statistics were displayed as pie charts to represent the distribution of responses by each group. Non-numerical nominal data was tabulated and presented as pie charts and bar graphs, such as information related to country of birth. Questions that had multiple responses (those that asked "check all that apply"), such as the reasons why someone may not use the internet, were also displayed using bar graphs.

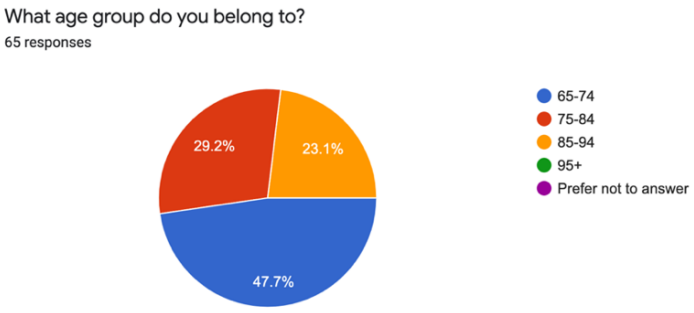
There was a total of 65 survey responses (N=65). The following two figures describe the gender and age distributions of the survey population.

Figure 1. Gender (Pie Chart)



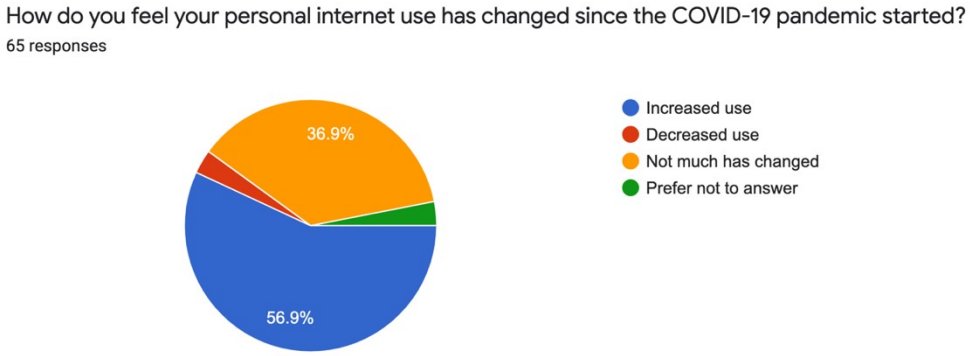
For gender, 73.4% (N=47) of the respondents were female, while 26.6% (N=17) were male, and one individual did not respond to the question.

Figure 2. Age Group (Pie Chart)



Most respondents were aged 65-74 (47.7%, N=31) and no respondents were aged 95+ (Figure 2).

Figure 3. Internet Use Change Since COVID-19 Pandemic (Pie Chart)



57% of individuals stated that their personal internet use had increased since the COVID-19 pandemic started (N=37) and that they would want to learn more about internet services (N=37) (Figure 3, Figure 4). Those who wanted to learn more about the
internet responded that the reason they wanted to learn more was due to "social interaction with family and friends" (91.4%, N=32) (Figure 5).

Figure 4. Wanting to Learn More about Internet (Pie Chart)

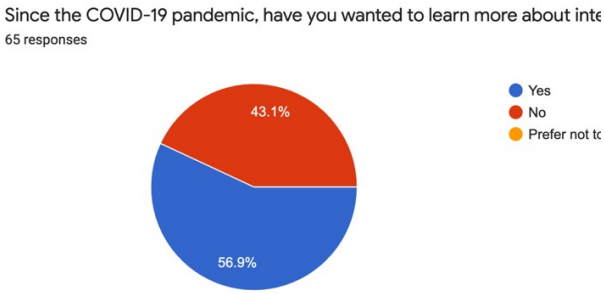
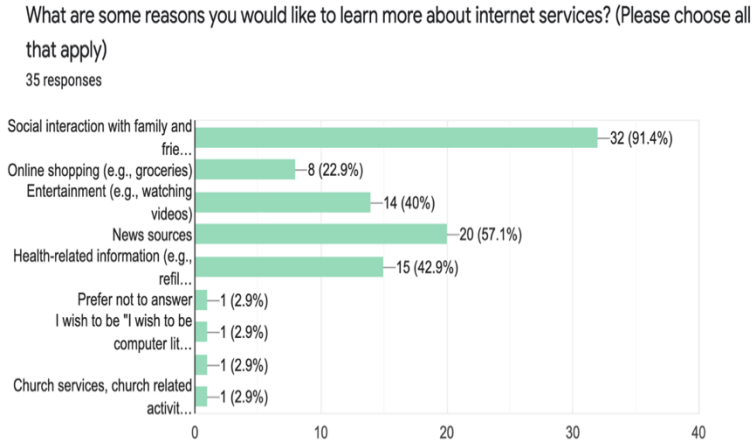


Figure 5. Reasons to learn more about internet services



As for level of stress since COVID-19 started, most individuals responded, "not much has changed" (57.8%, N=37). Slightly over half of the participants owned a smart phone (52.3%, N=34). Also, 56.9% (N=37) did not have to use a computer for work purposes (currently or in the past) (56.9%, N=37). Many participants did not feel that current online services were optimized to suit their need (44.6%, N=29). Table 1 displays the responses in relation to assistance with online/internet services and Table 2 displays responses related to level of comfort with the internet.

Table 1. Assistance with Internet

Do you require assistance with the internet?	**Percentage**
Yes	46.2%
No	21.5%
Maybe	3.1%
Of those who (may) require assistance (49.3%), is there someone who can assist you?	
Yes, I get all the help I need	51.8%
Yes, I get some help but not as much as I would like	36.5%
No, I do not have anyone who could help me	7.1%
Prefer not to answer	3.6%

Table 2. Level of Comfort with Internet

Level of comfort with Internet	Percent
Not comfortable at all	27.7%
Low comfort	27.7%
Moderately comfortable	24.6%
Comfortable	6.2%
Very comfortable	12.3%
Prefer not to answer	1.5%

Inferential Statistics

Six chi-square tests with significance level of 0.05 (5%) were used to determine the association between variables of interest. The first association of interest was the association between age and level of comfort with the internet. A total of 65 individuals filled out the survey. Data was organized and analyzed for multiple chi-square analyses by collapsing the original data and creating fewer categories. For example, level of comfort was re-analyzed by creating two categories from the six original categories (e.g., "not comfortable" responses with "low comfort responses" to create "uncomfortable" category). The age categories were also combined to make two categories instead of five.

Statistical Analysis

Null hypothesis 1 (H_o1): There is no association between age group and comfort level with technology

Alternative hypothesis 1 (H_a1): There is an association between age group and comfort level with technology

Interpretation of results (H_a1 and H_a1): Chi-square test was conducted (p=0.146). Therefore, do not reject H_o and conclude that there is no association between age group and level of comfort with technology/internet. The "prefer not to answer" responses were also removed for comfort level. Age was categorized into two groups (age 65-74 and age 75+). A larger sample would have perhaps resulted in statistically significant results.

Null hypothesis 2 (H_o2): There is no association between age group and wanting to learn more about technology

Alternative hypothesis 2 (H_a2): There is an association between age group and wanting to learn more about technology

Interpretation of results (H_a2 and H_a2): Chi-square test was conducted (p=0.29). Therefore, do not reject H_o and conclude that there is no association between age group and wanting to learn more about technology. Age was grouped into two categories (age 65-74 and age 75+). The "prefer not to answer" responses were removed for the "wanting to learn more" data. Perhaps with a larger N, there would have been statistically significant results.

Null hypothesis 3 (H_o3): There is no association between gender and level of comfort with technology

Alternative hypothesis 3 (H_a3): There is an association between gender and level of comfort with technology

Interpretation of results (H_a3 and H_a3): Chi-square test was conducted (p=0.02).

Therefore, reject the H_o and conclude that there is as association between gender and level of comfort with technology/internet. The data was analyzed by collapsing the categories for level of comfort into 2 groups: "not comfortable" and "comfortable". Males were more likely to be comfortable with the internet/technology (66.6%) versus females (34.8%). Disproportionate gender groups likely resulted in lower power.

Null hypothesis 4 (H_o4): There is no association between using a smart phone and comfort level with technology/internet

Alternative hypothesis 4 (H_a4): There is an association between using a smart phone and comfort level with technology/internet

Interpretation of results (H_a4 and H_a4): Chi-square test was conducted (p=0.009). Therefore, reject H_o and conclude that there is an association between using a smart phone and comfort level with technology/internet. Those with smart phones were more comfortable with technology/internet. The response "prefer not to answer" was removed from the analysis. The two groups analyzed for comfort level were "not comfortable" (including the original "low comfort" and "not comfortable" groups) and the second group was named "comfortable" (including the original "moderately comfortable", "comfortable" and "very comfortable" groups).

Null hypothesis 5 (H_o5): There is no association between age group and level of internet use since the pandemic started

Alternative hypothesis 5 (H_a5): There is an association between age group and level of internet use since the pandemic started

Interpretation of results (H_a5 and H_a5): Chi-square test was conducted (p=0.20). Therefore, do not reject H_o and conclude that there is no association between age group and level of internet use since the pandemic started. Age group was divided into 2 groups (age 65-74 and 75+).

Null hypothesis 6 (H_o6): There is no association between level of education and comfort with technology/internet

Alternative hypothesis 6 (H_a6): There is an association between level of education and comfort with technology/internet

Interpretation of results (H_a6 and H_a6): Chi-square test was conducted (p=0.019). Therefore, reject H_o and conclude that there is an association between level of education and comfort level with technology/internet. Education was divided into 2 categories: "some college or less" and "some university or more". Comfort level was also divided into 2 categories: "not comfortable" and "comfortable". Individuals who had some university or more level of education experienced higher comfort level with technology.

Three of the six null hypotheses (#3, 4, and 6 from above) resulted in statistically significant results. Number three found an association between gender and level of comfort with the internet, number four found an association between smart phone use and

level of comfort with the internet, and number six found an association between level of education and comfort with the internet. From these three results, it could be concluded that there are variables within the older adult population which affect their comfort level with internet during a global pandemic. The non-statistically significant results (#1, 2 and 5 from the above table) where the null hypotheses were not rejected also display some valuable information which will be discussed further.

DISCUSSION

Although the results from the first chi-square test (#1) were not statistically significant, it is interesting to note that 46.7% of the younger respondents (age 65-74) had moderate to high comfort level with the internet while almost two-thirds (64.7%) of those in the older age group reported low to no comfort with internet. These results agree with past literature where adults in the younger age group showed to be more comfortable with the Internet than the older age group (Anderson, 2019).

These descriptive results coincide with the descriptive results of the second hypothesis (#2) where wanting to learn more about the internet was more prevalent in the younger age group versus the older age group: 56.7% of those aged 65-74 (in the younger group) wanted to learn more compared to only 39.4% of those aged 75+ (in the older age group). Both these findings suggest that the older group may perceive themselves as not being comfortable or may believe they are not capable of learning technology at their age versus those in the younger adult age group who are more comfortable and willing to learn.

The statistically significant results of the fourth hypothesis suggest that there is an association between smartphone use and level of comfort with the internet – individuals who use a smart phone are more likely to have moderate to high level of comfort with the internet. Although the results were not statistically significant, an interesting result of the fifth chi-square test is that those in the older age group (75+) 48.5% responded “nothing has changed” versus the younger age group (27.7%). These results suggest that despite the difficult situation of the pandemic, older adults have not been able to access or are not willing to learn more about internet services. In other words, their experience with the internet has not changed because of the pandemic.

These differences in comfort level between age group and smartphone use align with the timing of when the Internet became commonly used which was in the in the late 1980s into the 1990s - roughly 30 to 40 years ago (Lee, 2014). During this time, the 65- to 69-year-olds would have roughly been in their 20s and 30s, which is a time of post-secondary education and career development. Therefore, the difference in senior age group and level of technology uptake suggests that there is a factor that makes younger seniors more likely to adapt to and use technology and internet versus those in the older senior age group. One of the factors may simply be that during the time Internet use was becoming widely adopted, the 90-year-old and older group may have been in their 60s and comfortable and happy with their lives without having to incorporate something new

such as the Internet – which could be complicated to learn at that age. Some of the other factors that could affect differences in level of Internet use between senior age groups includes occupation and level of education, where individuals who are in the younger age group (65 to 69-year-olds) may have been required to learn technology as part of their job.

As mentioned in the descriptive statistics, the most common reason why older adults used internet sources was to contact and chat with loved ones and watch the news. These findings agree with the findings from the literature where some of the main reasons older adults used ICT from the study in China was that they were able to chat with their friends and watch the news (Sun, 2000).

Another subject of this study which agrees with the literature is that of those individuals who did not use the internet, two of the three most prevalent answers were "trouble understanding how to use it" (45.5%) and "do not need to use it/content without it" (40.9%). These findings coincide with the Heart study conducted in 2011 where individuals did not adopt modern technology due to "no interest" or "no need" (Heart, 2011).

One of the most interesting findings of the study and which will be used for knowledge translation is that many participants (59.6%) wanted to learn more about internet services since the start of the pandemic. This finding agrees with past literature, where older adults are more willing to learn about internet and social media platforms (Dascălu, 2018). The results of this study suggest that more services are required to teach older adults about internet and that the pandemic did in fact affect older adults' willingness or wanting to learn about the internet.

The results may not be as reliable or valid as the results could have been if the sample size was larger. A sample size of 65 is small considering the number of categories that some questions had. Survey questions that had lots of categories and may have resulted in more statistically significant (descriptive and/or analytical) results were questions related to age, education, occupational level and comfort level. If there were more responses, there would be higher validity of the study results. The methodological limitation of the study was the study design itself. Although survey participants could have completed the survey via paper copy, most responses were completed online for convenience during the pandemic. Since the study responses were mostly completed online, this may have resulted in a decreased number of responses from individuals who were not comfortable using the internet to complete the survey. This could have contributed to biasing the study results where more individuals who were comfortable with using computers were the individuals more likely to complete the survey. Therefore, possible low external validity resulted from this study (Personal Communication, 2020). The results of this study would be generalizable to the Canadian population of older adults (aged 65+). The results may be more generalizable to females versus males due to the high proportion of female responses (73.4%) versus male responses (26.6%).

KNOWLEDGE TRANSLATION

It is important to note the major benefits of ICT in relation to health and accessible resources. For the older adults specifically, ICT applications can increase quality of life by "involving facilitating independent living, promoting social integration, enhancing opportunities for learning to control chronic diseases at a distance, and training and increasing availability and quality of care and technical assistance" (Vimarlund, 2005). In addition to these factors, ICT for older adults' care can be viewed as a new way of providing more home care services more frequently and can help provide long-term, cost-effective home care (Vimarlund, 2005). Another benefit of ICT services would be improvements in current care homes with the ability for older adult clients to follow-up and evaluate the performance of the health services they are provided (Melander-Wikman, 2011). It is important to note that a large proportion of the study participants did not feel that internet services were available to serve their needs (44.6% responded not suited for their needs and 29.2% stated that services somewhat suit their needs). Therefore, communicating with older adults about what they need in terms of internet services could also help guide new policies and tools to ensure they are suited for them in the future.

To translate this knowledge from research into practice, this research was conducted to better understand digital literacy in the senior population to make it more accessible, adaptable and manageable for them. Environmental Health Officers and other stakeholders could implement programs to promote acceptance and effective use of digital literacy in the senior population, especially during emergency situations. The findings from this study suggest that older adults can learn more about digital literacy services (if they wish to) to improve their overall quality of health and reduce the "digital divide" that acts as a barrier to access internet.

LIMITATIONS

Many limitations were present throughout the research study. The online self-administered surveys could have resulted in survey fraud, where survey participants may have answered incorrectly to answers or given fake answers (Howard, 2018). Survey fraud relates to the way in which individuals responded to the questions. For example, if the questions were too difficult or if the individual was simply clicking answers to get to the end, then they may have clicked on random answers. One of the main barriers which lead to multiple limitations was the physical distancing measures in place due to conditions of the pandemic. The circumstances of not being able to physically visit care homes and hand out paper copies of the survey to the representative sample limited the response rate for the survey. Although many individuals were not able to complete the survey independently, family members and friends were able to assist them. Time was also a limitation of the study, where the survey was open for a short period of time (3 weeks). If the survey was open for longer, this could have resulted in a larger sample size and hence improved external validity.

FUTURE RESEARCH

Ideas for future student research projects are as follows:

- Studying Vaccine Hesitancy among Older Adults During a Global Pandemic
- Studying Digital Literacy among Older Adults During a Global Pandemic (online survey along with in-person interviews)
- Studying the Mental Health effects among Older Adults After a Global Pandemic
- Survey the Older Adult Age Group to Identify which areas of the Internet they would like to learn and what their digital literacy needs are
- Complete the study post pandemic and in person to find out more about digital literacy in general

CONCLUSIONS

The aim of this research was to understand the knowledge and comfort level with digital literacy of the older adult population during a global pandemic and understand any barriers to accessing technology. This research ultimately provided practical knowledge to help encourage incorporating internet use for older adults in a way that enables them to educate themselves, communicate with their loved ones, and save them healthcare costs. This knowledge translation can include multiple stakeholders who can help create promotional tools to teach older adults about technology as a part of a healthy built environment approach. Since many individuals from the study concluded that recourses were not currently available to suit their needs, it would be important for future research to focus on what those needs are and to incorporate that into health promotion strategies.

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ABBREVIATIONS

ICT: information and communications technology

COMPETING INTEREST

The authors declare that they have no competing interests.

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