A STUDY ON THE EFFECTIVENESS OF I-SPARX FOR NUNAVUT YOUTH: CAN AN E-INTERVENTION MENTAL HEALTH TOOL IN THE FORM OF A COMPUTER GAME IMPROVE EMOTION REGULATION?

JENNA BARNHARDT

A THESIS SUBMITTED TO

THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF ARTS

GRADUATE PROGRAM IN PSYCHOLOGY

YORK UNIVERSITY

TORONTO, ONTARIO

April, 2023

Abstract

This study examines how the e-intervention computer game, I-SPARX, may affect user emotion regulation. I-SPARX was designed for at-risk ᐃᓄᐃᑦ(Inuit) youth to teach cognitive behavioural skills and assist with improving mental health and emotional well-being. Data were collected from 112 ᐃᓄᐃᑦ (Inuit) youth participants from 25 communities in Nunavut who played I-SPARX and completed pre- and post-game outcome measures. Mixed model analysis was conducted at two time points to examine changes before and after playing the game in 6 domains meant to assess learning objectives and skills development: finding hope, being active, dealing with emotions, overcoming problems, recognizing challenging and unhelpful thoughts, and overall wellness. Results showed positive shifts in participant responses across all categories including emotion regulation skill development. This preliminary data is promising, suggesting that I-SPARX could help teach ᐃᓄᐃᑦ(Inuit) youth skills to manage emotions when they are confronted with challenging situations where negative and unhelpful thoughts arise.

Author Note

Jenna is an Indigenous status First Nations student, born and raised in Tyendinaga/Kenhteke Mohawk Territory, part of the Haudenosaunee confederacy of the Iroquois, Mohawks of the Bay of Quinte (Kanien'kehá:ka; or People of the Flint) nation. She sits with the A'no:wara/Turtle clan at Tyendinaga and is an active community member both on and off reservation. The research explored in this thesis is embedded in an Indigenous perspective including traditional knowledges, expressions, and ways of knowing. The reader of this document should be mindful that research activities, analysis, and conclusions are documented with a perspective of an Indigenous lens and of an origin that includes a deep rooted sense of Indigeneity in Canada. All work described here has been supported and conducted by individuals who embrace and encourage this point of view. However it is important to note that the perspectives of this document are written from a First Nations - Kanien'kehá:ka point of view, and not an ᐃᓄᐃᑦ (Inuit) point of view. Accordingly, community experience related to ᐃᓄᐃᑦ (Inuit) ways of knowing, cultural traditions, and language associated with ᐃᓄᐃᑦ (Inuit) perspectives and knowledges is limited.

Table of Contents

List of Tables

A study on the effectiveness of I-SPARX for Nunavut youth: Can an e-intervention mental health tool in the form of a computer game improve emotion regulation?

Research regarding mental health and neurocognitive development with or about Indigenous people in Canada has always been a challenge. Historically, research in any capacity with Indigenous people has been fraught with turmoil, has been extremely unethical, and has purposely kept us in the dark about what was happening to us and for what purpose. This has built barriers between Indigenous people and academics often preventing further research with and about us that could potentially help in the long term. Some of these barriers include a lack of trust or education on Indigenous ways of knowing or belief systems. That is why it is imperative to involve Indigenous voices in the entirety of the research process which, first and foremost, has always been the starting point of this current research that was developed for and with ᐃᓄᐃᑦ (Inuit) youth. With this project, I hope to learn about the effects of engaging with a digital intervention tool on ᐃᓄᐃᑦ (Inuit) youth emotion regulation. More generally, I am hoping to contribute to knowledge that addresses how e-interventions for mental health might aid youth to develop positive executive functioning strategies.

The purpose of this research was to examine how an e-intervention tool, the computer game platform "I-SPARX", designed specifically for at risk ᐃᓄᐃᑦ (Inuit) youth, may affect user emotion regulation. The Smart, Positive, Active, Realistic, X-factor thoughts, or SPARX, program was originally developed for Māori youth in New Zealand to help build resilience and support emotion regulation through an interactive and culturally sensitive computer game (Merry et al., 2012). This award-winning mental health intervention strategy has recently been modified and culturally adapted for ᐃᓄᐃᑦ (Inuit) youth and renamed Inuit-SPARX, or I-SPARX (Bohr et al, 2016; Thomas et al., 2022). My study seeks to take a closer look at how I-SPARX may support players' executive functioning, specifically emotion regulation, and also how it may support youth's learning of the CBT strategies embedded into the game. By looking at how this game affects emotion regulation, this research will contribute to building knowledge for a more culturally appropriate approach to mental health for Indigenous people, specifically ᐃᓄᐃᑦ (Inuit) youth of Nunavut, Canada. The current mental health care systems appear to have failed to offer adequate support for ᐃᓄᐃᑦ (Inuit) youth and have not done enough to prevent the high suicide rates for ᐃᓄᐃᑦ (Inuit) youth (Nelson & Wilson, 2017). With ᐃᓄᐃᑦ (Inuit) youth having a significantly greater likelihood of suicide than other youth globally and given the documented link between poor emotion regulation and suicidality (Kumar & Tjepkema, 2019), this study will attempt to understand if I-SPARX is potentially helpful for emotion regulation using CBT-based strategies delivered through an electronic platform. With this study, I hope to provide some insight that might help propel the development of more effective mental health support and intervention strategies or tools for vulnerable ᐃᓄᐃᑦ (Inuit) youth at risk for suicide.

Three theoretical foundations form the basis of this study; Mi'kmaq Nation Two-Eyed Seeing theory, Inuit Qaujimajatuqangit/ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᑦ (IQ) principles, and Cognitive Behavioural Therapy (CBT) in conjunction with Beck's cognitive triad (originally used as the foundation for the SPARX pilot study). Each of these theoretical foundations have contributed to the uniqueness of this project by combining traditional Indigenous knowledges with Western concepts of mental health and integrating them in a way that is both culturally appropriate and practical for Indigenous communities.

Background

ᐃᓄᐃᑦ (Inuit) History – Pre-Colonization

The territory known as Nunavut in Canada is part of a larger territorial landmass known as ᐃᓄᐃᑦ ᓄᓇᖓᑦ (Inuit Nunangat) which contains the four territorial lands in Canada traditionally occupied by the ᐃᓄᐃᑦ (Inuit) (Inuit Tapiriit Kanatami, 2021). These lands include all of the Arctic Ocean islands north of Canada formally labelled as the Northwest Territories, as well as portions of northern Yukon Territory, northern Quebec, and northern Newfoundland and Labrador. The ᐃᓄᐃᑦ (Inuit) have roamed these lands for centuries relying on the natural resources found here for survival.

The ᐃᓄᐃᑦ (Inuit) of Nunavut specifically have developed a culture that is rich in community connectedness, rooted in complex cultural belief systems, and encompasses principles developed by the ancestral generations that are still being enforced today. Prior to what has been dubbed as the “Government Era” (1950s-1970s), the ᐃᓄᐃᑦ (Inuit) lived exclusively by their traditional ancestral values rooted in family togetherness and community connection (Stevenson & Wenzel, 1997). The nomadic lifestyle meant communities and families needed to travel the land as the food sources migrated, with parents, Elders, and extended family members working together to build community and teach children and youth the knowledge and skills required to survive on the land and its resources. The family unit remained a core component of survival, as working together, talking together, learning together, and growing together were essential in order for individuals to keep fed, stay sheltered from the elements, and protect themselves (Kral, 2012). Keeping the family together was so critical for survival that arranged marriages were common in these small nomadic communities, as well as partner exchange of the strongest or most fertile community members (Kral, 2016). Gender roles were understood, but also fluid in that it was believed a baby could change its gender just moments before it was born. Families with male offspring would often adapt to take on traditionally feminine roles like sewing, and vice versa where female dominated families would have some members take on male roles such as hunting (Saladin d'Anglure, 2005).

With the ᐃᓄᐃᑦ (Inuit) family at the centre of the cultural structure, pre-colonization, two aspects of these relationships were the most important: the ungayuq/ ᐅᖓᔪᖅ, and the naalaqutuq/ᓈᓚᖁᑐᖅ. The ungayuq/ᐅᖓᔪᖅ refers to the concept of affection and closeness, excesses of which were typically reserved for small children but also expressed more subtly among community members in ways such as helping each other and friendly gestures such as smiling, eye contact and compliments. The naalaqutuq/ᓈᓚᖁᑐᖅ, which translates to respect or obedience, was often displayed through respect for other older family members, parents, and Elders (Damas, 1964). The ᐃᓄᐃᑦ (Inuit) traditional way of life required equal parts ungayuq/ ᐅᖓᔪᖅ and naalaqutuq/ᓈᓚᖁᑐᖅ to be successful and it was often speculated that a disruption of this harmony would be disastrous to the community (Damas, 1964).

ᐃᓄᐃᑦ (Inuit) History – Post Colonization

As European settlers began to invade North America, ᐃᓄᐃᑦ (Inuit) life began to change drastically. More specifically, the "Government Era" from the 1950s to the 1970s was the most disruptive time in recorded ᐃᓄᐃᑦ (Inuit) history for their traditional way of life and established cultural foundations (Stevenson & Wenzel, 1997). People were relocated out of their traditional nomadic settlements to crowded living quarters where families were split apart and children were forced to attend residential schools. Languages, traditional teachings, community kinships and ways of knowing that relied on the family units were lost. At the same time, unfamiliar diseases began to take many ᐃᓄᐃᑦ (Inuit) lives, with tuberculosis (TB) being the most destructive.

Hunting and traditional means of survival were replaced with colonial jobs, currencies, and wage systems that resulted in poverty and homelessness (Kral, 2016).

Colonization disrupted the family unit and family connections, separating families and destroying ᐃᓄᐃᑦ (Inuit) cultural foundations—languages, ways of knowing, traditional teachings, and kinships. The Elders of the community did not know how to navigate colonization as they did not want to confuse the youth. As a result, loss of language prevented many traditional teachings, such as ungayuq/ ᐅᖓyᐅᖅ and naalaqutuq/ᓈᓚᖁᑐᖅ, from being handed down to younger generations, and these youth were forced to cope with the loss of these traditional ways of knowing and the new forced assimilation of colonial ideologies (Best Start by Health Nexus, 2019). The repercussions of colonization for the ᐃᓄᐃᑦ (Inuit) included residential school systems that broke apart traditional family units and resulted in children spending less time with parents and Elders. This marked the beginning of years of intergenerational anger among survivors of colonization who went on to become parents, passing their trauma down to all the children born after the Government Era (Stevenson & Wenzel, 1997). Today, these children and Elders have had to learn to cope with their trauma to avoid passing it to future generations. That has been challenging, as the effects of colonization on communities from the Government Era have been so deeply impactful. Colonized ways of being are still being imposed on communities to this day, making the passing of intergenerational trauma to future generations almost inevitable (Crawford, 2017). As such, unresolved intergenerational trauma has been known to be a risk factor in suicidality (Hackett, Feeny, & Tompa, 2016)

Promisingly, ᐃᓄᐃᑦ (Inuit) have also historically proven their resilience time and again with their survival tactics in the challenging northern climates, as well as their adaptability to change and traditional community togetherness. Modern ᐃᓄᐃᑦ (Inuit) culture welcomes new skills and knowledges while simultaneously preserving traditional culture and language, which has allowed them to thrive once more (Kumar & Tjepkema, 2019). Survival has not necessarily depended on balancing old and new, but more so taking successful traditional ᐃᓄᐃᑦ (Inuit) principles and communal ways of surviving like ungayuq/ ᐅᖓyᐅᖅ and naalaqutuq/ᓈᓚᖁᑐᖅ and applying them to current challenges, environments, and lifestyles (Best Start by Health Nexus, 2019). In order to support this, the Government of Nunavut has introduced a more integrated use of the old philosophy and way of living known as the Inuit Qaujimajatuqangit/ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᑦ or IQ. IQ refers to a set of eight ᐃᓄᐃᑦ (Inuit) principles designed to capture the ᐃᓄᐃᑦ (Inuit) way of life rooted in both traditional and contemporary knowledge. It encapsulates traditional ᐃᓄᐃᑦ (Inuit) belief systems, values, worldviews, language, social constructs, and life skills to preserve ancestral knowledge, foster growth of the current generation, and build long-lasting wisdom in the community (Tester & Irniq, 2008). IQ is used to foster a healthy learning environment for ᐃᓄᐃᑦ (Inuit) youth and also to provide the foundations of survival so that the community can continue for future generations (Nunavut Department of Education, 2007). There are eight principles or communal laws and values that govern the basis of IQ: Inuuqatigiitsiarniq/ᐃᓅᖃᑎᒌᑦᓯᐊᕐᓂᖅ (respect and care for others), Pijitsirniq/ᐱᔨᑦᓯᕐᓂᖅ (serving and providing for others), Pilimmaksasarniq/ᐱᓕᒻᒪᒃᓴᕐᓂᖅ (working together, mentoring, practise and skill development), Piliriqatigiiniq/ᐱᓕᕆᖃᑎᒌᖕᓂᖅ (knowledge/skill acquisition), Tunnganarniq/ᑐᙵᓇᕐᓂᖅ (inclusivity and open mindedness for others), Aajiiqatigiinniq/ᐋᔩᖃᑎᒌᓐᓂᖅ (conscious decision making), Qanuqtuurunnarniq/ᖃᓄᖅᑑᕐᓂᖅ (resourcefulness), and Avatittinnik Kamatsiariq/ᐊᕙᑎᑦᑎᓐᓂᒃ

ᑲᒪᑦᓯᐊᕐᓂᖅ (kinship with the environment, animals and land). These communal laws of ᐃᓄᐃᑦ (Inuit) culture offer important guidelines to live life as an ᐃᓄᒃ (Inuk) and provide a framework of expectations of the entire community to thrive and survive together (Nunavut Department of Education, 2007). Care was taken throughout the development of the I-SPARX project as a whole to integrate these IQ principles in every possible way, at every stage.

ᐃᓄᐃᑦ (Inuit) Mental Health and the Suicidality of ᐃᓄᐃᑦ (Inuit) Youth

Currently, risk factors for ᐃᓄᐃᑦ (Inuit) mental health that are directly associated with colonization of these northern communities include depression, anxiety, substance abuse, physical and sexual abuse, substantial cultural loss, and social disconnect (Kral, 2016). As well, the increase of suicidality among peers has had a contagion impact on ᐃᓄᐃᑦ (Inuit) youth, with suicide being seen as a common resolution for managing stress, depression, anxiety, relationship conflicts, addiction and other mental health issues (Kumar & Tjepkema, 2019). Pre-contact, suicide in ᐃᓄᐃᑦ (Inuit) communities would occur among the Elders, during times of famine or illness (Tester & McNicoll, 2004). When food was scarce, it was an honour for an elderly member of the community to sacrifice their life for the greater good for the others' survival. Post-colonization, suicide has shifted from the elderly to youth affected negatively by colonization in ᐃᓄᐃᑦ (Inuit) communities (Smith et al., 2005). Family separation caused by the implementation of the residential school system resulted in less family time, children being separated from their parents (sometimes permanently), and traditional family values and ways of knowing being lost, including language, survival tactics, and community togetherness (Smith et al., 2005). As a result, children who were affected by the trauma this system had inflicted, and the sequelae of this trauma, showed increased substance abuse, increased violence, and high poverty/unemployment as adults (Smith et al., 2005).

By the 1980s, suicide rates rose among members of the generation who were forced to attend residential schools (Kral, 2012). These emerging acts of suicide had a cascading effect on a generation that began to see suicide as the only solution to stressful or negative situations (Kral, 2016). Family relationships and communication were not a priority and children began to feel more and more isolated and alone (Kral, 2012). Suicide threats among children started to increase as an act of defiance against their parents, or as a possible cry for help (Kral, 2012). These negative family relationships translated to strain in romantic and peer relationships which caused a rise in male youth suicidality (Kral, 2012). Males were often jealous and possessive of their female partners, and would threaten suicide if their girlfriends broke up with them, continuing the pattern of suicide as an act of defiance or cry for attention (Kral, 2012). Males' sense of identity was compromised as colonization resulted in a loss of traditional male roles within the community, such as lack of migratory behaviour (Tester & McNicoll, 2004). Currently, young ᐃᓄᐃᑦ (Inuit) males still rank as the most at risk for suicide in Nunavut (Tester & McNicoll, 2004). Increasing levels of mental health challenges associated with emotion regulation, specifically regarding anger, helplessness, loneliness, and grief, have significantly impacted the suicide rate among these youth (Walls et al., 2014).

The Role of Emotion Regulation in Suicidality

Dysfunction associated with emotion regulation has been linked to increased suicidality in the literature (Hatkevich et al., 2019; Walls et al., 2014). The current research focuses on emotion regulation of ᐃᓄᐃᑦ (Inuit) youth as a possible factor in their mental wellness and the risk for suicidality for two critical reasons. First, I thought it important to focus on the potential link between intergenerational trauma, the ensuing parenting challenges in supporting children with soothing and regulation of difficult emotions generally, and the resulting lack of experience, in those children, with regulating their own strong emotions as adults. Second, I have chosen emotion regulation as a focus because the original SPARX pilot study that launched with 24 youth in Nunavut showed promise in supporting several areas of psychological functioning, such as hopelessness, catastrophizing, rumination and self-blame, which are all characteristics of emotion regulation (Bohr et al., 2016). If emotion regulation is a challenge for ᐃᓄᐃᑦ (Inuit) youth, and it could be addressed directly or indirectly through an accessible intervention (i.e., the I-SPARX e-intervention), this might be a consideration when supporting youth's overall health and wellbeing in the quest to better understand and prevent suicidality in ᐃᓄᐃᑦ (Inuit) communities.

Emotion regulation is described plainly as an individual's ability to respond constructively to an emotional situation (Rolston & Lloyd-Richardson, 2020). Individuals with healthy emotion regulation use healthy coping strategies such as talking with friends or family, writing, or exercising to effectively manage their emotions in a variety of different challenging situations (Rolston & Lloyd-Richardson, 2020). However, an individual struggling with emotion dysregulation may be unable to effectively manage their emotions during challenging situations, possibly resorting to unhealthy coping strategies such as substance abuse, withdrawal from friends and family, and self-harm (Rolston & Lloyd-Richardson, 2020). The frontal lobes and the prefrontal cortex have been associated with emotion regulation in neurocognitive and behavioural studies that examine brain activity (Goldin et al., 2008). Research has found that by mimicking specific emotional response stimuli (negative or positive), the brain activity associated with emotion regulation can be studied through imaging (Ochsner et al., 2012). By triggering a patient's emotion response systems with specific scenarios and capturing brain activity through scans and images, we can pinpoint which areas of the brain are responsible for coping strategies involved in emotion regulation. This type of research has shown that distinct dysfunctional coping strategies can be linked to suicidal ideation and behaviour, and are more prevalent in individuals who are vulnerable to risk factors associated with suicidality (Hatkevich, et al. 2019).

Notably, because emotion regulation is associated with the pre-frontal cortex, it is multidimensional, and many factors can play a part in an individual's experiences of suicidal thoughts, feelings and actions, and how that individual copes. For example, the Difficulties in Emotion Regulation Scale (DERS) model identifies six dimensions of emotion regulation; 1) nonacceptance, 2) goals, 3) awareness, 4) impulse, 5) clarity, and 6) strategies, where deficits occur in all areas and severity of each can inform treatment options (Hatkevich et al., 2019). However, studies have found that individuals at higher risk for suicide do not necessarily show deficits in *all* dimensions of emotion regulation, but all show a commonality of strong emotions of defeat and hopelessness in emotionally charged situations (Hatkevich et al., 2019). Given that youth report feelings of hopelessness, loneliness, and social disconnect in ᐃᓄᐃᑦ (Inuit) communities with high rates of suicidal behaviours (Morris & Crooks, 2015), it seems reasonable to examine emotions of defeat and hopelessness in ᐃᓄᐃᑦ (Inuit) youth, and whether these emotions can be attenuated with an intervention that is aimed at teaching coping/regulation skills. Given the potentially protective effects such emotion regulation related skills might then have when it comes suicidal ideation, a targeted intervention strategy could offer some preventive potential for suicidality.

Addressing Emotion Regulation

Is a CBT skills-based psychoeducational activity such as I-SPARX a good option for addressing emotion regulation?

Treatment options designed to target emotion dysregulation commonly focus on youth with neurodevelopmental, behavioural, and mood disorders such as anxiety, depression, ADHD, PTSD, and eating disorders (Rolston & Lloyd-Richardson, 2020). Treating emotion regulation difficulties entails teaching an individual how to reduce triggers, intensity, and the duration of the emotion (Stanley et al., 2009). By managing these three characteristics, the individual can reduce the likelihood of negative response to that emotion. One of the most effective approaches to supporting these components of emotion regulation is Cognitive Behavioural Therapy (CBT), which connects cognition with emotion and behaviour and examines how they interact (Stanley et al., 2009). CBT has been clinically established as one of the most effective treatment options for disorders like anxiety and depression, which characteristically involve the dysregulation of emotions, or the poor regulation of negative emotions (Davies et al., 2014). Considering dysfunctional emotion regulation as a component of suicidality further strengthens the case for making CBT an intervention of choice for individuals at risk for suicidality, including the associated pathways of depression and anxiety (Stanley et al., 2009).

However, in addition, it is important to acknowledge the unique needs of ᐃᓄᐃᑦ (Inuit) youth in developing a holistic, community driven approach to treatment. A meta-analysis carried out in 2012 by Henry G. Harder and colleagues (2012) looked at 23 papers to assess risk and protective factors for Indigenous youth's suicide and how treatment methods addressed these factors. Their findings showed that community involvement at every level of treatment and management to lower suicidal risk factors and improve protective factors was common in all effective studies. Other unique protective factors found were treatment literacy and inclusion, positive social circles, and family support incorporating community involvement (Harder et al., 2012). Therefore, when considering treatment options for Indigenous communities, especially those in remote areas, it is important to incorporate community involvement and support systems. An additional, important consideration at the time of the writing of this thesis: the COVID-19 pandemic has made face-to-face mental health intervention precarious and challenging; new self-guided, engaging mental health intervention resources are desperately needed.

I-SPARX – A Youth Directed E-CBT Intervention

Internationally, CBT-based e-intervention strategies have shown effectiveness for remote communities: for example, the SPARX program was developed for Aboriginal youth in New Zealand to help build resilience and support emotion regulation through an interactive and culturally sensitive computer game platform (Bohr et al, 2016). Due to the reported effectiveness of SPARX (Bohr et al., 2022; Litwin et al., 2022), this award-winning mental health intervention strategy has recently been modified and adapted to be culturally relevant for ᐃᓄᐃᑦ (Inuit) youth (Thomas et al., 2022), and renamed Inuit-SPARX (or I-SPARX).

A pilot study of Māori SPARX conducted remotely in Nunavut in 2016 asked youth from 25 Nunavut communities if it was useful for ᐃᓄᐃᑦ (Inuit) to learn cognitive behavioural therapy (CBT) skills with an interactive video game, remotely self-administered without in-person intervention. As noted above, the pilot provided preliminary data indicating that the game contributed to decreased hopelessness, catastrophizing, rumination and self-blame (Bohr et al, 2016; Bohr et al., 2022). These promising results suggested that SPARX could be an effective tool for the improvement of mental health and well-being for Indigenous ᐃᓄᐃᑦ (Inuit) youth. Youth were highly positive in their feedback about SPARX and their experience playing the game. Community consultations revealed interest in making the game more widely accessible, but also suggested that changes needed to be made to make this tool more culturally appropriate

(Litwin et al., 2023). A subsequent CIHR Project Grant (Bohr et al., 2017-2022) supported engagement from youth leaders in five Nunavut communities to conceptualize and implement modifications to the game, which included: modifying the language (adding Inuktitut ᐃᓄᒃᑎᑐᑦ and Inuinnaqtun ᐃᓄᐃᓐᓇᖅᑐᓐ), adding ᐃᓄᐃᑦ (Inuit) symbolism and Nunavut imagery (shifting from New Zealand to the Canadian Arctic), and atmosphere aesthetic (background, avatar garb, and northern landscapes). With community approved changes successfully implemented in the adapted software, a more extensive I-SPARX trial was launched in Nunavut in Summer 2020. Along with stylistic changes made to the game, pre- and post-game surveys and interview questions were designed together with ᐃᓄᐃᑦ (Inuit) youth and community members, provided during a youth leaders' retreat in Spring 2019, to create more culturally appropriate outcome measures.

Youth can play the game independently, and at their own pace with no supervision or contact from clinicians. Players start the game by creating an avatar, a customizable, playable character they use to navigate through seven different levels. The game tells a story of a world in which light has been stolen away by GNATs (Gloomy Negative Automatic Thoughts) and the players use their avatar to solve puzzles and overcome challenges to defeat the GNATs, restoring light to the land. Throughout the game the players are also monitored by in-game ᐃᓄᐃᑦ (Inuit) guides to help capture players' thoughts and feelings along the way through quizzes and open-ended questions. Each level has a theme and provides lessons around the fundamentals of CBT. Level one (the "Cave Province") teaches about hopefulness and depression, level two (the "Ice Province") teaches about active participation, level three (the "Volcano Province") teaches skills that help manage emotions like anger and hurt, level four (the "Mountain Province") offers cognitive restructuring exercises through problem solving skills, level five (the "Swamp

Province") teaches youth how to recognize their own negative thoughts, level six (the "Bridgeland Province") challenges youth to change their negative thoughts to more positive ones, and level seven (the "Canyon Province") brings all the skills together. By the end of the seven levels, players should have gained an understanding of fundamental CBT concepts and how to apply them when they are feeling stressed, sad or experiencing negative thoughts.

Since the first youth-led re-design and launch of I-SPARX, the COVID pandemic has necessitated significant changes to the original trial design. While some changes brought setbacks, other modifications were beneficial to communities, as participation in testing I-SPARX was now opened to youth in all 25 communities of the Territory. The process of participation in research activities such as this may have also provided useful strategies for coping with pandemic-related isolation (see also Thomas et al., 2022).

The Current Study

The overarching goal of this study was to contribute to the improvement of prevention and intervention strategies for Indigenous individuals who live in remote areas and/or have little access to mental health care, specifically care that could act as a protective factor in suicidality. The main objective was to explore, together with youth leaders from five ᐃᓄᐃᑦ (Inuit) communities in Nunavut, whether I-SPARX is a tool that may be useful in enhancing emotion regulation skills that are pertinent to building resilience against suicidality in ᐃᓄᐃᑦ (Inuit) youth in Nunavut.

Conducting respectful research with Indigenous communities is important in order to build meaningful relationships with the individuals involved and to come to conclusions the community deems helpful and usable. In order to do this effectively, this study took guidance from two main theoretical approaches: The Mi'kmaq Two-Eyed Seeing framework, and the

Cognitive Behavioural Theory (CBT) approach. This study has also incorporated the cultural values and belief systems observed in the Inuit Qaujimajatuqangit/ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖕᒋᑦ or IQ milieu. By using the Mi'kmaq Two-Eyed Seeing framework which integrates Indigenous and Western/Southern perspectives, we relied on a merging of a CBT strategy, through the I-SPARX game itself, with the cultural values and belief systems dictated by the Inuit Qaujimajatuqangit/ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖕᒋᑦ or IQ, which influenced all aspects of the I-SPARX project process (see Oskalns et al., in preparation). Combining these three approaches, this ensures respectful and culturally embedded research practice, but also empirically effective approaches to formulate reliable and valid results.

The Mi'kmaq *Etuaptmumk* (Two-Eyed Seeing) framework applies the concepts derived from traditional Indigenous ways of knowing with Western concepts of science (Iwama et. al., 2009). It adapts an integrated approach to learning that combines both Indigenous and Western ideas to derive diverse and inclusive decision making. The Indigenous portion adapted for this project included a comprehensive community approach to project evolution led by IQ principles that involved community and youth input on all levels. Two-Eyed Seeing is meant to foster an environment for growth and provides multiple perspectives to problem solving and decision making. This format was approved by ᐃᓄᐃᑦ (Inuit) youth and community members for the transformation of SPARX to I-SPARX. Traditional Indigenous ways of knowing were adapted through all areas, such as game development, questionnaire and research measure development, community interaction, and ethical procedures for research. Youth and community members participated in panel discussions with researchers where critical data were gathered to formulate the process from start to finish in a culturally appropriate manner.

The CBT approach incorporated Beck's et al. (1987) cognitive triad from the original SPARX pilot study into the *Etuaptmumk* as the Western half. Beck's (1987) cognitive triad identifies three inaccurate and unhelpful core beliefs — negative views about the world, negative views about one's self, and negative views about the future — which are associated with higher risks of depression and suicide (McIntosh & Fischer, 2000). This framework was used to measure levels of depression in ᐃᓄᐃᑦ (Inuit) youth for the SPARX pilot study (Bohr et al., 2022) and was carried over with similar measures for I-SPARX. Beck (1987) suggested that if these three thinking styles have become chronic in individuals, the latter would be at high risk for depression and suicide. When considering Beck's (1987) cognitive triad as a contributing portion of the theoretical foundation for this project's model, measures of youth's automatic negative thoughts can be used for assessing ᐃᓄᐃᑦ (Inuit) youth success when playing I-SPARX. In other words, identifying negative thought patterns, according to Beck's (1987) cognitive triad, can help us assess whether or not CBT is a meaningful treatment strategy for ᐃᓄᐃᑦ (Inuit). Given that the targeted dimensions associated with emotion dysregulation for this intervention project are hopelessness and defeat, identifying negative thoughts surrounding these areas using youth's interpretation of their own views about themselves, the world, and their future helps us determine what aspects of ᐃᓄᐃᑦ (Inuit) emotion regulation are important to address. Using Beck's (1987) framework in this case allows us to understand the negative thought process and possibly learn how to remedy it.

Research Question

The central research question explored in this study is as follows:

Does the I-SPARX intervention support aspects of emotion regulation (ER) that may be pertinent to the prevention of suicidality in ᐃᓄᐃᑦ (Inuit) youth?

My study examined the impacts of the adaptation of SPARX, i.e. Inuit SPARX or I-SPARX, on emotion regulation, specifically, with a hypothesis that youth playing I-SPARX would experience a positive impact overall.

Operationalizing the Research Question

The research question was addressed through reviewing participants' answers, on a youth-designed wellness questionnaire that included a variety of topics, to questions specific to emotion regulation. I focused on questions querying the management of emotions, feelings of hopelessness, rumination, and negative thoughts more generally. The outcome measure (30-item questionnaire) is featured in Table 1, with the questions selected for analysis highlighted with an asterisk. All items queried how respondents felt over the past week using a 5-point Likert scale, with the following choices: never (1 point), hardly ever (2 points), sometimes (3 points), often (4 points), and always (5 points).

Methods

Ethics

The current study is a sub-study of a larger research initiative, *Making I-SPARX Fly in Nunavut*. Ethics approval for this research was obtained through the York University Human Participants Review Committee (HPRC), including the Indigenous Advisory Committee. An independent review and research license/ethics certificate were obtained through the Nunavut Research Institute (NRI). This research complied with all Tri-Council guidelines for research with Indigenous Peoples and Communities and with Inuit Tapiriit Kanatami (ITK) guidelines (Inuit Tapiriit Kanatami, 2021).

Community members, including a Nunavut-based coordinator, Elders, and parents, along with a committee of youth leaders, were consulted throughout every decision of game development and launch processes to ensure that requirements for cultural sensitivity and inclusion were met. These requirements included the aforementioned cultural modifications to the SPARX game, topics and assessment measures that were of importance to communities, increased accessibility to communities without equipment or reliable internet access, and specific participant inclusion and exclusion criteria requirements. The research team hosted in-person and virtual focus groups and youth summits to obtain as much community expertise as possible to develop and deploy the game ethically and respectfully.

Participants

118 youth of ᐃᓄᐃᑦ (Inuit) ancestry between the ages of 13-24 from 14 different communities in Nunavut completed all or part of the I-SPARX study protocol, which includes the intake pre-game questionnaire and consent, the I-SPARX video game (levels 1-7) and the post-game questionnaire. Originally, inclusion criteria for participants included residing in communities where facilitators were present or where the team was visiting. Due to COVID-19 restrictions and remote access procedures, participation was not limited to residents of the original targeted communities but open to all ᐃᓄᐃᑦ (Inuit) youth aged 13-24 in 25 Nunavut communities.

In this study, all youth were considered in the results regardless of environment, however it is important to note that out of the 118 participant surveys that were completed for this study, 6 (5%) of them were designated game testers, 52 (44%) participants played the game independently in their own locations of choice, and 60 (51%) participants played the game over a span of two days in a controlled workshop environment. While the six game- and questionnaire-testers were excluded (final n = 112), this analysis did not examine the differences in results between the independent and the workshop groups.

Recruitment

The pandemic-driven revised process of recruitment for ᐃᓄᐃᑦ (Inuit) youth participants began with an electronic outreach through social media platforms favoured by Nunavut communities (Facebook, Instagram, Twitter, etc.), as well as email newsletters, direct email to community partners and youth leaders, telephone calls, and other accessible online content such as videos and articles provided on the website. Electronic flyers were created by the York research team and printed and posted by community partners in community centres, local stores, and schools where youth could access them in both English and Inuktitut ᐃᓄᒃᑎᑐᑦ. Youth were directed through all of these platforms to sign up to participate in I-SPARX by filling out the intake form on the project website (see isparxnunavut.com).

Research assistants from York University were originally scheduled to be on site in 5 communities (Pangnirtung ᐸᖓ ᓂᖅ ᑐᖓ , Baker Lake (Qamani’tuaq) ᖃᒪᓂ’ᑐᐊᖅ, Pond Inlet (Mittimatalik) ᒥᑦᑎᒪᑕᓕᒃ, Cape Dorset (Kinngait) ᑭ ᓐ ᖕᖏ and Cambridge Bay (Iqaluktuuttiaq) ᐃᖃᓗᒃᑑᑦᑎᐊᖅ) to facilitate registration and participation in the game, but due to travel restrictions, recruitment methods and engagement had to be modified to accommodate pandemic conditions. Participants fell into one of two groups: they either signed on through the project website, or they participated in one of two group sessions held by facilitators from the Kitikmeot Friendship Society in three communities in the Kitikmeot Qitirmiut/ᕿᑎᖅ ᒥ ᐅᑦ region of Nunavut.

Procedure

After youth signed up via the online form, they were given an identification number and instructions to complete consent forms and download the game. Pre-play surveys were sent via email. A staggered entry design was used: to begin, participants were assigned randomly by I-SPARX research assistants in either a Play Now or Play Later group; half the participants were directed to start playing the game immediately (Play Now), the other half were instructed to wait to be notified by the research assistants when they could start playing (approximately one month after sign up for the Play Later or Control group). All forms were administered via Qualtrics and consent from parents was obtained for any users under the age of 16.

Once participants completed the consent forms and pre-game survey, research assistants ensured that they had the equipment required to download the game. Tablets were provided through an arrangement with local stores to participants who needed them. Participants were then given download instructions for I-SPARX via e-mail and could begin to work through all seven levels of the game at designated time periods (some played on their own time, while others were given a set amount of time to complete the levels). Research assistants checked in at specified time points to ensure engagement with youth in the hopes of minimal attrition and to keep youth on track completing the game within a certain timeframe (approximately one week per level). If participants did not finish the level within the allotted time frame, researchers noted the timing on a participant activity tracking sheet and continued to reach out with engaging reminders via email until the game was completed.

Once the participants had finished level seven of the game (the final level), they completed the post-game questionnaire via Qualtrics, identical to the pre-game survey. Participants were then invited to engage in a virtual interview or focus group to provide feedback on and describe their experience with I-SPARX to members of the research team. Once completion of the game was confirmed by the research team, each participant was compensated for their time via an email gift card to Northmart, a retailer with stores in all communities in Nunavut, or another retailer of their choice if a Northmart was not accessible to them.

Measures

The study outcome measures were developed in collaboration with ᐃᓄᐃᑦ (Inuit) youth leaders and community members at a project retreat in 2019 during Phase 1 of the I-SPARX initiative, which focused on the cultural adaptation of the SPARX tool and the design of culturally specific outcome measures and interview questions (see Bohr et al., in press). The I-SPARX specific *Wellness Questionnaire* was adapted from the Aboriginal Children's Health and Well-Being Measure (ACHWM), developed by Nancy L. Young and colleagues (Wabano & Young, 2012) for Indigenous communities, to increase ᐃᓄᐃᑦ (Inuit) cultural appropriateness, reduce triggers, and ensure high face validity. Reliability and internal validity of the measures were examined in this study using data from the Control group and are currently being described in a separate paper (Padgett & Bohr, in preparation). There are five outcome domains in the survey matching the levels of the I-SPARX game: Level 1 - Finding Hope, Level 2 - Being Active, Level 3 – Dealing with Emotions, Levels 4-7 – Overcoming Problems, Recognizing Challenging Unhelpful Thoughts, and the final section on Overall Feeling. For the purposes of this study, measures relating to Level 3 of the game (i.e., "Dealing with Emotions") were assessed to examine patterns of emotion regulation pre- and post- gameplay, questions such as *"When I feel a bad mood coming on, I have tools I can use to make myself feel better"*, and *"When I get sad or upset, I get over it quickly"* (Table 1).

Four validity measure questions (Table 1) were implemented in the questionnaire which stated *"Please choose 'Always' for this question,"* with something similar replacing 'Always' with 'Never' or 'Sometimes,' for example, depending on which questionnaire the youth was filling out. These questions were ultimately designed as a validity measure to filter out participants who were rushing through the questionnaires and not reading the questions carefully to provide thoughtful answers. These questions were not included for the purposes of this analysis.

Data Analysis

Data were examined with a linear mixed-effect model analysis using different time points: pre-intervention/gameplay [time 0 (base or control questionnaire data) + time 1 (pre-gameplay questionnaire)] and post-intervention/gameplay [time 2 (post-gameplay questionnaire)]. By organizing the data in the long format (i.e. stacking the data from each time period on top of each other) the mixed-effect model analysis was considered to be an efficient way to combine three time points (base, pre and post) to compare pre- and post-intervention variables for the purposes of this study (Gelman & Hill, 2006). The mixed model approach was appropriate in this case because it can handle imbalanced data (i.e. not all participants were measured at all time points), and it keeps all three time points in context while other approaches only handle two time points at a time (paired sample t-test) (Singer & Willett, 2003).

Further analysis was done of specific executive functioning characteristics that each question was meant to assess, in this case with a focus on emotion regulation. Model analysis showed whether a participant's score increased or decreased per question, by how much, and if this value was significant or not. Since the community designed measure used in this study is not standardized, results could not be described based on clinical norms or standard scores (z-scores). Statistical analysis was carried out using the developmental environment and programming language for statistical computing in R and R-Studio.

To explore the research question, results from 10 selected items relating specifically to emotion regulation were analyzed. The 10 questions selected for this analysis are questions 10.2, 12.7, 13.2, 13.3, 13.4, 13.5, 13.6, 13.10, 13.11, and 14.6 (full descriptions indicated in Table 1), with questions 13.5, 13.6, 13.10, 13.11, and 14.6 reverse coded. Average responses for each question were calculated and compared pre- and post- intervention using the mixed model analysis to determine an increase (indicating positive intervention effect) or decrease (indicating negative intervention effect) in overall response scores. These values were also used to determine subsequent overall effect of gameplay on emotion regulation, as described below.

Table 1

Outcome Measures – Questionnaire items sorted by level:

Level	1 – *Finding Hope*	2 – *Being Active*	3 – *Dealing with Emotions*	4-7 - *Overcoming Problems, Recognizing & Challenging Unhelpful Thoughts*	*Overall*
Questions (Over the past week…)	I have hope for my future. Even when things aren't going well for me, I remind myself that things will get better.* I feel like good things will happen.	I am physically active (on the land, organized sports, playing with friends, etc.). I get so worried that I feel it in my body.* I have enough energy. I have activities that can help me when I'm feeling upset or stressed.* I have time on my own to relax with an activity I like (music, etc.). I miss doing things that used to be fun.	When I feel a bad mood coming on, I have tools I can use to make myself feel better.* When I get sad or upset, I get over it quickly.* I break things when I am upset or angry.* I hurt other people when I am upset or angry.* I get mad or cry when something small goes wrong. I feel like hurting myself when I'm upset or angry.* I often get in a bad mood.	Sometimes I feel like giving up. I feel overwhelmed by everything I have to do.* I can recognize when I'm having gloomy or negative thoughts. I have strategies I can use to help myself cope with gloomy or negative thoughts. I have strategies that help solve conflict with others. I am able to replace gloomy or negative thoughts with more positive ones.* I'm comfortable asking for support when I need it.	I appreciate what I have. I laugh and have fun. There are things in my life that make me happy. I make healthy choices that send me on a good path in life. I get a good night's sleep. I feel like my relationships at school are positive. I feel lonely.

*Indicate questions chosen for analysis to answer thesis questions.

Additional questions that were not categorized per level and not meant to assess the efficacy of I-SPARX:

1. I feel loved by other people around me.
2. There is at least one really good person in my life who is there for me.
3. I feel like I matter in my community.
4. I feel safe in my community.
5. I think that knowing about cultural practices (storytelling, country food, craft making, traditional healing, spirituality, etc.) is important.
6. I spend time listening to and learning from elders.
7. I feel connected to the land.
8. Learning is hard for me.
9. I think that learning is an important part of my future.

Results

Results are based on responses from a sample of 112 ᐃᓄᐃᑦ (Inuit) youth participants across Nunavut. A demographic breakdown of this sample can be found in Table 2 in the Appendix.

Effect of Game Play on Emotion Regulation

At $\alpha = 0.05$, 5 out of 10 questions—10.2, 12.7, 13.2, 13.3, and 13.4 (Table 3)—selected to assess emotion regulation effects following I-SPARX gameplay showed an increase of scores (β) at a statistically significant level ($p < 0.05$). The highest average response increase from pre- to post- game play was for question 13.2 *"I have activities that can help me when I'm feeling upset or stressed"* which showed an increase of $\beta_0 = 0.40$ points ($n = 112$, $\beta = 3.41$, $p > 0.05$) after game play. The lowest increase response from pre- to post- game play was for questions 13.3 *"I am able to replace gloomy or negative thoughts with more positive ones"* and 13.4 *"When I get sad or upset I get over it quickly"* which both showed an increase of $\beta_0 = 0.33$ points ($n = 112$, $\beta_{13.3} = 3.24$, $\beta_{13.4} = 3.22$ $p > 0.05$). Overall, responses for question 13.3 increased from 3.24 (pre- game play) to 3.57 (post- game play) and increased for question 13.4 from 3.22 to 3.55.

Overall responses to five emotion-regulation focused questions showed statistically significant positive changes post-gameplay at $\alpha = 0.05$. 100% of those showed an increase in β

scores, whereas the responses to the remaining 5 questions chosen to assess emotion regulation did not show statistically significant changes post-play (questions 13.5, 13.6, 13.10, 13.11 and 14.6). Identical analyses were carried out on the remaining 20 questions and those results are reported in the Appendix in Table 3.

When looking at the remaining 20 questions meant to assess different learning objectives and skill development in the game, 16 questions yielded statistically significant results at $\alpha = 0.05$ (questions 10.4, 10.5, 10.7, 10.11, 12.2, 12.4, 12.8, 12.9, 12.10, 12.11, 13.7, 14.2, 14.3, 14.4, 14.9, and 14.10). The highest score increase response from pre- to post- game play was for question 13.7 *"I'm comfortable asking for support when I need it"* with an increase of $\beta_0 = 0.54$ after intervention (at $\alpha = 0.05$.), with a $\beta = 2.92$ pre-intervention increase to $\beta = 3.46$ post intervention. The question that generated the lowest increase result overall was question 14.9 *"I feel like good things will happen"* which included $\beta = 3.54$ with a response output of $\beta_0 = 0.23$ points ($n = 112$, $p > 0.05$). This resulted in a change in scores from 3.54 to 3.77 with statistically significant results at $\alpha = 0.05$. As well, for these 16 questions that were statistically significant 100% of them were positive β_0 results.

Overall, responses to 21 of the 30 questions showed statistically significant positive changes ($p < 0.05$), with 9 responses showing no significant change, and 0 responses showing statistically significant unfavourable changes post-play. Across all 30 questions, the average β_0 value was 0.25 which indicates that on average playing I-SPARX will likely increase a participant's score by 0.25.

Discussion

The purpose of this study was to examine the effectiveness of the I-SPARX psychoeducational game in supporting emotion regulation for ᐃᓄᐃᑦ (Inuit) youth and to do so in a culturally embedded manner. The I-SPARX intervention, an ᐃᓄᐃᑦ (Inuit)-specific adaptation of SPARX, was designed to impart strategies to help with coping skill development using a CBT framework. Given that the evaluation of I-SPARX, a novel culture-focused tool, was completed with community designed outcome measures, results could not easily be predicted based on existing research. However, we did hope for promising overall positive outcomes for youth who engaged with I-SPARX, given that this intervention tool and the process through which it was developed and assessed aimed to meet the criteria of the Mi'kmaq Two-Eyed Seeing framework and Inuit Qaujimajatuqangit (IQ) Principles. It was hoped that both the content of this digital mental health tool, and the process used to evaluate it, would be relatable for ᐃᓄᐃᑦ (Inuit) youth, and that I-SPARX's effect on emotion regulation could be assessed in such a way that would be useful for the participating youth and their communities when it comes to supporting youth mental wellness.

Congruent with those recorded with Māori youth in New Zealand, I-SPARX participant outcomes reflect learning of the CBT-based concepts taught in the game, namely in areas such as finding hope, being active, dealing with emotions, overcoming problems, and recognizing challenging and unhelpful thoughts. Thus youth who played I-SPARX appeared to acquire the skills on which I-SPARX is built, and this had generally positive effects on several areas of mental wellness that youth consultants in the study had deemed important. Positive changes were also recorded specifically for emotion regulation-focused questions. As noted in the study by Stanley and colleagues (2009), teaching individuals to reduce triggers, intensities and durations of their emotions through CBT can be an effective way at managing difficulties associated with emotion regulation. Based on our study, the I-SPARX intervention appears to be effective at teaching CBT skills and these results are promising when it comes to bolstering emotion regulation for youth who learn to use these skills effectively.

Overall positive changes post-play on answers to questions such as *"I am able to replace gloomy or negative thoughts with more positive ones,"* and *"When I feel a bad mood coming on, I have tools I can use to make myself feel better,"* show that playing I-SPARX may help specifically with learning to manage, and lowering the intensity, of negative emotions and thoughts. In addition, post-play positive changes on answers to questions such as *"Even when things aren't going well for me, I remind myself that things will get better,"* address the significance of identifying potential unhelpful core beliefs according to Beck's cognitive triad theory (1987) (i.e. negative thoughts about one's self or future) and learning CBT skills that are focused on examining those negative beliefs and substituting more constructive thoughts (i.e. reminding yourself that things will improve). Our hope was that teaching fundamental CBT skills within an ᐃᓄᐃᑦ (Inuit) culturally relevant context as a means of identifying, and intervening in, negative thoughts would contribute to improved emotion regulation for youth (and, hopefully, by extension, a reduction in risk for suicidality). This expectation appears to have been supported.

Although results from this study cannot conclude that teaching positive emotion regulation skills in ᐃᓄᐃᑦ (Inuit) youth can alleviate suicidality altogether, there are empirically based studies that support emotion regulation dysfunction as a risk factor for youth suicidality (Hatkevich et al., 2019; Walls et al., 2014). The literature also suggests that manualized CBT programs for suicide prevention may be effective at reducing suicidal risk factors by teaching and enhancing coping skills that can prevent suicidal behavior (Stanley et al., 2009). Therefore, implementing an effective e-intervention platform such as I-SPARX to teach coping skills and improve overall emotion regulation in a culturally relevant way could potentially be an effective tool at reducing ᐃᓄᐃᑦ (Inuit) youth suicidal ideation. These empirically driven therapeutic approaches to reducing suicidality in youth focus on acceptance and management of emotions in stressful situations, pertinent to skills transferred when youth play I-SPARX and potentially reducing suicidal behaviour (Clapham & Brausch, 2022). Questions with statistically significant positive change reflecting this in the I-SPARX measure included *"I have strategies that I can use to help myself cope with gloomy or negative thoughts,"* and *"I can recognize when I'm having gloomy or negative thoughts."* This suggests that giving youth tools to recognize their negative thoughts and emotions, and using strategies they learned to help cope with them, has been effective through I-SPARX. This does not suggest these tools will help directly with reducing suicidal ideation (and subsequently suicidal behaviour) in ᐃᓄᐃᑦ (Inuit) youth, but introducing emotion regulation and coping skills through a CBT-based interactive tool such as I-SPARX is promising and consistent with empirically driven intervention methods successfully used to manage suicidal ideation in youth populations.

We also know from the literature that suicidal behavior and ideation as it relates to dysfunctional emotion regulation is multifaceted with a plethora of risk factors including increased prevalence of mood disorders, anxiety and depression among youth populations (Morris & Crooks, 2015). While this study did not control for participants with mood disorders, anxiety, or depression it did take into consideration that in addition to these known risk factors in non-Indigenous populations, ᐃᓄᐃᑦ (Inuit) youth are susceptible to other unique risk factors related to the effects of colonialism and intergenerational trauma that increase the likelihood of suicidal behaviours. Therefore it was necessary that I-SPARX incorporate and consider protective factors that addressed this population and their unique needs. By implementing a strong community driven approach to this study with the development of the outcome measure itself, collecting input and feedback from community (including youth and Elders) at every stage of development, and culturally adapting the game to be relatable and familiar to ᐃᓄᐃᑦ (Inuit) youth, it is hopeful that I-SPARX could potentially become a positive intervention tool that incorporates aspects of important unique protective factors for youth who may be at risk for suicidality.

Limitations

Given that this study is the first of its kind to examine the data collected with the launch of I-SPARX, and given this study relied on statistically significant changes in pre- to post-play responses, some trends may have been missed, both in terms of positive but also negative shifts in participant responses. Negative individual changes in cognitions and/or coping could possibly be concerning in populations that are vulnerable, as even slight negative changes in cognitive and emotional regulation might contribute to a reduction in an individual's mental wellness and resilience. For example, emotion regulation focused questions such as *"I feel like hurting myself when I'm upset or angry," "I feel overwhelmed by everything I have to do,"* and *"I get so worried that I feel it in my body (for example I feel butterflies in my stomach or my shoulders get tense)"* did not show any statistically significant change, given much variability in the responses. The effects of playing the game on the areas of functioning tapped by the above questions should be investigated further in future, perhaps with qualitative approaches to better understand the potential usefulness, or lack thereof, of I-SPARX in helping to regulate emotions and cognitions in these domains specifically. Future research should also endeavour to identify which individuals benefit most and least from playing I-SPARX, and in which domains.

One of the strengths of this study is the use of a community-designed outcome measure to evaluate the effects of a culturally adapted intervention; however, this presents a challenge, as the measure is not yet standardized and cannot be compared to existing theoretically and empirically driven scales, nor can it be examined in the context of subscales of existing measures. While the face validity of the current scale is good, given how it was developed, clinical validity, and validity in general, needs to be studied and factor analyses completed.

Overall, in conforming with conventions in reporting the results of outcome studies, we are reporting that, based on standard multilevel statistical analysis, the effects of playing I-SPARX were, on average, positive for the following areas of mental wellness as reported by youth: general wellness, overcoming problems, dealing with emotions, being active, and finding hope. However, the current lack of standardization of our outcome measure, while culturally driven, limits the formal analyses that can be performed and conclusions that can be drawn regarding the meaning and clinical significance of the recorded pre-post changes. Nonetheless, our results suggest that the game may have potential as a CBT-based intervention tool for ᐃᓄᐃᑦ (Inuit) youth and might be a promising remotely accessible solution for mental wellness support for this population.

This study assessed outcomes for community members generally, and did not evaluate the potential benefits of playing I-SPARX for clinical populations, i.e. individuals who have been formally diagnosed with mental health problems such as depression and anxiety, which was what Merry and colleagues (2012) did in their New Zealand based study. Their research showed positive outcomes for Māori youth hospitalized with depression who played the original SPARX. In the current study, while individuals with diagnoses were not specifically recruited, there were also no exclusion criteria for recruitment of youth that would have prevented individuals with more serious mental health challenges from participating in testing. It is thus difficult to predict whether the pre-post intervention changes would be more dramatic in a similar study focused on individuals with clinical diagnoses. At the same time, the current study was naturalistic, and thus perhaps more useful overall, in that problems with accessibility to mental health diagnostic services in remote communities would suggest that the differentiation between “clinical” vs. “community” populations, when recruiting for studies such as this, may not be helpful, appropriate, or even possible.

It should be noted that this study was conducted under circumstances dictated by the COVID-19 pandemic that might have affected results. Participants with different demographic profiles played the game in diverse environments and over a varying period of time and, given the relatively small sample (*n*), consideration could not be given to circumstances under which youth played the game. For example, participants played individually with controlled access to the game levels, individually but at their own leisure, or in a group over two intensive play days. Subgroups based on specific demographics and/or play contexts were too small to effectively analyze in this study, and it is important to consider that such factors could potentially impact the results. For example, potential variance in participants’ understandings of teachings embedded in the game and the game’s effects, when completed over 48-hours as opposed to a month, is not well understood. Timing could potentially be an important factor to yielding more positive results or maximizing impact of the I-SPARX teachings. This was also speculated by Litwin and colleagues (Litwin et al., 2023) and considerations of environment as a limiting factor should be better controlled for in further research.

Future studies should break down participant demographic and environmental factors to determine any additional outcome predictors related to participant characteristics, the environment, and timespan in which the game was played and questionnaires completed. While further analysis is recommended to determine differences between subgroups, it is important, as discussed above, to recognize that, if the game were freely available to anyone who wanted to play it, there would be great variability in the way that players might approach it, and thus the current examination is naturalistic in the sense that it mimics “real life”.

A strength of this project was that it proceeded in spite of unexpected obstacles presented by the COVID-19 pandemic, which began just as the research team was preparing to proceed with the community-based introduction to and administration of I-SPARX, as well as outcome data collection. The impact of the COVID-19 pandemic created many challenges in the deployment of I-SPARX and limitations that were not originally considered prior to COVID-19. In this regard, we had to modify our data collection plan to be entirely remote as travel restrictions and limitations of in-person deployment by our team became a concern. Although a remote data collection plan did allow us to open up the research to more communities in Nunavut, several technological challenges became apparent such as access to reliable internet connections and to electronic devices enabled to play the game. Access to fast and compatible technology in the Canadian North has always been a problem, and for this project it was not always easily resolved. The best effort was put in by the research team to troubleshoot technology and internet issues with the game remotely by providing equipment such as internet sticks and tablets for interested participants. However, this became extremely difficult to monitor remotely and without available technicians on-site within each community to help with these issues, it has remained an ongoing problem.

While the results of this study are encouraging, it is important to recognize that a larger sample size is necessary to gather more detail about the profile of youth who might benefit most from playing I-SPARX and those that could potentially be harmed by it. Recruitment of more participants from a more diverse demographic is necessary for creating subgroups of participants large enough to determine effect size analyses that are specific to various risk factors impacting the outcome of the I-SPARX measure. For example, risk factors believed to contribute to youth suicidality could impact the effect of the measure, such as specific pre-existing mental health issues (depression and anxiety), substance/physical/sexual abuse, loss of culture and social disconnect (Kral, 2016). As well, considering that the sample used in this research was self-selected, it might be more comprehensive to deliberately include demographics of individuals directly affected by suicide, those formally diagnosed with mental health issues (namely anxiety or depression, if possible in this context), or those born with FAS (Fetal Alcohol Syndrome) to asses if the game had any effect. By considering these specific risk factors in participants and widening the sample demographic, the usefulness of I-SPARX will be better understood.

Future adaptations of the I-SPARX measure could potentially yield even better overall outcomes as community involvement and feedback continue to grow and evolve. Fine-tuning specific aspects of this tool, or the design of better tools, will hopefully improve its benefits for emotion regulation. Unanswered questions pertaining to emotion regulation should be investigated in future studies that also aim to better understand cultural and other context-specific factors that affect emotion regulation specifically in ᐃᓄᐃᑦ (Inuit) youth populations. These factors may include, for example, effects of pre-existing mental health issues, community connectedness, intergenerational trauma and colonialism. Continuing work in this area should improve this intervention tool, develop additional tools specifically focused on emotion regulation, and perfect any outcome measures that ideally would aim to capture emotion regulation as expressed in of ᐃᓄᐃᑦ (Inuit) youth culture specifically.

Conclusion

The I-SPARX game is a community developed e-intervention tool that was evaluated using a community developed outcome measure relying on input provided by youth leaders, Elders, and other community members. This study aimed to examine I-SPARX effectiveness in supporting emotion regulation. Due to the novelty of the tool and the outcome measure, and the unusual circumstances under which both development and evaluation took place, many unknowns remain about the interpretation of statistical analyses in this study, and the implications of the data generated for I-SPARX's effectiveness in doing so. While overall participants showed positive shifts in their response to wellness question pre- VS post I-SPARX play, only tentative conclusions can be made at this point about the potential clinical significance of I-SPARX as an intervention tool.

This study is the first of its kind to examine the effect of Inuit-SPARX overall, and on emotion regulation specifically. The goal of this study was to take a detailed but preliminary look at the data collected from the first launch of the I-SPARX game, to ensure we understood how it might be helpful to ᐃᓄᐃᑦ (Inuit) youth, and to ensure that it did not cause any harm. Despite limitations, the data generated from this exploration remain promising all around and open the door for further future research opportunities with these remote ᐃᓄᐃᑦ (Inuit) communities of Nunavut.

References

Atuaqsijut: Following the Path, Sharing Inuit Specific Ways. Resource for Service Providers Who Work With Parents of Inuit Children in Ontario.

Beck, A. T., Rush, J. A., Shaw, B. F., & Emery, G. (1987) *Cognitive Therapy of Depression.* Guilford Publications.

Bohr, Y., Litwin, L., Flett, G., Rawana, J., G., Healy, G. & Dion, S. (2016)**.** *Making SPARX fly in Nunavut: Pilot testing an innovative computer-based intervention for reducing youth depression as a preamble to the development of a culturally specific, community led prevention program.* (Research report No. 2016-1 prepared for the Department of Health, Government of Nunavut). Retrieved from https://www.isparxnunavut.com/publications.

Bohr, Y., Litwin, L., Hankey, J., McCague, H., Singoorie, C., Lucassen, M., Shepherd, M., & Barnhardt, J. (2022). Evaluating the utility of a psychoeducational serious game in protecting Inuit youth from depression: A SPARX pilot modified randomized control study. *Journal of Medical Internet Research (JMIR Serious Games).* https://preprints.jmir.org/preprint/38493/accepted

Canadian Institutes for Health Research (CIHR) Project Scheme (2017). *Making SPARX Fly in Nunavut.* **PI (**Co-Investigators: Ahmad, Farah; Bornstein, Marc H; Flett, Gordon L; Flicker, Sarah; Healey, Gwen K; Jenson, Jennifer; Litwin, Leah; Lucassen, Mathijs F; Merry, Sally N; Pepler, Debra J; Rawana, Jennine S; Shulman, Shmuel; Weiss, Jonathan A.). (1,258,424.00).

Clapham, R., & Brausch, A. (2022) Internalizing and Externalizing Symptoms Moderate the

Relationship Between Emotion Dysregulation and Suicide Ideation in Adolescents. *Child Psychiatry Hum Dev*. https://doi-org.ezproxy.lib.torontomu.ca/10.1007/s10578-022-01413-9

Crawford A. (2014) “The trauma experienced by generations past having an effect in their descendants”: Narrative and historical trauma among Inuit in Nunavut, Canada. *Transcultural Psychiatry*, *51*(3), pg. 339-369. DOI:10.1177/1363461512467161

Damas, D. (1964). The Patterning of the Iglulingmiut Kinship System. *Ethnology*, *3*(4), 377–388. https://doi.org/10.2307/3772840

Davies, C.D., Niles, A.N., Pittig, A., Arch, J.J., & Craske, M.G. (2014) Physiological and behavioral indices of emotion dysregulation as predictors of outcome from cognitive behavioral therapy and acceptance and commitment therapy for anxiety. Journal of Behavior Therapy and Experimental Psychiatry. DOI: 10.1016/j.jbtep.2014.08.002.

Gelman, A., & Hill, J. (2006) *Data Analysis Using Regression and Multilevel/Hierarchical Models* (Analytical Methods for Social Research). Cambridge: Cambridge University Press. doi:10.1017/CBO9780511790942

Goldin, P. R., McRae, K., Ramel, W., & Gross, J. J. (2008). The neural bases of emotion regulation: reappraisal and suppression of negative emotion. *Biological psychiatry*, *63*(6), 577–586. https://doi.org/10.1016/j.biopsych.2007.05.031

Hackett, C., Feeny, D., & Tompa, E. (2016) Canada's residential school system: measuring the intergenerational impact of familial attendance on health and mental health outcomes. *J Epidemiol Community Health,70*, pg. 1096-1105. DOI: http://dx.doi.org/10.1136/jech-2016-207380

Harder, H. G., Rash, J., Holyk, T., Jovel, E., & Harder, K. (2012) Indigenous Youth Suicide: A

Systematic Review of the Literature. Pimatisiwin: *A Journal of Aboriginal and Indigenous Community Health*, *10*(1), p. 125-142

Hatkevich, C., Penner, F. & Sharp, C. (2019) Difficulties in emotion regulation and suicide ideation and attempt in adolescent inpatients. *Psychiatry Research, 271*, p. 230-238. DOI: https://doi.org/10.1016/j.psychres.2018.11.038

Inuit Tapiriit Kanatami (2021) *Maps of Inuit Nunangat (Inuit Regions of Canada)*. Retrieved from: https://www.itk.ca/maps-of-inuit-nunangat/

Iwama, M., Marshall, M., Marshall, A., & Bartlett, C. (2009) Two-Eyed Seeing and the Language of Healing in Community-Based Research. *Canadian Journal of Native Education*, *Vol 32*(2) p3-23.

Kral, M. J. (2012) Postcolonial Suicide Among Inuit in Arctic Canada. *Cult Med Psychiatry, 36*, pg. 306-325 DOI 10.1007/s11013-012-9253-3

Kral, M. J. (2013) "The Weight on Our Shoulders Is Too Much, and We are Falling" Suicide among Inuit Male Youth in Nunavut, Canada. *Medical Anthropology Quarterly*, *21*(1), pg. 63-83. DOI: 10.1111/maq.12016

Kral, M. J. (2016) Suicide and Suicide Prevention among Inuit in Canada. *The Canadian Journal of Psychiatry*, *61*(11), 688–695. https://doi.org/10.1177/0706743716661329

Kumar, M. B., & Tjepkema, M. (2019) *Suicide among First Nations people*, *Metis, and Inuit* (2011-2016): Findings from the 2011 Canadian Census Health and Environment Cohort (CanCHEC). National Household Survey: Aboriginal Peoples, Statistics Canada. Retrieved from: https://www150.statcan.gc.ca/n1/pub/99-011-x/99-011-x2019001-eng.htm#a5c

Litwin, L., Hankey, J., Lucassen, M., Shepherd, M., Singoorie, C., & Bohr, Y. (2023).

Reflections on SPARX, a self-administered e-intervention for depression, for Inuit youth in Nunavut. *Journal of Rural Mental Health*, *47*(1), 41-50.https://doi.org/10.1037/rmh0000218

McIntosh, C. N., & Fischer, D. G. (2000). Beck's cognitive triad: One versus three factors. *Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement*, *32*(3), 153–157. https://doi.org/10.1037/h0087110

Merry, S.N., Stasiak, K., Shepherd, M., Frampton, C., Fleming, T., Lucassen, M.F.G. (2012) The effectiveness of SPARX, a computerised self-help intervention for adolescents seeking help for depression; randomised controlled non-inferiority trail. *BMJ, 344*, e2598. DOI:

Morris, M., & Crooks, C. (2015) Structural and Cultural Factors in Suicide Prevention: The Contrast between Mainstream and Inuit Approaches to Understanding and Preventing Suicide. Journal of Social Work Practice, Vol. 29(3), pg. 321-338. DOI: https://doi.org/10.1080/02650533.2015.1050655

Nelson, S. E. & Wilson, K. (2017) The mental health of Indigenous peoples in Canada: A critical review of research. *Social Science & Medicine, Vol 176*, pg. 93-112. DOI: https://doi.org/10.1016/j.socscimed.2017.01.021

Nunavut Department of Education (2007) Inuit Qaujimajatuqangit Education Framework. Nunavut Department of Education, Curriculum and School Services Division.

Ochsner, K.N., Silvers, J.A. & Buhle, J.T. (2012), Functional imaging studies of emotion regulation: a synthetic review and evolving model of the cognitive control of emotion. *Annals of the New York Academy of Sciences, Vol 1251*(1), pg. E1-E24. https://doi.org/10.1111/j.1749-6632.2012.06751.x

Rolston, A. & Lloyd-Richardson, E. (2020) What is emotion regulation and how do we do it?

Cornell Research Program on Self-Injury and Recovery, Cornell University.

Saladin d'Anglure, B. (2005) The 'Third Gender' of the Inuit. *Diogenes*, *208*, pg. 134-144. DOI: 10.1177/0392192105059478

Singer, D., & Willett, B., *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence* (New York, 2003; online edn, Oxford Academic, 1 Sept. 2009), https://doi.org/10.1093/acprof:oso/9780195152968.001.0001, accessed 10 Nov. 2022.

Smith, D., Varcoe, C., & Edwards, N. (2005). Turning around the intergenerational impact of residential schools on Indigenous people: Implications for health policy and practice. *Canadian Journal of Nursing Research, 37*(4), 38–60

Stanley, B., Brown, G., Brent, D. A., Wells, K., Poling, K., Curry, J., Kennard, B. D., Wagner, A., Cwik, M. F., Klomek, A. B., Goldstein, T., Vitiello, B., Barnett, S., Daniel, S., & Hughes, J. (2009). Cognitive-behavioral therapy for suicide prevention (CBT-SP): treatment model, feasibility, and acceptability. *Journal of the American Academy of Child and Adolescent Psychiatry*, *48*(10), 1005–1013. https://doi.org/10.1097/CHI.0b013e3181b5dbfe

Stevenson, M.G., & Wenzel, G.W. (1997) Inuit, whalers & cultural persistence: structure in Cumberland South & central Inuit social organization. *Arctic, 50*(3), 207

Tester, F. J., & Irniq, P. (2008) Inuit Qaujimajatuqangit: Social History, Politics and the Practise of Resistance. *Arctic, 61*(1), 48-61.

Tester, F. J., & McNicoll, P. (2004). Isumagijaksaq: Mindful of the state: Social constructions of Inuit suicide. *Social Science & Medicine, 58,* 2625–2636. doi:10.1016/j.socscimed.2003.09. 021

Thomas, A., Bohr, Y., Hankey, J., Oskalns, M., Barnhardt, J., & Singoorie, C. (2022) How did

Nunavummiut youth cope during the COVID-19 pandemic? A qualitative exploration of the resilience of Inuit youth leaders involved in the I-SPARX project. *International Journal of Circumpolar Health, 81*(1), 2043577. DOI: https://doi.org/10.1080/22423982.2022.2043577

Wabano, M. J. & Young, N. L. (2012) *Aaniish Naa Gegii? (The Aboriginal Children's Health and Well-Being Measure –ACHWM).* Wikwemikong Health Centre, Laurentian University.

Walls, M. L., Hautala, D., & Hurley, J. (2014). "Rebuilding our community": Hearing silenced voices on Indigenous youth suicide. *Transcultural Psychiatry, 51*(1), 47–72. doi:10.1177/1363461513506458

Appendix

Table 2

Demographic characteristics:

Variable	*n* = 118
Youth Gender	
Female	56%
Male	42%
Transgender	2%
Age	*M* = 18 (*SD* = 3.12)
Community Distribution	
Igloolik ᐃᒡᓪooᓕᒃ	7%
Arctic Bay (Ikpiarjuk) ᐃᒃᐱᐊᕐᔪᒃ	4%
Iqaluit ᐃᖃᓗᐃᑦ	8%
Cambridge Bay (Iqaluktuuttiaq) ᐃᖃᓗᒃᑑᑦᑎᐊᖅ	11%
Rankin Inlet (Kangiqtiniq) ᑲᖏᖅᑎᓂᖅ	3%
Arviligjuaq (Kugaaruk) ᑯᒑᕈᒃ	12%
Kugluktuk ᑯᒡᓗᒃᑐᒃ	11%
Pond Inlet (Mittimatalik) ᒥᑦᑎᒪᑕᓕᒃ	4%
Repulse Bay (Naujaat) ᓇᐅᔮᑦ	2%
Baker Lake (Qamani’tuaq) ᖃᒪᓂ’ᑐᐊᖅ	1%
Hall Beach (Sanirajak) ᓴᓂᕋᔭᒃ	8%
Taloyoak ᑕᓪoyoᐊᒃ	14%
Whale Cove (Tikirarjuaq) ᑎᑭᕋᕐᔪᐊᖅ	1%
Gjoa Haven (Uqsuqtuuq) ᐅᖅᓱᖅᑑᖅ	9%
Other*	6%

*Other locations indicate locations that were not provided on the drop down menu in the survey or Inuit youth who live outside Nunavut Territory.

Table 3

Outcome Measures – Questionnaire items in order of question number as they were presented to the youth and linear mixed model results for all questions.

Number	Question	β	β_0	P	T	DF
10.1	I feel loved by other people around me.	3.73	0.39	0.0004	3.73	92
10.2	Even when things aren't going well for me, I remind myself that things will get better.	3.55	0.36	0.0007	3.50	92
10.3	Learning is hard for me.	3.07	-0.02	0.9000	-0.13	92
10.4	I laugh and have fun.	3.49	0.34	0.0004	3.78	92
10.5	I have enough energy.	3.19	0.37	0.0004	3.76	92
10.6	I feel like I matter in my community.	3.34	0.41	0.0004	4.17	92
10.7	I have hope for my future.	3.60	0.25	0.0230	2.31	92
10.9	I think learning is an important part of my future.	3.77	0.27	0.0096	2.65	92
10.10	I feel connected to the land.	3.44	0.27	0.0250	2.28	92
10.11	I appreciate what I have.	3.79	0.41	0.0001	4.15	92
12.1	Sometimes I feel like giving up.	2.94	0.09	0.4400	0.77	92
12.2	I get a good night's sleep.	3.02	0.47	0.0000	4.50	92
12.3	There is at least one really good person in my life who is there for me.	3.84	0.20	0.1000	1.68	92
12.4	I feel lonely.	3.05	0.30	0.0180	2.60	92
12.5	I get mad or cry when something small goes wrong.	3.20	-0.005	0.9700	-0.04	92
12.7	When I feel a bad mood coming on, I have tools I can use to make myself feel better (e.g. talking to a friend, writing about how I'm feeling).	3.10	0.38	0.0011	3.38	92
12.8	I make healthy choices that send me on a good path in life.	3.27	0.29	0.0087	2.68	92
12.9	I have time on my own to relax with an activity I like (e.g. music, sports).	3.37	0.43	0.0001	4.11	92
12.10	I can recognize when I'm having gloomy or negative thoughts.	3.43	0.27	0.0160	2.45	92
12.11	I often get in a bad mood.	2.90	0.30	0.0040	2.95	92
13.1	I think that knowing about cultural practices (storytelling, country food, craft making, traditional healing, spirituality, etc.) is important.	4.05	0.11	0.3100	1.02	92
13.2	I have activities that can help me when I'm feeling upset or stressed.	3.41	0.40	0.0005	3.59	92
13.3	I am able to replace gloomy or negative thoughts with more positive ones.	3.24	0.33	0.0045	2.91	92

13.4	When I get sad or upset, I get over it quickly.	3.22	0.33	0.0013	3.32	92
13.5	I feel like hurting myself when I'm upset or angry.	3.58	-0.05	0.6300	-0.48	92
13.6	I feel overwhelmed by everything I have to do.	2.94	-0.03	0.8200	-0.22	92
13.7	I'm comfortable asking for support when I need it.	2.92	0.54	0.0000	4.67	92
13.8	I feel safe in my community.	3.60	0.31	0.0036	2.99	92
13.10	I get so worried that I feel it in my body (for example, I feel butterflies in my stomach or my shoulders get tense).	2.91	-0.12	0.3200	-1.01	92
13.11	I hurt other people when I am upset or angry.	3.44	0.11	0.4026	0.84	92
14.1	I miss doing things that used to be fun.	2.33	-0.13	0.2800	-1.09	92
14.2	There are things in my life that make me happy.	3.78	0.27	0.0048	2.89	92
14.3	I am physically active (on the land, organized sports, playing with friends, etc.).	3.14	0.29	0.0200	2.45	92
14.4	I have strategies that help solve conflict with others.	3.06	0.45	0.0000	4.62	92
14.5	I spend time listening to and learning from elders.	2.96	0.36	0.0011	3.37	92
14.6	I break things when I am upset or angry.	3.64	0.04	0.7300	0.34	91
14.8	I feel like my relationships at school are positive.	3.34	0.18	0.0800	1.79	92
14.9	I feel like good things will happen.	3.54	0.23	0.0300	2.20	92
14.10	I have strategies that I can use to help myself cope with gloomy or negative thoughts.	3.27	0.43	0.0000	4.55	92

**Questions 10.8, 12.6, 13.9, and 14.7 are exempt from the list as they are validity questions such as “Please choose ‘Always’ for this question”