

Older Adults' Use of and Interest in Technology and Applications for Health Management: A Survey Study

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ABSTRACT

Background: Older adults face challenges with managing their medications, obtaining health education, and accessing health services. Mobile health (mHealth), defined as any medical or public health practice facilitated through mobile devices, could help to overcome these difficulties.

Objectives: To determine what technologies and apps are in current use by older adults, to explore the types of technologies and apps that may be of interest to people in this age group, to explore concerns about technologies, and to examine any age-related differences.

Methods: Adults 60 years of age or older were invited to complete a 35-item electronic survey, in either French or English, which was distributed through social media and by email from organizations working with older adults. The survey was conducted in mid-2020.

Results: A total of 266 respondents completed some or all of the survey. Most participants had a mobile phone (229/243, 94.2%), and approximately one-third (78/222, 35.1%) had used a health-related app in the previous 12 months; this level of usage was consistent across age groups. Most respondents were interested in using an app to improve their health (171/225, 76.0%), with variation by age: highest among those 60–64 years of age (82/95, 86.3%), lower among those 80 years or older (40/52, 76.9%), and lowest among those 65–69 years of age (6/14, 42.9%). Most older adults were interested in using an app to ask questions of pharmacists (161/219, 73.5%) and to review their medications (154/218, 70.6%). Participants' mHealth concerns focused on costs, disclosure of personal information, effectiveness, usability, and endorsement by health care providers. The study limitations included challenges related to electronic recruitment and survey distribution, as well as a high representation of participants with postsecondary education.

Conclusions: These findings suggest that a substantial proportion of older adults are already using and are interested in using mHealth for health information, to ask questions, and/or to review their medications with a health care team member.

Keywords: older adults, mobile health (mHealth), apps, electronic health (eHealth), medication, seniors

RÉSUMÉ

Contexte : Les personnes âgées sont confrontées à des difficultés pour gérer leurs médicaments, s'informer sur la santé et accéder aux services de santé. Les applications de « santé mobile », définies comme toute pratique médicale ou de santé publique facilitée par des appareils mobiles, pourraient aider à surmonter ces difficultés.

Objectifs : Déterminer quelles technologies et applications sont actuellement utilisées par les aînés; examiner celles qui pourraient être intéressantes dans cette tranche d'âge; étudier les préoccupations concernant les technologies et examiner les différences liées à l'âge.

Méthodes : Des adultes d'au moins 60 ans ont été invités à répondre à un sondage électronique comprenant 35 questions en français ou en anglais. Ce sondage, mené à la mi-2020, a été diffusé par des organismes travaillant avec des aînés via les médias sociaux et par courriel.

Résultats : Au total, 266 participants y ont répondu en partie ou en totalité. La plupart des répondants avaient un téléphone portable (229/243, 94,2 %) et environ un tiers (78/222, 35,1 %) avaient utilisé une application liée à la santé au cours des 12 derniers mois; ce taux d'utilisation était constant tous groupes d'âge confondus. La plupart des répondants souhaitaient utiliser une application pour améliorer leur santé (171/225, 76,0 %), avec des variations du taux d'utilisation selon l'âge : le plus élevé chez les 60 à 64 ans (82/95, 86,3 %), un peu moins chez les 80 ans ou plus (40/52, 76,9 %), et le plus bas chez les 65 à 69 ans (6/14, 42,9 %). La plupart des personnes âgées souhaitent utiliser une application pour poser des questions aux pharmaciens (161/219, 73,5 %) et pour s'informer sur leurs médicaments (154/218, 70,6 %). Les préoccupations des participants en matière de « santé mobile » portaient sur les coûts, la divulgation d'informations personnelles, l'efficacité, la convivialité et l'approbation par les prestataires de soins de santé. On notera, parmi les limites de l'étude, les défis liés au recrutement électronique et à la distribution électronique des sondages, ainsi qu'une forte représentation de participants ayant fait des études postsecondaires.

Conclusions : Ces résultats portent à croire qu'une proportion importante d'adultes âgés utilisent déjà la technologie de « santé mobile » et souhaitent l'utiliser pour obtenir des informations sur la santé, poser des questions et/ou s'informer sur leurs médicaments auprès d'un membre de l'équipe de soins de santé.

Mots-clés : personnes âgées, santé mobile (mHealth), applications, santé électronique (eHealth), médicaments, aînés

INTRODUCTION

New Brunswick has the highest proportion of persons 65 years of age or older in Canada.¹ In 2021, nearly one-quarter (22.4%) of the provincial population was 65 or older,² a proportion that is expected to increase to 32.4% by 2043.¹ Of New Brunswick residents in this age group, 39% have at least 3 chronic diseases, and this proportion is also projected to increase over time.¹ As of 2010, adults with chronic disease were consuming 64% of health care resources,³ and this high level of consumption coincides with increased health care costs over the past decade.¹

New Brunswick has high levels of need because of health care unavailability and long wait times, particularly in rural areas.⁴ Approximately 47% of those 65 or older live in rural communities, in contrast to 20% across Canada,¹ and health disparities exist between rural and urban communities. Fewer health care providers in rural areas means fewer support options for older adults.¹ Lack of transportation options is also an issue in both urban and rural New Brunswick.¹

Alternative methods of providing care are needed, in light of the identified need to improve timely access to care for older patients³ and the shortage of primary health care providers in New Brunswick.⁵ The New Brunswick Health Council identified 4 initiatives to improve care for older adults in the province, one of which was self-management, which could include online tools to enable patients to access their health information or a health system that provides up-to-date information for self-management.³ However, empowering patients in their own care is offset by findings of low health literacy in the older adult population. Two-thirds (60%) of Canadian adults⁶ and 88% of those older than 65 have low health literacy.⁷ The Canadian government's goal of establishing high-speed internet access for all Canadians by 2030 offers an opportunity to establish mobile health (mHealth) practices to improve health literacy and to better educate, engage, and empower Canadians in their own care.⁸

The COVID-19 pandemic has driven health care providers to incorporate virtual care into their practices. Virtual care can facilitate access to health care providers⁹ and can help overcome the challenges faced by older adults in rural areas or in areas with transportation issues. The World Health Organization considers mHealth to be any medical or public health practice facilitated through mobile devices (e.g., mobile phones, patient monitoring devices).¹⁰ Virtual care, including mHealth interventions to help provide education and facilitate self-management, may represent a novel mechanism to increase health care access for older adults.

In the United States, 42% of adults older than 65 years own a smartphone, and individuals between 65 and 69 years of age self-report higher smartphone usage than those older than 80 (59% versus 17%).¹¹ Greater smartphone ownership also is associated with higher income and education.¹¹ In addition, research suggests that use of mobile technologies

may improve chronic disease outcomes in older populations.¹²⁻¹⁴ Less information is available about the use of mobile applications (apps).

Limited data exist regarding older adults' use of mHealth in Canada. In one study, the feasibility and acceptability of mHealth interventions was investigated in older adults with a recent fracture.¹⁵ Most owned a mobile device and were somewhat interested in mHealth technology. In contrast, a survey of primary care clinics in low- and middle-income areas found that less than half of participants older than 70 years were interested in mHealth.¹⁶ Privacy concerns and lack of face-to-face communication with clinicians were noted as reasons.¹⁶ Neither study explored what older adults would like from a mobile app or mHealth technology.

The aforementioned Canadian studies were conducted in large urban centres,^{15,16} which limits their generalizability to rural areas. Additionally, little is known about the use of health technology, mHealth, smartphones, and apps, or the barriers to their use, among older adults in New Brunswick. In that province, pharmacists play a key role in medication education, yet there are no studies assessing patients' interest in mHealth pharmacist services. Thus, the objectives of the current study were as follows:

- To determine what mobile technologies and apps are currently used by older adults in New Brunswick.
- To explore the types of technologies or apps that may be of interest for health and medication management.
- To explore concerns related to these technologies.
- To examine age-related differences among older adults relating to app use on devices, interest in using health-related apps, and interest in using an app to ask pharmacists questions and review medications.

METHODS

Participants

Although people are considered senior citizens at age 65, the survey was open to anyone over the age of 60, given that these patients will be approaching the age of 65 by the time resources suggested by this research will have been developed and launched.

Survey Instrument

The survey used in the current study was based on an existing 25-item survey that inquired about mobile phone and app usage.¹⁷ Given that New Brunswick is a bilingual province, the survey was made available in English and French. Wording was modified to align with the ethnic group identities used by Statistics Canada,¹⁸ and app-specific questions were added (e.g., "What particular health-related app feature do you think would be useful?"). The survey is available from the corresponding author upon request.

The final survey consisted of 35 questions. Section 1 sought demographic and clinical information: location

(urban/rural), sex on birth certificate, gender identity, ethnic identity, language, relationship status, household income, education, medical conditions, and number of daily medications. Section 2 asked about mobile phone and app usage, as well as interest in using apps for health management, to learn about medications, to improve medication adherence, and to interact with a pharmacist or peer/family member. Section 3 asked about concerns with technology and apps.

Procedure

Institutional approval was obtained from the Horizon Health Network Research Ethics Board. The survey was hosted by LimeSurvey (<http://www.limesurvey.org>). A link to the anonymous survey was distributed in June and July 2020 through social media and by email from organizations that work directly with older adults in New Brunswick. Data were stored in the locked office of the primary investigator (A.S.). Only the coauthors and a statistician had access to the data file.

Data Analysis

All survey responses had missing data; therefore, only valid frequencies and percentages are reported. All data were summarized with descriptive statistics. χ^2 analyses were used for age-based comparisons, according to Statistics Canada age groups: 60–64, 65–69, 70–74, 75–79, and 80 years or older. Using the software program G*Power,¹⁹ we estimated a sample size of 133 for χ^2 analyses based on the following parameters: medium effect size ($w = 0.30$), $\alpha = 0.05$, power = 0.80, degrees of freedom = 4 (based on 5 age groups).

RESULTS

Demographic Characteristics

After screening for nonresponses and duplicate entries, the final sample size was 266 respondents who answered some or all of the survey questions. As shown in Table 1, 40.6% of the sample was 60–64 years of age and 39.8% were 75 years or older. Most of the sample was female, white, English-speaking, and married. Just under half (47.8%) lived in rural areas or small centres. The most frequent clinical conditions (past and present) were cardiovascular and circulatory (166/243, 68.3%), musculoskeletal or related to connective tissue (111/243, 45.7%), and endocrine, nutritional, or metabolic (73/243, 30.0%). Almost all (222/242, 91.7%) self-reported taking at least 1 daily medication; progressively smaller proportions reported taking 2 or more medications (195/242, 80.6%), 5 or more medications (99/242, 40.9%) and more than 10 medications (21/242, 8.7%).

Current Use of Technology

Mobile Devices

The most frequently owned devices were mobile phones (229/243, 94.2%), tablets (191/243, 78.6%), and laptop

computers (187/243, 77.0%). Only 3 participants (3/243, 1.2%) did not own any devices. When those to whom the question applied were asked whether they had accessed

TABLE 1. Demographic Characteristics ($n = 266$)

Characteristic	No. (%) of Patients ^a
Age (years)	$n = 266$
60–64	108 (40.6)
65–69	18 (6.8)
70–74	34 (12.8)
75–79	47 (17.7)
≥ 80	59 (22.2)
Sex on birth certificate	$n = 264$
Female	194 (73.5)
Male	70 (26.5)
Gender identity	$n = 242$
Female	183 (75.6)
Male	58 (24.0)
Gender nonconforming	1 (0.4)
Racial or cultural group	$n = 257$
White	253 (98.4)
Other	4 (1.6)
Primary language	$n = 260$
English	235 (90.4)
French	24 (9.2)
Both	1 (0.4)
Marital status	$n = 256$
Married	172 (67.2)
Single	34 (13.3)
Widowed	24 (9.4)
Living with partner	13 (5.1)
Divorced/separated	12 (4.7)
Living apart together	1 (0.4)
Area of current residence (population size)	$n = 255$
Rural (< 1000)	58 (22.7)
Small centre (1000–29 999)	64 (25.1)
Medium centre (30 000–99 999)	89 (34.9)
Large centre (> 100 000)	44 (17.3)
Annual household income (\$)	$n = 207$
< 20 000	11 (5.3)
20 000–40 000	55 (26.6)
40 001–60 000	45 (21.7)
60 001–80 000	31 (15.0)
80 001–100 000	29 (14.0)
≥ 100 000	36 (17.4)
Highest level of education	$n = 247$
Grade 5–12	15 (6.1)
High school graduate	43 (17.4)
Some college or university	48 (19.4)
College or university degree	98 (39.7)
Master's, professional degree, PhD	43 (17.4)

^aExcept for age, all variables had missing data. Only valid percentages (excluding missing data) are reported.

the internet from their mobile phone during the previous 12 months, 80.8% (181/224) responded in the affirmative.

Health-Related Apps

The frequency of using apps on mobile phones and tablets was similar (165/229, 72.1%, and 154/229, 67.2%, respectively). More than a third of respondents (78/222, 35.1%) had used health-related apps in the previous 12 months, with no differences in usage across age groups: $\chi^2(4,222) = 4.06$ ($p = 0.39$). Most participants (171/225, 76.0%) reported interest in using a mobile app to improve health, and for this variable, there was a difference among age groups: $\chi^2(4,225) = 17.18$ ($p = 0.002$). Interest was lowest among those 65–69 years of age (6/14, 42.9%); progressively higher among those 70–74 years old (17/27, 63.0%), 75–79 years old (26/37, 70.3%), and 80 years or older (40/52, 76.9%); and highest among those 60–64 years of age (82/95, 86.3%).

Among participants with an interest in using health apps, 43.3% (74/171) said they would use them every week and 33.3% (57/171) said they would use them every day. As shown in Table 2, health-related app features that were reportedly most useful were disease information (128/178, 71.9%), medication education (110/178, 61.8%), and nutrition information (100/178, 56.2%).

Medication Management on Devices

Most respondents (156/211, 73.9%) indicated that they would be comfortable allowing a caregiver or family member to access their medication adherence or other health information through an app. Most (161/219, 73.5%) indicated an interest in using mobile apps to contact pharmacists with questions, with this interest differing by age:

TABLE 2. Most Useful Health-Related App Features ($n = 178$)

Useful Feature	No. (%) of Participants ^a
General information about diseases	128 (71.9)
Learn more about your medication	110 (61.8)
Nutrition information	100 (56.2)
Mental wellness techniques	75 (42.1)
Other	10 (5.6)
Fitness (e.g., yoga, exercise, physical activity)	3 (1.7)
Access to medical records/files	2 (1.1)
Virtual visits	1 (0.6)
New Brunswick Drug Plans Formulary	1 (0.6)
COVID-19 testing	1 (0.6)
Only apps by medical schools/government (e.g., not pharmaceutical companies)	1 (0.6)
Unspecified	1 (0.6)
Prefer to use web-based search engine (e.g., Google) rather than individual apps	2 (1.1)

^aThe percentages shown are not mutually exclusive because each participant could endorse more than 1 category.

$\chi^2(4,219) = 11.14$ ($p = 0.025$). Interest was lowest among those 65–69 years of age (5/13, 38.5%); progressively higher among those 70–74 years old (17/26, 65.4%), 75–79 years old (28/39, 71.8%), and 60–64 years old (72/92, 78.3%); and highest among those 80 years of age or older (39/49, 79.6%). Most respondents (154/218, 70.6%) indicated an interest in using a mobile app to contact pharmacists for a review of medications, with interest differing by age group: $\chi^2(4,222) = 10.01$ ($p = 0.040$). The pattern by age group was similar to that for interest in using an app to contact a pharmacist: those 65–69 years of age were least interested (5/13, 38.5%), with progressively stronger interest among those 70–74 years old (15/24, 62.5%), 75–79 years old (26/39, 66.7%), and 60–64 years old (69/93, 74.2%); those 80 years of age or older were most interested (39/49, 79.6%).

Concerns about Using Mobile Devices and Applications

Half of the participants (111/224, 49.6%) had concerns about disclosure of personal information, and more than half (124/224, 55.4%) indicated concerns related to phone or monthly plan costs. Other concerns, including lack of a recommendation from a health care provider (23/224, 10.3%), are listed in Table 3.

DISCUSSION

In this study, we aimed to describe older adults' current use, interest in using, and concerns with using mobile technologies and apps. Our results indicate that most older adults who participated in the survey were using mobile devices, and most owned at least 1 mobile device. Similar rates have been reported in other Canadian studies.^{15,20} Although older age is generally associated with lower app use,^{20–23} this study found high app use overall relative to other studies of older adult populations²⁰ and the general adult population.^{17,21,23–25} Reasons may include the online recruitment method, the COVID-19 pandemic (which forced older adults to embrace new technology), and the inclusion of middle-aged adults (i.e., entering their 60s) who have already embraced technology.¹¹

Interest in Using Health Apps

More than 75% of participants expressed interest in using a mobile app to improve health, although the level of interest differed by age. Other studies have found similar rates of interest in the general adult population (≥ 18 years).^{17,24,25} Among adult orthopedic patients (≥ 18 years) in an urban centre, 71% felt that an app would improve their health care experience.²⁴ Younger age is associated with obtaining medical information via smartphone: in the same study, those up to age 40 were more likely to obtain information using a smartphone relative to those over 40 years of age.²⁴ The current study indicates that an association may also exist between age and interest in using a mobile app to improve health among individuals 60 years of age or older.

The proportion of participants taking more than 5 medications was greater than the rate observed by a pan-Canadian study of adults 65 years and older²⁶ (40.9% versus 27%). In the earlier study, taking 5 or more medications was associated with a higher rate of adverse effects requiring medical attention and increased emergency department use.²⁶ As a result, these individuals may benefit from an app to improve medication management. Further research should explore this notion.

Desired App Features

Most of the app features desired by participants focused on health-related information or improving medication management. The provision of information as an app feature has been described in the literature. For example, in a multisite US study, participants 55 years of age or older who were taking 5 or more medications reported that the most desired app feature was medication information, specifically the ability to choose a medication from their medication

list and access “need-to-know” information.²⁷ These findings, combined with the current study, highlight a potential niche and current unmet need to support patients taking 5 or medications with mHealth-based applications.

Although their study was not specific to older adults, Ramirez and others¹⁷ found that nutrition information and general information about diseases were among the most useful health app features reported by primary care patients. Similarly, among ambulatory surgery patients, access to literature, pictures, and videos explaining surgical procedures and information about potential surgical complications were highly ranked app features.²⁸ Among patients with type 2 diabetes, recommendations for future app design also centred on educational features.¹³

Information-related app features may be desired because of the belief that more information is linked to better outcomes. Khurana and others²⁹ found that patients (particularly those over 45 years of age) believed they were more likely to take proactive measures if they had more knowledge about their disease. This is consistent with New Brunswick’s aging strategy, which recommends promoting self-management through the provision of information.¹ Therefore, app designers should include features related to medication, health management, and health information in future apps.

It is also worth noting that 73.9% of respondents were willing to share health app information with family members or caregivers. In Canada, 88% of seniors have low health literacy.³⁰ Thus, caregivers, family members, and friends represent an underused resource in supporting the older adult population.³¹ Mobile health-based interventions may offer the opportunity to better educate and engage a support network for this patient population to improve health outcomes.

Interactions with Health Care Providers

Most participants were interested in using an app to connect with a pharmacist to ask questions (73.5%) or review medications (70.6%). Although interest in mHealth interactions with pharmacists has not been previously reported in the literature, more than 80% of respondents in a previous study (aged 35–79 years) were interested in electronic interactions with their physicians to manage and treat type 2 diabetes.²⁹ Among ambulatory surgery patients, top-rated app features were the ability to contact a health care provider and ability to consult a health care provider before and after surgery.²⁸ In a study involving Spanish oncology patients, more than 40% expressed interest in communicating with their health care provider through an app or email, and approximately one-third would have liked remote monitoring by health care professionals as an app feature.²¹ These findings, combined with the results of the current study, indicate that using mHealth and apps to facilitate patient–pharmacist interactions may be one approach to improving medication management in older adults.

TABLE 3. Concerns about Using Mobile Apps and Mobile Phones (*n* = 224)

Concern	No. (%) of Participants ^a
Related to mobile apps	
Personal information disclosure	111 (50.0)
Fees to use apps	78 (34.8)
Apps use a lot of data	48 (21.4)
Unsure of effectiveness	44 (19.6)
Not easy to use	35 (15.6)
Not recommended by a health care provider	23 (10.3)
Take too much time to use	19 (8.5)
Other	20 (8.9)
Uninterested in app use	6 (2.7)
Lack of app-related knowledge	5 (2.2)
Privacy concerns	3 (1.3)
Security concerns	2 (0.9)
No data on device	2 (0.9)
Lack of accuracy	1 (0.4)
Already using apps	1 (0.4)
None of the above	45 (20.1)
Related to mobile phones	
Cost concerns (e.g., phone, monthly plans)	124 (55.4)
Not easy to use	22 (9.8)
Reducing face-to-face interaction	56 (25.0)
Other	14 (6.3)
Security	3 (1.3)
Privacy	4 (1.8)
Accessibility (hearing, vision)	2 (0.9)
No data/voice only	2 (0.9)
Poor/unreliable service	1 (0.4)
Telemarketers/being “too available”	1 (0.4)
None of the above	63 (28.1)

^aThe percentages shown are not mutually exclusive because each participant could endorse more than 1 category.

Concerns with Mobile Phones and Apps

The most common concern related to the use of mobile phones and, to a lesser degree, apps was the cost, specifically extra fees and the cost of data. This finding is consistent with user concerns about remote health interventions and device and app costs to both individuals and the health care system that have been reported by others.^{16,21,22,32,33} Hopefully, these cost concerns will be partially addressed with incoming nationwide high-speed internet access,⁸ which may allow Canadians to access mHealth options without costly data charges.

The most frequent app-based concern was worry about disclosure of personal health information, as has been consistently noted in the literature.^{16,34-36} For example, semi-structured interviews conducted in England indicated that privacy and confidentiality constituted 1 of 6 distinct barriers reported among adults over 50 years of age.³⁵ Given that privacy and security of personal health information are key concerns among older adults, these would need to be addressed in the development of future mHealth technologies.

Concerns about app efficacy (i.e., whether they accomplish their intended task) and usability (e.g., ease of use) were noted by study participants. People would be unlikely to use an app that has not been proven effective or is difficult to use. The concern about efficacy has also been voiced by veterans,³⁴ and a systematic review found that efficacy was a major barrier to remote health interventions.³² Usability is a well-documented barrier to app use.^{33,36} Mendiola and others³³ found that usability was 1 of 4 features associated with positive user ratings of mHealth apps, and all 4 features were related to making disease management less time-consuming and more efficient. Therefore, apps for older adults need to be efficacious, usable, and more efficient relative to currently used methods.

One novel finding in this study was that older adults were concerned when an app had not been recommended by a health care provider, likely because of the high level of trust that people place in clinicians.^{37,38} Satisfaction with apps and willingness to use an app may increase if the apps are recommended by a health professional.¹³ Lack of provider engagement has been found to be a barrier to user engagement in mHealth solutions.³² Thus, health care providers should be involved in the development and review of apps for older adults to ensure they feel comfortable recommending them to patients.

Limitations

One limitation of this study was the self-selection of individuals who were already active online to complete the survey, which may have introduced some bias. Because of the COVID-19 pandemic, the survey could only be distributed and completed electronically, and the rate of app usage may have been higher in the surveyed population than in the general population. Furthermore, most participants

had postsecondary education, which is associated with increased use of technology and apps.^{21,22} Most of the sample was female, white, English-speaking, and married, and these characteristics warrant caution when interpreting and generalizing the results of this research. Future research is needed among older adults who are generally not active online, do not use technology/apps, and have lower levels of formal education, to determine their levels of use, interest, and concerns regarding mHealth and apps.

CONCLUSION

The findings in this study highlight that a substantial proportion of older adults are already using mobile technology and apps and are interested in using apps for health and to interact with health care providers. Concerns relating to cost, disclosure of personal information, effectiveness, usability, and provider endorsement should be considered when developing mHealth interventions for this patient population. Concepts of health literacy must also be considered, to ensure that these resources are easily understood and applicable to improve the health of this population.

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