

Perceptions on mobile health use for health education in an Indigenous population

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Abstract

Introduction: Indigenous peoples in Canada face numerous health needs and challenges and often have poor health status due to inequitable access to care. Providing culturally appropriate support for health conditions, particularly chronic conditions that require self-management, can assist in averting complications and morbidity. Mobile health is a useful medium for delivering health education across different populations. However, meaningful user involvement is necessary because mobile health interventions suitable for one population may not be appropriate for another. Indigenous people's views will inform the use of mobile health interventions in Indigenous communities.

Objective: The study explored the perception of Indigenous women on using mobile health as a tool for receiving health information.

Methods: This was a qualitative study, and participants comprised of 22 Indigenous women (First Nations and Métis) with or at risk of diabetes, aged 18–69 years in Saskatoon, Canada. After 12 weeks of disseminating diabetic eye care information via text messaging, data were collected via sharing circle discussions and analyzed using thematic analysis.

Results: Participants indicated that the nature of messages such as the use of Indigenous languages, the message content, frequency of messages, group activities, and delivery formats such as voice messages, mobile applications, Internet, two-way messaging, and text messages were essential considerations in using mobile health as a tool for receiving health information.

Conclusion: Different factors need to be considered in using mobile health as a tool for health education among Indigenous peoples. These factors could be applicable in implementing mobile health solutions in other populations for the management of health conditions.

Keywords

Mobile health, Indigenous, health education, health information, women

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Introduction

Indigenous peoples in Canada consist of the First Nations, Inuit, and Métis peoples.¹ Indigenous people face diverse health needs and challenges and health care is often less accessible and sometimes they may be reluctant to seek medical care. As such, the social determinants of health are inseparably linked to the health inequalities of Indigenous peoples in Canada. Health conditions are

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often complex as a result of underlying factors such as poverty, housing, food insecurity, community infrastructure, health and education systems, racism, and social exclusion.² These interacting factors directly and/or indirectly influence health and lead to health inequities between populations.³ Also, adverse childhood experiences are linked to the development of several chronic conditions in childhood and adulthood,⁴ which in Indigenous people have a strong association with intergenerational trauma and stressors that affect child development due to the accumulation of stress before, during, and after pregnancy.⁵ Thus, although stress is common to many populations, Indigenous women may have higher stress levels than other populations due to their inequitable experiences with the health care system.⁶ Continuous anxiety from these factors may weaken their resistance to diseases and increase vulnerability and progression to chronic diseases through physiological and behavioral patterns.⁷ These factors have contributed to a disproportionate distribution of ill health, causing Indigenous people to have worse health outcomes than non-Indigenous people.⁸

Providing support for health conditions, particularly chronic conditions that require self-management, will assist in averting complications and morbidity. There is a need for innovative ways of improving healthcare management among Indigenous peoples. To counter the significant gaps in care among Indigenous people,⁹ culturally appropriate and accessible interventions should be designed. With input from communities, the provision of health information may empower Indigenous peoples so they have relevant knowledge. A significant aim is to motivate uptake of health care services and assist with self-management of health conditions.

Mobile devices are now embedded in the lives of most people around the world. On average, North Americans use a mobile phone three hours daily; hence, mobile delivery offers significant potential for mobile health (mHealth) solutions and clinical support interventions.¹⁰ In this study, mHealth refers to public health practices supported by mobile devices⁷ such as mobile phones. mHealth solutions that provide a means of delivering health information may help those with the greatest need for health assessment and self-management. Thus, the use of mHealth can contribute to the improvement of health outcomes¹¹ and may reduce health inequalities due to increased ownership of mobile phones across Indigenous and non-Indigenous populations.¹²

Internationally and across Canada, numerous government programs are using mHealth services such as telehealth to assist in health care delivery in Indigenous communities¹³ and to bridge the gap in primary care and health care access to secondary and tertiary care services. However, few initiatives exist on the use of mHealth for health information dissemination among Indigenous peoples of Canada. This may be because the feasibility

and acceptability of mHealth for health information distribution have not been explored among Indigenous populations.

Health education and behavior change via mHealth

mHealth has proven to be a well-received and useful medium for delivering health education to patients¹⁴ in addition to providing information in a culturally acceptable way.¹⁵ mHealth educational interventions assist users to overcome the barriers of access to health care by tailoring disseminated information to address the special interests and needs of diverse populations to change behavior.¹⁶

With a majority of adults worldwide using mobile phones,¹⁷ mHealth health promotion solutions can be used across populations. Literature shows that mHealth interventions are used in different populations for a range of public health priorities and behavior change objectives by providing information in an individualized and engaging manner.¹⁸ mHealth interventions are used to improve health literacy, provide greater access to health services, support self-management of general health conditions, and enhance communication with health practitioners.¹⁹

There is an increase in smartphone ownership and access to Long-Term Evolution (LTE) mobile networks and in 2019, 99.5% of Canadians had access to LTE mobile networks, suggesting that people can be reached by mobile (even though there are areas of intermittent access).²⁰ As smartphone ownership increases, mobile technology is increasingly popular for health education and awareness creation, particularly among the younger population²¹ in Indigenous communities. Therefore, mHealth platforms may provide an innovative approach to improving health care services and management in Indigenous populations.²²

Indigenous peoples are as technologically progressive as non-Indigenous populations in Canada. They appreciate support in making healthy choices, and like non-Indigenous populations, they would resist being judged and controlled.²³ Therefore, it is essential that providing health education enhances autonomy, self-efficacy, and self-determination. Motivating people to use health services and make informed health decisions depends on the ease of use, access, and perceived usefulness. Furthermore, mobile technology may be adopted particularly for health education if it addresses the inherent strengths of the culture of Indigenous peoples and can increase empowerment and self-determination in the community. Thus, meaningful user involvement is necessary for mHealth design.

Women are often primarily responsible for their families in many populations and are the primary seekers of care and information, but often lack adequate care themselves.²⁴ A study that examined eye care knowledge and self-efficacy related to attending eye screening among women living with diabetes showed substantial gaps in diabetes eye

complications awareness and knowledge.²⁵ Hence, in this study, we found it necessary to procure information from Indigenous women to understand factors they consider important when using mHealth for health education. This will inform concept creation, designing, and implementing mHealth interventions.

Purpose of the study

This study explored the perception of Indigenous women with or at risk of diabetes on using mHealth as a tool for receiving health information.

Methods

Research context and participants

The study occurred in Saskatoon, which has a large population of Indigenous peoples who come to the city from rural communities across Saskatchewan, Canada as well as First Nations and Métis people who were born and raised in Saskatoon. A mHealth intervention was carried out in Saskatoon among Indigenous women living with diabetes or at risk of diabetes selected from two community organizations that provide exercise and cooking programs for Indigenous peoples in Saskatoon.²⁶ The community organizations work collaboratively with various Indigenous communities and provide information sessions to Indigenous groups in Saskatoon. The intervention involved distributing diabetes eye care messages to the women every day for 12 weeks. The information was delivered directly to participants via mobile text messages. Participants received daily messages in the morning between 8:30 am and 9:00 am. The platform used for disseminating messages distributed text messages with different numbers to participants.

Our study occurred immediately after the mHealth intervention and study participants were First Nations and Métis women who were part of the diabetes mHealth intervention.²⁶ Participants were recruited via purposive sampling to include women who had received the mHealth intervention and possessed adequate information to explore our study objective. All participants provided written informed consent.

Data collection

This was a descriptive qualitative study using sharing circles to explore perceptions of the participants on the use of mHealth for health information. Sharing circle is based on Indigenous epistemology, often used among Indigenous peoples,²⁷ and is important in building relationships. It offers a way to explore participants' insights and experiences on a topic. The sharing circle is an egalitarian and inclusive way to share knowledge; it is akin to

ceremony.²⁸ In the literature, researchers have used focus groups in mHealth studies to improve the structure and content of interventions,²⁹ such as the frequency of text messages and appropriate language.³⁰ Sharing circles have been used for the evaluation of learning programs,³¹ and to understand cultural and gendered experiences of health issues from the perspectives of First Nations women.³² Since both focus groups and sharing circles encourage conversation between persons having similar experiences,³³ within the context of our study, we used sharing circles to obtain data.

In accordance with the Tri-Council Policy Statement on Research involving the First Nations, Inuit, and Métis Peoples of Canada, community members were involved in the study design, data collection, and interpretation of results. Furthermore, an Elder from the community was consulted in developing the sharing circle guide and was present at each sharing circle session. Four sharing circles were used to collect information and a total of twenty-two (22) participants took part in the sharing circle discussions. For each sharing circle, every participant had a chance to speak, or they could choose not to speak when it was their turn. The discussions commenced with the presentation of the two questions by VU to the group, (1) *"I would like you to share your story of your experience with receiving diabetes health messages via text messages. As you think of your experience, I would like you to think about what worked and what did not work with the messages you received."* and (2) *"How do you feel about receiving health information via mobile phones?"*

Inductive thematic analysis was used for the qualitative data analysis supported by NVivo 12. The discussions were recorded with a digital recorder and transcribed; the data were de-identified before analysis. Thematic analysis phases, i.e. data immersion, initial coding, theme creation, reviewing, and refining themes, guided the analysis.³⁴ Recurrent views from the data were coded, and a codebook was used to code the entire data from the four transcripts. The codes that captured a set of ideas were organized into themes and sub-themes. The themes were reviewed by the authors, along with some study participants and community members. Thereafter, the themes were aligned to the research question. All authors agreed on the final themes and approved them as being representative of the data.

Results

A total of 22 women participated in the sharing circles, of which 17 women identified as First Nations and 5 as Métis. There was a mix of participants across different ages and ages ranging from 18 to 69 years. Most participants had some college and university education (18), 2 had completed high school and 2 participants had some high school or no formal education.

Participants provided feedback during the sharing circles on their perceptions of receiving health information via mobile phones. Three key themes emerged from the discussions including the nature of message delivery, content, and delivery format. Figure 1 shows an outline of the themes and sub-themes. The *delivery style* referred to utilizing an array of mobile phone features to receive health messages such as via voice messages, mobile applications, Internet, two-way messaging, and text messages. Participants indicated the value of using a combination of these mobile phone features in disseminating health information. Participants suggested that the *nature of message delivery* which involved timing, phone number used, and repeating messages, were important in mHealth interventions. Also, the message *content* which referred to providing detailed content of the health condition, sharing health information via group activities, and the tone of messages, were noted as essential in using mHealth as a tool for receiving health information.

Discussion

mHealth services are regularly delivered via various mobile technology platforms.³⁵ Advances in mobile phone designs have created the ability for mHealth services to be creatively offered in multiple formats across different populations. An understanding of how populations engage with and use these technologies is important³⁶ as it will illuminate various factors to take into account when developing and implementing mHealth interventions in Indigenous populations.

Delivery style

mHealth utilizes different stimulus types that align with various platforms for dissemination. The stimulus types are linked with delivery styles such as text, voice, sound, or image.³⁷

Mobile apps and Internet

This study showed that the mHealth platform preference varied by individual choices and characteristics. For instance, some participants highlighted the need for mobile applications (apps) rather than text messages for better and prolonged engagement with the educational context. A participant indicated:

“An app that would just like bring up a notification that tells you daily facts without it bringing up all the text messages, that would be ideal for my lifestyle I guess.”

The use of apps was suggested by several young women in the study, which may be due to digital knowledge and use of advanced mobile technology by the younger population.

Hence, adopting mobile apps for health education to better meet the needs of the young population may increase the use of apps for self-management of health conditions via improved engagement.³⁸ Nevertheless, the ability/inability to use mHealth apps can create a gap in care, especially between the younger and older population.

On the other hand, some participants suggested using the Internet for mHealth initiatives. A participant stated, “*I like the text messages but ... if there's like a website like for additional information*”. This is promising as age is becoming less of a barrier to using mobile technology as evidence has shown that Internet adoption among older adults is climbing. Stollefson et al. (2017) indicated that a majority of older adults use the Internet for various needs including obtaining information,³⁹ and Indigenous peoples use the Internet and apps for health promotion and education.^{22,40}

Nevertheless, in Canada, Internet access and the use of apps are affected by income.⁴¹ Also, worldwide, Canada is one of the countries with the highest wireless data cost.⁴² Using the Internet or mobile apps to disseminate health messages among Indigenous peoples may limit the access and use to people who can pay for Internet services and afford/own smartphones for the download of mobile apps, thereby introducing inequity in mHealth service delivery. For this reason, text messaging may remain a better choice because it does not require data, messages can be sent and received on rudimentary devices, and costs are lower.

Voice messages

Another major finding was the use of audio messages in distributing health messages. Several participants expressed interest in receiving voice health messages. Also, participants suggested that voice messages could also be in Indigenous languages.

“Even like if it was recorded in Cree [an indigenous language] and somebody could get a message, like a voicemail.”

The suggestion buttresses the need to incorporate cultural components when developing mHealth interventions. This can occur using targeted strategies such as audio versus text messaging. Voice/audio messages in various languages could also compensate for literacy difficulties. In addition, cultural continuity and preservation are instrumental to health and self-determination; and defined as “the preservation of traditional culture and often assessed by the knowledge of Indigenous languages”.⁴³ So, including Indigenous languages in the design and implementation of health messages may also aid in the preservation of Indigenous languages. Also, research showed that there is a positive relationship between preservation of culture and chronic

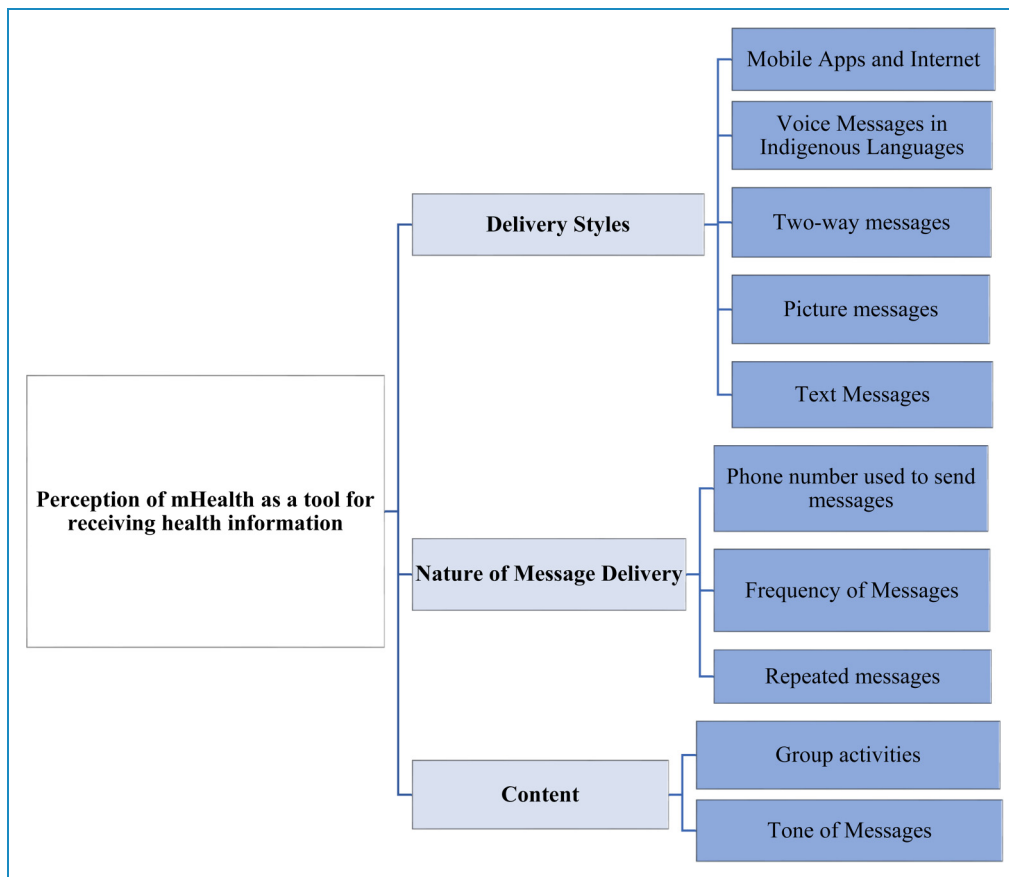


Figure 1. Outline of themes and sub-themes on the perception of mobile health (mHealth) as a tool for receiving health information.

disease prevalence such as diabetes among First Nations peoples.⁴³

Although voice messaging has many advantages, in many situations, messages sent via voice platform cannot be saved for future reference without a special app. There might also be a lag time in receiving voice messages. On the other hand, text messaging arrives nearly instantaneously and can be saved and referred to later. Hence, it may be a more reliable and efficient method of message delivery than voice messages.⁴⁴

Two-way messaging

There were many comments on two-way versus one-way messaging, with some participants indicating interest in responding to text messages to make further inquiries on health information received. The study findings suggested that mHealth interventions that enabled users to send questions and receive a timely reply would enhance mHealth usage and engagement. It is important to mention that a mHealth intervention with the capability of two-way messaging could reduce anxiety and provide support to users. Literature shows interest in bidirectional messaging with health care providers in

mHealth interventions.⁴⁵ Also, a study in a Canadian Indigenous population that utilized two-way messaging in their intervention indicated high acceptance and interest in using the mobile phone technology for health.⁴⁶ But, there may be no difference between the impact of one-way messaging versus two-way messaging.⁴⁷

Picture/image messages

Findings showed that participants were interested in picture health messages sent via mobile phones. About that, a participant stated:

“I’m like new to the cellphone so I wish there was little pictures or bouncy things or something. I like those.”

Based on Mayer’s multimedia principles, combining images and words enhances knowledge acquisition and learning.⁴⁸ Furthermore, the use of diagrams and pictures to explain health conditions and instructions improve communication in health care.⁴⁹ But not all phones have the capability to receive picture messages; hence, sending health messages solely as images would impede equitable

access to the health information among individuals with basic mobile phones.

Text/SMS messages

Irrespective of other mHealth platforms, text messaging was considered reliable, easy to use, and easily accessible, which are all essential components and objectives of mHealth initiatives. Several participants indicated that there were advantages to receiving health messages via text such as iniquitousness, convenience, and ease of reading and sharing.

“You could choose to keep the messages if you want. You could look back on them when you need to. I think that’s a really good way of, like sharing health information.”

A participant indicated that receiving health information via text was beneficial for some Indigenous peoples who are uncomfortable visiting doctors.

“I think it’s a good idea because then there’s a lot of Indigenous people that don’t like going to doctors.”

Some participants preferred receiving health messages by text rather than other platforms.

“I think it’s like a good medium to use because everyone always has their phone or is on their phone so it’s the best way to get the information.”

“I think it’d be a lot easier for like text messages rather than emails because I get text messages and emails and some-days I forget to check my emails... So text messages were very easy.”

A systematic review assessing the impact of mHealth interventions in different health conditions found that SMS was the most widely used platform addressing chronic disease management and showed a positive impact on clinical outcomes, treatment and care, and health behavior.⁵⁰ Studies showed that irrespective of age or gender, text messaging is often preferred in health messaging. A case in point, Dobson et al. (2017) suggested that mHealth via SMS was preferred for the management of diabetes due to its convenience.⁵¹ This may be because of the privacy of messages, the ability to retrieve and refer to text messages,⁵² and share text messages with family and friends.

Despite the potential of mHealth in health care management, it also has the potential to increase health inequalities because, within the same population, effective mHealth design for one group could bring about negative and unforeseen consequences for another group with different characteristics.⁴¹ For instance, younger people often

obtain smartphones compared with older people.⁵³ Hence, mHealth interventions that leverage smartphone platforms such as mobile apps would be unavailable to individuals who do not own a smartphone—possibly resulting in variations in the management and outcome of health conditions among individuals within the same population. To provide an equitable mHealth intervention, content would have to be made available for various platforms based on the characteristics of the target population.

Nature of message delivery

In the diabetes eye health text messaging program, different numbers were used to send the text messages. The results showed that the participant’s interest and engagement with a mHealth intervention were influenced by the consistency of the number used to send the text messages. This indicates that being able to relate to and connect a phone number to a mHealth service can influence intervention use. Number consistency may also reduce anxiety on receipt of messages since participants would be aware of the source of the message.

Furthermore, results showed that daily receipt of text messaging could both support and reduce interest and use of the mHealth intervention. The participants gave contrasting comments on their perception of the frequency of the messages. Some did not mind receiving daily messages.

“I like getting text messages every day. That could work so well for diabetes management to a First Nation person and I think that would be really good bonus to get.”

Whereas some participants felt that there were too many messages. Related research showed that the regularity of text messages was vital in mHealth education interventions.⁵⁴ It is crucial to explore the “dose-response effects”⁵⁵ of the mHealth intervention and ensure that distributing high doses of the intervention does not result in information overload and overburden the users.

Message content and format

The study showed that disseminating repeated messages, the inclusion of specific health information/tips, and the integration of mHealth interventions with group activities were crucial when using mHealth as a tool for health information. Pushing out repeated messages was welcomed by some participants as it served as a reminder of key information. A participant stated:

“Personally, didn’t mind the daily messages or the repetitiveness. Because as you get older, memory becomes an issue, so, when you’re young, it’s not an issue.”

Adults generally benefit from repeated reminders, especially older adults to improve memory.⁵⁶ However, the repetition of messages may lead to boredom among users.⁵⁷ A possible suggestion would be to provide the option for users who require more information to request it through an established channel of communications (such as text, email, telephone).

The content of the mHealth intervention was considered as very important. Some participants were interested in receiving more detailed content that could enable them to make better-informed health choices. Indicating the importance of tailored and personalized messages which a study showed increased satisfaction with text messaging interventions in Indigenous populations.⁵⁸ Yet, sending personalized messages will make the delivery of the intervention more complex and could increase the cost of providing mHealth service.

Furthermore, a finding that stood out in this study was that integration of group activities into mHealth interventions was integral in health information dissemination. In the words of a participant, “*more group activities.*” Indicating the importance of relationships and group interactions. Gathering together and participating in activities is familiar and uplifting for Indigenous people; it provides support and is an opportunity to share health experiences and stories.⁵⁹ Thus, the study findings showed that, along with providing health information, mHealth interventions should be combined with group activities to create an environment of encouragement and social support.

Participants voiced a preference for a less formal tone of messages. Similarly, participants indicated that providing supportive, suggestive, and non-pushy health information, enhanced engagement with the mHealth intervention. Individuals respond to different tones of health messages, whether empathetic, authoritative, or motivational.⁶⁰ Nonetheless, people generally respond well to a kind word or encouraging message. It is essential to explore the favored tone and the preferences of the intended user population and pretest the messages before distribution.

In summary, the study findings articulated that various factors, such as the nature of message delivery, content, and delivery format, need to be considered in the design and implementation of mHealth interventions among Indigenous peoples.

Strengths and limitations

Participants and community members from the partner organizations were included in the analysis and interpretation of the study, which ensured apt interpretation of the data and aided in confirming that the data interpretation aligned with participants' views. Transcripts were coded and reviewed by all authors and the community members to strengthen the credibility of the analysis. Our study was limited by the sample number of participants who

were involved in the research and restricted to persons living with diabetes. The aim of the study was not to deliver broad generalizations about the views of all Indigenous women; however, the findings provided rich insights into the perceptions and suggestions from Indigenous women in the study on the use of mHealth for the dissemination of health information and could be generalized to Indigenous women within the study location.

Study contributions

The study makes contributions to healthcare by providing information that can be utilized in designing mHealth interventions for Indigenous populations. Furthermore, the study demonstrates the various mHealth platforms that health care providers can use to support the self-management of health conditions and complications. Some of the key findings from this study include:

1. While it is important to elicit participants' preferences with regard to delivery mechanisms, contextual considerations such as cost, access, and reliability of platforms remain significant—particularly in rural and remote areas in Canada.
2. Voice, image, and two-way messaging may appeal to different communications preferences and literacy types. However, provision of multimedia may require engagement of multiple platforms which may increase the cost.
3. Advanced distribution platforms may be required to allow recipients manage when and how often they receive messages.
4. The design and implementation of mHealth programs and other support systems are best planned alongside communities to ensure relevance, appropriateness, and acceptance.

Conclusion

Population health professionals should explore novel approaches for health education. Although the perceptions mentioned here regarding using mHealth as a tool for health information represented the views of Indigenous women in this study, the suggestions may be transferable to various populations for the management of several health conditions. What is important is including communities in the design and testing of the tools and interventions. There is a need for further research to study the long-term outcomes of mHealth interventions.

The findings of this study revealed some unique perceptions of using text messages for health information among Indigenous women. mHealth interventions must be designed to be culturally appropriate and acceptable to intended users so that it can promote uptake and engagement with the intervention for sustainable health care.

This can occur from the use of a single or a combination of mobile platforms, using Indigenous languages, sending the appropriate frequency of messages, utilizing supportive and encouraging messaging tones, and including group activities in the design of a mHealth intervention, for an enriched and equitable distribution and use of the health information.

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Ethical approval

The Research Ethics Board of the University of Saskatchewan provided ethical approval (BEH Number: 16-437).

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