The Impact of the Aboriginal Youth Mentorship Program on Risk Factors for Type 2 Diabetes in Children

by

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ABSTRACT

Statement of Problem: Aboriginal youth are at greater risk of Type 2 Diabetes (T2D) compared to non-Aboriginal youth. Diabetes prevention strategies need to consider cultural factors that are embedded within an ecological perspective.

Methods: Photovoice was used to explore the meanings of T2D and the Aboriginal Youth Mentorship Program (AYMP). Also, a non-randomized crossover experimental trial was performed on children. Grade 4 students were offered a 5 month intervention led by high school mentors. The main outcome measures were WC and BMI z score.

Results: Results indicate that youth were very hopeful that T2D can be prevented or managed through nutrition and physical activity. They believe that AYMP can help with T2D prevention, through learning positive health behaviors, but also by enhancing social determinants of health related to education, employment and social support networks. After the intervention, the change in WC was significantly lower in the intervention group compared to the control group ($p < 0.05$).

Conclusion: Findings from this research study show that AYMP may be a successful program in teaching positive lifestyle behaviors while supporting social determinants of health; the combined biological and social outcomes can benefit students in reducing their risk for T2D.

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This image and the following information about the Circle of Courage® was obtained with permission from https://www.reclaiming.com/content/about-circle-of-courage. To learn more about the Circle of Courage®, please visit the website or book, Brendtro, L., Brokenleg, M., & Van Bockern, S. (2002). Reclaiming youth at risk (Rev. ed.). *Bloomington, IN: National Educational Service*.

INTRODUCTION

This Master's of Science thesis includes two studies that investigate the health benefits of the Aboriginal Youth Mentorship Program (AYMP) in relation to risk factors for Type 2 Diabetes (T2D) on children and youth. AYMP is a communal, relationship-based mentorship program where high school mentors plan and deliver an afterschool physical activity, nutrition and education program for early years children. In the first study, the meaning of the high school mentors' experience in AYMP as related to T2D and T2D prevention was investigated. In the second study, we tested the hypothesis that the AYMP was effective in attenuating waist circumference and BMI Z score for Grade 4 students participating in the program. Furthermore, we hypothesized that changes in adiposity would be associated with increases in self-efficacy related to peer interactions and civic responsibility. Combined, the two studies were designed to further our understanding regarding the efficacy of peer mentoring interventions in attenuating risk factors for T2D in youth.

Each study is presented independently as a stand-alone paper. The Review of Literature includes literature pertaining to T2D, including biological factors and social determinants of health, set within an ecological framework that acknowledges the impacts of colonization on Aboriginal peoples' health[i]. The Methods includes a description of the qualitative and quantitative research activities used in both studies, which are further developed in papers presented in Study 1 and Study 2. While efforts have been made to reduce the replication of information across the literature review, qualitative and quantitative studies, some overlap is unavoidable due to each section offering the same intervention and study context. The

[i] I am often conflicted with which terminology I should use. For this document, I have chosen to use Aboriginal, in place of Indigenous, as our program is called the Aboriginal Youth Mentorship Program, and the Government of Canada still uses the term Aboriginal.

Conclusion includes a summary of the findings emerging from the two studies, along with recommendations for future research, policy and practice.

As a research assistant working on the larger Aboriginal Youth Mentorship Program research project, I was responsible for collecting and analyzing pilot data related to the impact of AYMP on attenuating risk factors for T2D at one study site. Upon analysis of this data, I was first author in a peer-reviewed publication of the findings that I include, in its entirety, in the appendix. Given that my thesis research builds on the findings of this earlier co-authored study, and given my substantial role in the overall conduct of this study, I have included this paper in the appendix of my thesis.

While the two studies presented represent my Masters thesis, each was part of a larger research project investigating the impact of AYMP on T2D for Aboriginal children and youth (primary investigators Drs. Jonathan McGavock and Joannie Halas). Given the community-based nature of the larger research project, which respected the principles of ownership, control, access and possession, Aboriginal community members have exercised responsibility for key aspects of the research design from the outset. As such, it is important to note that the two research questions identified, as well as the research methods employed, were requested and/or approved by the community advisory board. Recognizing the collaborative nature of this community-based research project, throughout this document I will often use the words “our” or “we” to describe the research activities. My intent in using these words is to represent everyone involved in the project, including the investigators, community members, and in particular, the youth and early years mentors. Everyone has played an important role in this project and deserves to be recognized.

REVIEW OF LITERATURE

Type 2 Diabetes

Type 2 Diabetes (T2D), once considered a disease limited to older adults in the upper social class, is now one of the fastest growing health threats worldwide, affecting people of all ages and disproportionately affecting individuals in the lower social classes[1]. In 2000, the worldwide number adults living with diabetes was approximately 171 million, and is predicted to double by 2030[2]. Rising rates of T2D are mainly due to changes in human environments that lead to weight gain (i.e. sedentary lifestyle and excessive calorie intake), and the increased access to processed foods[3,4]. Furthermore, gestational diabetes has been shown to be a risk factor for obesity, glucose intolerance, T2D and earlier onset of T2D in children born from diabetic mothers[5]. In Canada, the prevalence of T2D among adults has increased 70% in the last decade[6]. Worldwide, Indigenous[ii] people are disproportionately affected by T2D. In Canada, the prevalence rate of T2D is 2.5 to 5 times higher than the general population, and Aboriginal people experience higher rates of morbidity and mortality due to disproportionately higher rates of diabetes-related complications[7]. Despite the increasing and disproportionate rates of T2D among Aboriginal people in Canada, few prospective studies have applied strengths-based approaches to understand this inequity or intervene to reduce rates.

The factors that contribute to the disproportionate rates of chronic diseases among Aboriginal people are, in large part, social in nature, and not genetic[8]. For example, a survey of 1500 Aboriginal people living in Saskatchewan in 1937 did not reveal a single case of T2D. By 1990, almost 10% of the adult Aboriginal population of Saskatchewan was living with T2D, and that rate doubled to 20% by 2006[9]. These trends in Saskatchewan have been documented in other

[ii] I use the term Indigenous peoples to refer to the original peoples within a geographic space outside of Canada.

provinces in Canada[7,9]. The increasing prevalence of T2D is not restricted to adults; rates have been increasing in children and adolescents since the first reported case in the mid 1980's[10] (Figure 1). Currently, children as young as 8 years old are being diagnosed with T2D[11].

While the development of T2D was once considered impossible in children, there has been an increase in the prevalence of T2D in youth over the past three decades[12]. In Manitoba, the incidence of T2D in youth is 12-25 fold greater than rates in other provinces in Canada[13,14] (Figure 2). The majority of these youth are Aboriginal and live in northern remote communities[13]. Additionally, a majority of these youth are significantly younger at diagnosis, compared to children in other ethnic groups. They are also less overweight/obese than other ethnic groups[15]. Also, there is a greater prevalence in females than males[12]. These trends are concerning as youth with T2D have a greater burden of diabetes-related complications, and complications present earlier than youth with Type 1 Diabetes (T1D)[16].

There are many causes for the increased risk of T2D and associated complications among Aboriginal youth. These include both biological (i.e. rising rates of obesity and unique private mutations in diabetes-risk genes) and sociological/historical (i.e. stress, colonization, residential schools)[1]. The adverse effects of colonization on the emotional, physical, mental, and spiritual health of Aboriginal people cannot be ignored[17]. To understand the increased risk of T2D in Aboriginal children, a socio-ecological framework is essential.

T2D is more than a disease of physical inactivity, screen time and inadequate diet; we must also "acknowledge that how Aboriginal children live, play, eat and drink, spend their leisure time, etc. are not merely individual choices, but often have social, cultural, economic, and environmental determinants[17]." Figure 3 shows the multiple layers that influence obesity among Aboriginal children, however it can also be applied to T2D. The different factors are all related,

Figure 1. Incident Rate of Type 2 Diabetes in Children in Manitoba[13]

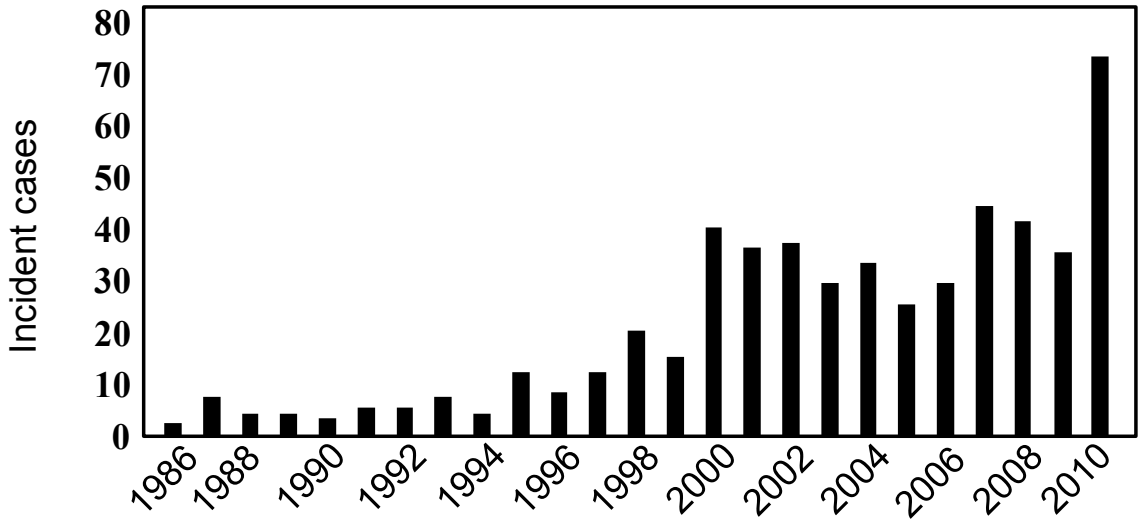
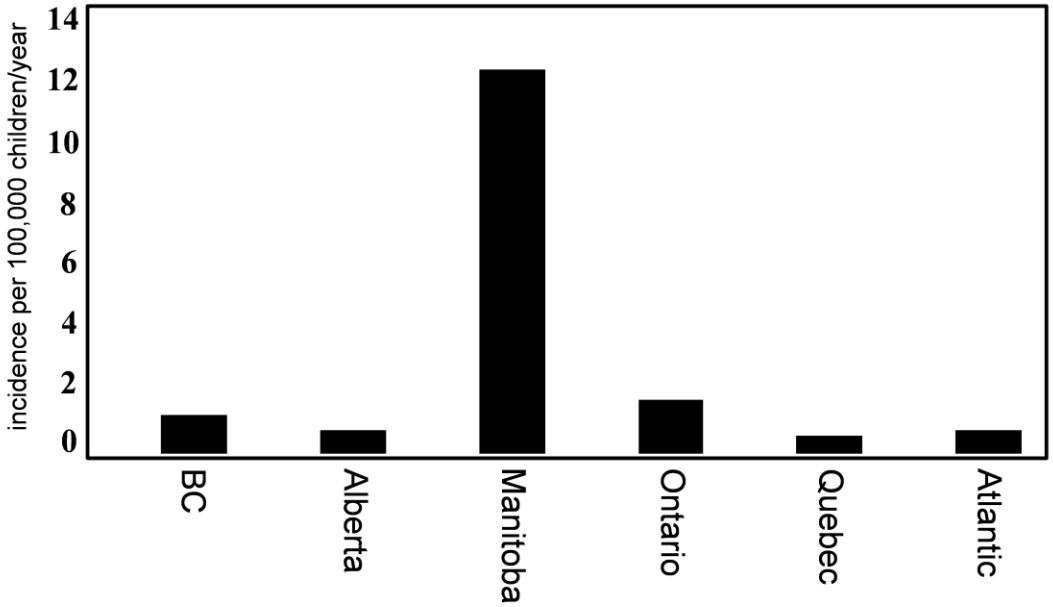


Figure 2. Canadian Incident Rate for Type 2 Diabetes in Children[13,14]

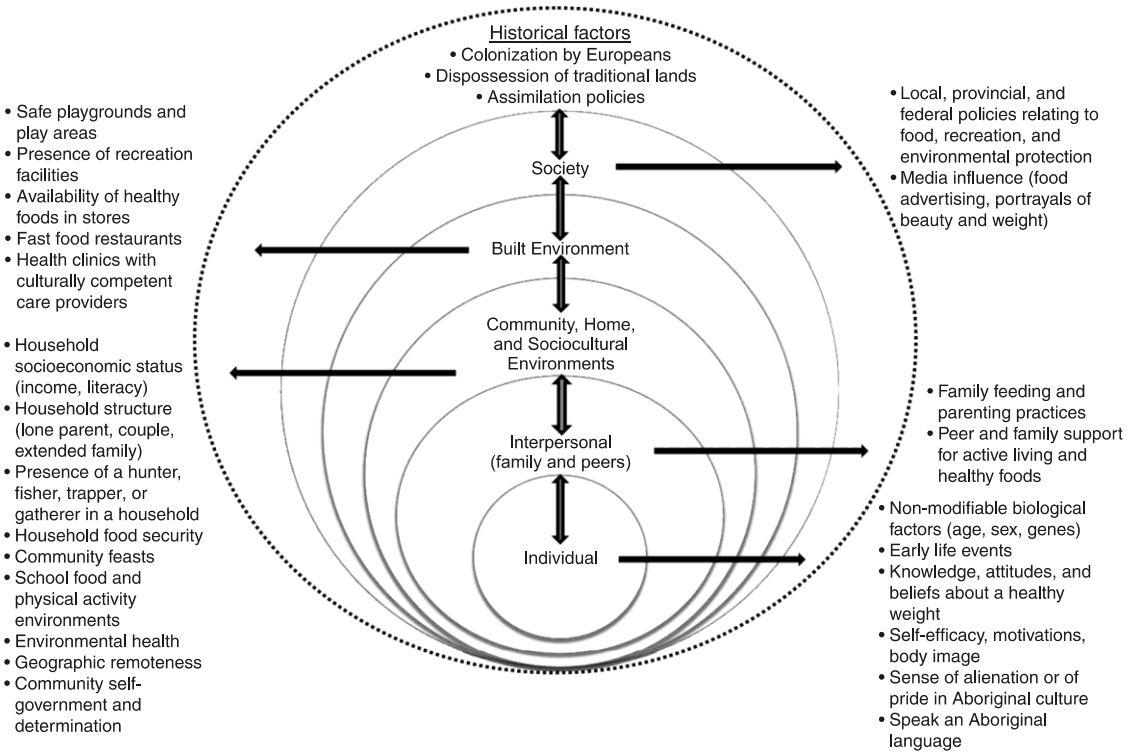


as they have bidirectional arrows. Historical factors are the outermost layer, as they influence all of the ecological levels. The other interconnected factors are: 1) society; 2) built environment; 3) community, home and sociocultural environments; and 4) interpersonal factors. These interconnected factors influence one's risk exposure to health disparities and can be read within colonization and social determinants of health discourses.

The outer ring describes the determinants of obesity and T2D that uniquely face Aboriginal people in Canada[17]. Colonization practices attempted to destroy traditional ways of hunting and gathering, introduced harmful substances and diseases, and shattered language and culture for Aboriginal communities in Canada[18]. As a result of the Indian Act, the loss of traditional land and the subsequent enforced reliance on the Canadian government, access to healthy foods and physical activity has decreased in a number of these communities. Additionally, trans-generational stress has led to significant burden of poor mental health and chronic disease among Aboriginal peoples in Canada[19]. Indian residential schools played a major role in the health of Aboriginal people. Children were forced to leave their families and attend schools where they were taught to be ashamed of their languages and cultural traditions[19]. Students of those schools are at a higher risk of mental and physical health problems, compared to children that did not attend[8]. Furthermore, children of Indian residential school survivors are also at a greater risk for poor health[19].

The cumulative, devastating effects of colonization continue to present day. As such, there is an urgent need for intervention programs aimed at preventing T2D and reducing risk factors among rural Aboriginal youth. These programs should incorporate theoretical frameworks that are sensitive to the social and biological determinants of T2D.

Figure 3. Ecological Model for Understanding Obesity



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Social Determinants of Health

Social Determinants of Health (SDOH) are the "economic and social conditions that shape the health of individuals, communities and jurisdictions as a whole."[20] They are primary indictors for health of individuals. In Canada, there are 12 recognized social determinants, which include early life, education, employment and working conditions, food security, gender, health care services, housing, income and its distribution, social safety net, social exclusion, unemployment and employment security, and Aboriginal status[20]. These determinants cannot be ignored in the prevention and management of T2D as they are vital to mental health, access to

healthy foods, hope and resilience[21]. There is increasing literature related to the "importance of the social determinants of health in population health in general and the incidence and management of diseases such as diabetes[22]." In the following sections, I identify how each SDOH impacts Aboriginal people's health in relation to T2D.

Early Life

Early life may be one of the most important social determinants of health. Societal factors, which may include poverty, illiteracy and illness or disease, that occur during early life can have powerful influences on lifelong health and wellbeing[23]. To combat potential negative societal factors, the Canadian government has put emphasis on early childhood education (ECE)[24]. Yet, as Raphael notes, by comparison to other wealthy developed nations, Canada lags behind in societal support for ECE[20]. ECE includes any program, activity, and/or experience that are intended to promote the overall health and education of children under the age of 9, including daycare, preschools and family resource centers. This is particularly important for Aboriginals peoples, as they are the fasting growing and youngest cohort in Canada[25,26]. Most educational programs are rooted in Western ideologies that are individual, competitive, and outcomes driven and do not incorporate Aboriginal ways of knowing and learning[27]. For Aboriginal people, learning is a lived experience, which cannot be easily measured through formalized tests[27]. The lack of Indigenous-based models for early life education could be considered a modern day form of residential school activity that deprives Aboriginal youth of access to language and culture.

Many communities have created their own curriculum for ECE, which privileges Aboriginal pedagogy[24]. This includes incorporating wait times between teacher's questions and student's answers and stressing the importance of experiential learning and service learning. It also includes promoting Aboriginal languages and culture[24]. One study found that using

Aboriginal language and culture among students was linked to improved educational outcomes[24]. With better educational outcomes, students are more prepared for school[28]. This will result in more students continuing from early years education through to completing high school and pursuing post secondary education, which will translate into more employment opportunities and income. In relation to this study, the Aboriginal Youth Mentorship Program (AYMP) intervention (described in detail below) provides young children in Grade 4 (8 years of age) with exposure to culturally appropriate and safe healthy physical activities, nutrition, and positive role models through their participation in the mentorship program. Importantly, as I will show later, the program incorporates Aboriginal teachings and cultural practices and provides opportunities for children to be engaged in positive ways as an experiential form of diabetes education at the early childhood level.

Education

Education is an important SDOH as it is directly correlated with income. Estimates suggest that as many as 50% of First Nations people, living in First Nations communities, have not graduated from high school[25]. Despite the decrease in drop out rates across Canada, drop out rates for Aboriginal students is higher. Manitoba has the lowest school attendance rates among Aboriginal students, compared to any other province in Canada[29]. Recent data suggest that only 33.7% graduate high school[29]. One reason for this may be that education systems do not account for differences in learning and teaching. While many First Nations schools use Aboriginal ways of teaching and passing on knowledge, post secondary education privileges Western ideologies and ways of knowing. Students who are not exposed to Western forms of teaching and learning styles may be at a disadvantage as they progress through the public education system[24].

Another important consideration is the disparity in federal funding for band schools versus provincially funded public schools. In Manitoba, First Nations schools receive approximately 60% of the funding received by public schools. This inequity impacts on the quality of education experienced by Aboriginal students, including within physical education[30]. With more limited access to quality educational opportunities, students are less likely to pursue post secondary education, which can impact employment and employment security and health.

Employment and Working Conditions & Unemployment and Employment Security

Employment and health are positively correlated. Aboriginal peoples are less likely to participate in the workforce, and for those that do, have a higher unemployment rate than the Canadian average (19.1 vs. 7.1%)[26]. Aboriginal peoples annual earnings are also significantly lower than the Canadian average[26]. One factor preventing Aboriginal peoples from entering the workplace, is social exclusion, which may result in anxiety, low self esteem and feelings of hopelessness[26]. Combined, these factors impact Aboriginal peoples' health. Because children are exposed to the systemic structural barriers that their parents encounter, their health is also impacted[20].

Food Security

Food insecurity is the lack of available nutritionally adequate and safe foods[31]. For Aboriginal peoples, two main components that affect food insecurity are availability of food, and one's ability to purchase food[32]. Remote communities are less likely to have basic food items, such as fruits and vegetables, available for purchase[33]. Also, location of communities and lack of transportation makes certain foods more difficult to obtain, due to weight, time it takes to spoil, and refrigeration needs[32]. Community members have little control over when, how often, and what kind of food is available for purchase at their store[31]. This reduces autonomy and ability to

access healthy foods. The second component that affects food insecurity is one's ability to purchase healthy foods. Healthy food is more expensive and time sensitive than other foods[32].

As previously mentioned, many Aboriginal peoples earnings are lower than the Canadian average[20]. If you are feeding a large family, one needs to consider how far their limited income can go. Limited funds can make control over what one buys very difficult. One research study found that individuals who did not have food security reported poor general health, life dissatisfaction, and high stress[33]. In relation to preventing T2D, it is difficult for a family to choose healthy foods when the unhealthy choices are often the most accessible and least expensive.

Gender

Women in Canada experience more adverse social determinants of health than men[34]. Women are less likely than men to finish high school and receive a diploma[20]. They are also less likely to be working full-time and earn unemployment benefits, and earn less than men, regardless of their occupation[34]. Aboriginal women tend to use health care services more than men[35]. Due to more adverse social determinants of health, women are at higher risk for cardiometabolic conditions such as T2D [34].

Health Care Services

To benefit from health care systems, individuals must have physical, political, and social access to those services, which is often not the case for Aboriginal peoples[26]. Health services in Canada are provided based on the assumption that individuals and families can afford costs that are related[20]. These include transportation, prescription medication or over the counter medication, time away from work, and childcare. "Health then becomes a powerful determinant of health by virtue of its neutrality or presumptuousness regarding these hidden costs of full

access"[20]. Health services in Canada are highly correlated with geography[25]. Over one third of First Nations people living on reserve feel they do not have adequate access to health care services[26].

Housing

Health Canada census data showed that 28% of homes in First Nations communities were below the adequacy standards[25]. This is 10 times the percentage of the Canadian average[25]. Similarly, 12% of homes in First Nations communities did not have enough space and bedrooms for the number of residences [25]. "Lack of affordable housing has created situations of overcrowding in First Nation and Inuit communities as well as homelessness for Aboriginal people living in urban areas"[26]. Due to overcrowding and inadequate ventilations, many homes have created health problems for Aboriginal children, mainly asthma and allergies[26]. Health problems such as asthma, can limit physical activity, which could increase the risk of developing cardiometabolic conditions like T2D.

Income and its distribution

Health Canada found that 25% of adults in First Nations communities had a total annual income of less than $5000, compared to 10% of the Canadian population[25]. Also, Aboriginal peoples were less likely to make more than $60,000 annually, compared to the total Canadian population (3.6% vs. 19.2%)[26]. One of the main factors relating to this gap is education[20]. Income is an important determinant of health as it may have an impact on other determinants such as access to health services, food security, social exclusion, and early life. In the absence of government policy that seeks to address income inequality at the societal level, children's health will continue to be impacted[20].

Social Safety Net

The social safety net refers to benefits, programs and supports that protect citizens during various life changes that affect their health[34]. Raising children, attending school, seeking housing, retiring are some examples of life changes. Unemployment insurance is one example of a social safety net. It provides funding for individuals without employment who meet the criteria[34]. However, it is unavailable to many people, and of those that do receive it, it is not enough to cover monthly costs of necessities such as housing and food[20,34]. Many First Nations communities do not have access to many of the programs[36]. As Raphael notes, the current political ideologies driving Canada's liberal welfare state reduce societal problems to the individual level, thus leaving many children vulnerable[20].

Social Exclusion

As previously mentioned, social exclusion, including racism, is one of the major factors related to unemployment in Aboriginal peoples. A recent study showed that 32.6% of Aboriginal people had personally experienced racism in the last year[26]. Over 50% stated that it had some impact on their self-esteem. Social exclusion also impacts individuals' social support networks, health care access, and education as well as access to sport and recreation opportunities[20,25,37].

Aboriginal Status

In Canada, Aboriginal status is a SDOH. This is mainly due to the residual effects of colonial history and policy on Aboriginal peoples. As illustrated in the examples provided above, Aboriginal peoples fair worse than the rest of Canada on almost all of the social determinants of health, but mainly education, employment, access to health care, and social exclusion[20,26]. There are four main historical events that resulted in negative SDOH for Aboriginal peoples in Canada[20]. First, The Indian Act was passed in 1876. As a result, many First Nations communities

were relocated to less desirable land[18]. This made it difficult for communities to hunt and harvest crops[31]. As a result, food security issues arose. At the same time, many communities were struggling with new diseases, such as the measles and smallpox, which drastically impacted the health of communities[18,20].

Second, the government disregarded Metis land claims in 1869[20]. This occurred at a time when Metis families were economically flourishing. As a result of losing their land, Metis peoples began to struggle financially and faced racial prejudice, which limited job opportunities.

Third, Inuit communities were also forced to relocate in the 1930s. This resulted in loss of hunting conditions and traditional food supplies[20]. Inuit communities were forced to find a new way of living, while also struggling with outbreaks of tuberculosis.

Fourth, the introduction of residential schools in 1849 had a vast impact on the SDOH of Aboriginal peoples[20]. There were approximately 100 residential schools across Canada. Some of the negative consequences of residential schools include loss of identity, language, culture and ability to parent[19]. As mentioned earlier, intergenerational trauma due to the Indian Residential Schools is recognized as negatively impacting health outcomes today, and leaves Aboriginal peoples at greater risk for diseases such as T2D[38].

In summary, prevalence of T2D is high in Aboriginal communities which are disproportionately impacted by interconnected biological and socio-historical factors, including the impacts of colonization and on-going government policy (e.g., inadequate funding for First Nations schools) that continue to oppress Aboriginal communities today. Aboriginal people, including children and youth, are disproportionately affected by SDOH; accordingly there is an immediate need for interventions designed to address the ecological factors impacting T2D prevention.

Previous Prevention Studies

The Canadian Diabetes Association guidelines have called for culturally appropriate prevention programs designed for Aboriginal children[39], however, it appears that only a few school-based interventions have been tailored to address these issues from an ecological perspective with the aim of preventing obesity and T2D in Aboriginal youth[39]. Two of the studies took place in Canada and used community-based participatory action models[40,41].

The Sandy Lake Health and Diabetes Prevention Project (SLHDP) was a school-based intervention delivered in a remote Oji-Cree community in northern Ontario for children in grades 3-5[40]. The program focused on four components: school curriculum, family support, peer influence, and environmental changes. The curriculum component included the school-based intervention, which provided education on healthy eating, physical activity, and diabetes within a culturally relevant context. This education was extended to family members of the children, making up the family component of the program. The peer component provided opportunities for the children to act as mentors/role models within their community, through cooking and radio shows. The environmental component of the program included banning high-fat and high-sugar snack foods in school as well as providing a healthy lunch program. Evaluation of the program indicated a significant improvement in: knowledge about foods low in fat, overall health knowledge, dietary self-efficacy, and meeting dietary fiber intake recommendations[40]. However, body mass index (BMI) (21.5 vs. 20.5 kg/m^2) and body fat (31.0 vs. 29.8 %) increased among the students. In the absence of a control group, the true effect of the intervention is unknown[40].

The Kahnawake School Diabetes Prevention Project (KSDPP) was a community wide intervention project that took place between 1994 and 2002[41]. It was aimed at promoting healthy eating and active lifestyles among youth living in the community. This school-based prevention

program focused on children in grades 1-6. There were four components: health education curriculum, community activities, development of capacity and environmental and policy changes. The health education curriculum focused on topics such as T2D, healthy nutrition, physical activity and fitness. Community activities included regular use of the newspaper and radio to advertise topics in the health education curriculum, promote events, and collaborate with other community organizations. The development of a capacity component focused on promoting healthier environments and stronger social norms for healthy behaviors, nutritional choices and physical activity. The environmental and policy change component focused on banning junk food and building walking/cycling paths in the community.

Early longitudinal data showed an increase in physical activity, physical fitness, and a decrease in television and video-gaming time in children in the school[41]. Also, children in the elementary school displayed a reduction of triceps skin folds without any change in BMI[41]. Unfortunately, these improvements were not maintained for the duration of the study[42]. Similar to the Sandy Lake prevention program, body mass index (BMI) (19.5 vs. 18.9 kg/m^2) and body fat (skinfolds 12.5 vs. 10.0 mm) increased among the students between 1994 and 2002.

A third study, which took place in the United States, Pathways[43], evaluated the effectiveness of a school-based intervention to prevent or reduce excess weight gain in elementary children using a three year randomized control trial. The intervention consisted of four components: classroom, food service, physical education, and family involvement using several Indigenous models. The classroom component promoted healthy eating behaviors and increasing physical activity levels. The food service provided nutritional guidelines and tools for reducing fat in school meals. The physical education component aimed to implement three 30-minute physical activity sessions containing American Indian Games. The family involvement

component was used to introduce families to the intervention and helped create an environment for learning about healthy behaviors. There were no changes in percentage of body fat, BMI, or skinfold measurements after the three year intervention. However, the intervention group had a significantly lower total daily energy intake (1892kcal/d vs. 2157kcal/d, p=0.003) and percentage of energy from total fat (31.1% vs. 33.6%, p=0.001) compared to the control group. Also, the intervention group had significantly higher self-reported physical activity levels compared to the control group (0.27 vs. 0.24, p=0.001), however objectively measured physical activity was not different between the groups[43].

A commonality between these three pediatric trials was the community-guided model; however, these approaches were grounded largely in Western approaches to obesity. There is evidence that interventions that target culture and connection with Indigenous teachings are more effective than Western-based approaches. Data from a pilot randomized trial among Pima American Indian adult compared the effects of a standard Western-based model of diabetes prevention (Pima Action) to a culturally relevant model that promoted history and culture (Pima Pride) among 95 members of the community[44]. The main emphasis of Pima Pride was self-directed learning, facilitated by an application of Pima culture. Monthly small group meetings were held to discuss an understanding of current lifestyles and listen to local speakers about culture and history, facilitated by a community leader. Newsletters with Pima poetry, stories and folklore were also circulated. Pima action was a standard weight loss intervention with dietary knowledge and suggestions for physical activity aimed at achieving a weekly deficit of 700-1000 kcal. At 12 months following the intervention the Pima Pride cohort experienced an attenuated gain in fasting insulin (-5.6 pmol/L, p = 0.02), weight (-1.7 kg, p = 0.06) and 2 hr glucose (-1.3 mmol/L, p =0.007). These data, while collected in adults, suggest that culturally appropriate

interventions have been more effective than standard Western approaches for the prevention of T2D among Indigenous people.

Collectively, these studies suggest that community-based participatory action approaches are important for engaging Indigenous youth in prevention studies. However, the models to date have not been effective at reducing the risk of T2D among youth. Recent school-based interventions in Canada suggest that peer mentoring is an attractive alternative for promoting behavior change in youth[40-43]. To the best of our knowledge, none of these school-based interventions relied on peer mentoring approaches to elicit behavior change. Although the SLHDP had a peer component, children in the program did not personally interact with other students. Therefore, the effectiveness of peer mentoring for prevention of T2D among Aboriginal youth remains unclear.

There have been two benchmark school-based experimental studies in children, which showed improvements in body weight. Both of these studies used peer mentoring in the intervention[45,46]. One of the studies was a Canadian intervention called Healthy Buddies© that focused on healthy eating, physical activity, and self-efficacy in early years students using middle years students as peer mentors. Using a quasi-experimental design, the research team enrolled middle year buddies (grades 4-7) to learn healthy-living lesson plans from their teachers, which they would then deliver to their younger buddies (grades K-3). The 21-week curriculum consisted of 3 main components of healthy living: being physically active (Go Move!), eating healthy foods (Go Fuel!), and having a healthy body image (Go Feel Good!). Healthy Buddies© attenuated weight gain in students in grades 4-7, while weight increased in the control group, which received the standard age appropriate curriculum[45].

The province of Manitoba conducted a clustered randomized controlled effectiveness trial of the Healthy Buddies© curriculum in 19 schools to determine if the effect size observed in the original study could be maintained when delivered at the provincial level[46]. The intervention was delivered over the course of a single school year and led to a significant reduction in waist circumference (-1.60cm; [95% CI: -2.28 to -0.91]; $p < 0.001$) in both early and middle years students. Additionally, the early years students in the program had significant improvements in self-efficacy, healthy eating knowledge, and healthy physical knowledge. Impressively, the intervention was nearly twice as efficacious in First Nations children compared with non–First Nations children (treatment effect, −2.5 cm [95% CI, −4.2 to −0.8] vs. −1.3 cm [95% CI, −2.0 to −0.6])[46].

Researchers at the University of British Columbia adapted the Healthy Buddies© program to be more culturally relevant for Aboriginal children[47]. They met with Aboriginal communities and obtained feedback to include culturally relevant content and visual aids. Images were changed to resemble Aboriginal children, and foods and activities were improved to include traditional foods and activities. The program was piloted in three remote Aboriginal communities; Gitga'at, Gitkxaahla, and Lax Kw'alaams, to study its effectiveness in reducing BMI Z score, waist circumference, and blood pressure. BMI Z score (effect size, -0.16, [95% CI: -0.28 to -0.02]) and waist circumference (effect size, -0.1, [95% CI: -4.34 to 0.74]) decreased significantly in the intervention group, compared to the control group. Also, 13% of the intervention group moved to a normal waist circumference (from one in the 90th percentile) compared to 3% of the control group[47]. This is of relevance, as waist circumference in one of the top predictors for T2D in children. This appears to be the first school-based program to show significant reductions in BMI Z score and waist circumference in Aboriginal children in Canada.

Although the Healthy Buddies© curriculum is established as an efficacious peer-based mentoring model for promoting health in children, there are a few limitations that make it difficult to implement into Aboriginal communities. First, although adapted for First Nations communities in British Columbia, it still does not include any cultural teachings. Secondly, it requires significant time commitments by teachers, and unfortunately turnover rates of educators in Aboriginal communities are quite high[48]. Finally, it requires a significant systematic change to the educational curriculum. Given the provincial jurisdiction of education and the local control of schools via school boards, implementation of Healthy Buddies© across a wide-range of schools and communities is problematic and would require a significant infusion of time and resources to implement across the board.

The Aboriginal Youth Mentorship Program (Rec and Read)

Community-based researchers in the Faculty of Kinesiology and Recreation Management at the University of Manitoba have developed a culturally informed peer-based after-school program that overcomes these limitations that may be an attractive alternative[49]. With the help of physical education researchers Amy Carpenter and Joannie Halas, Aboriginal youth worked together in a participatory action research project designed to develop a cultural approach to urban after-school physical activity programming[49]. As a result of this research collaboration, a communal, relationship-based, peer mentoring program emerged called the Rec and Read/Aboriginal Youth Mentorship Program for All Nations (AYMP), that is grounded in a strengths-based approach to youth health and considers the social challenges that Aboriginal youth face[50,51].

Within Rec and Read/AYMP, peer mentoring is considered the personal development of two of more people. Relationships are reciprocal. Individuals are called mentors, as opposed to

leaders, because the program seeks to shift the traditional age and experience-based hierarchies typically found in groups that are formed using Western values and ideologies. Rather, all individuals involved are viewed as equal. Mentors may be the same age or can vary in age. Peers include the early years mentors, high school mentors, community mentors, and university mentors. Everyone learns for and from each other, and throughout the program, an equitable sharing of the planning and delivery of the program is promoted[52].

Rec and Read is informed by Aboriginal teachings and worldviews that target four components of wellbeing that relate to healthy weights: healthy food, healthy play, education, and healthy fun. Using a Medicine Wheel theoretical approach, the program is designed to improve wholistic health in youth by incorporating the components mentioned above and two guiding principles (The Circle of Courage®, and The Four R's)[51,53,54] (Appendix 1). Over time, a mentor manual has been created for the high school mentors describing the evolving theoretical framework and Aboriginal teachings that guide the program (Appendix 2). The first guiding principle is the Circle of Courage®, developed by Brendtro, Brokenleg and Van Bockern[55] (Appendix 3)[iii]. The following is an overview of how the Circle of Courage® has been interpreted within the mentor program.

The Circle of Courage® focuses on four universal human needs that will create positive youth growth and development: Belonging, Mastery, Independence, and Generosity[55]. Indigenous scholar, Dr. Martin Brokenleg believes that behavior change cannot happen until a sense of belonging is established[55]. Belonging will occur when there is trust, inclusion, friendship and cooperation. The Rec and Read program promotes Belonging by allowing everyone to participate and feel comfortable in the program. In the very first mentorship program, belonging was established by first claiming important activity space (e.g., a multi-

[iii] To learn more, please visit https://www.reclaiming.com/content/about-circle-of-courage.

purpose room and gymnasium) that affirmed the mentor's identities within the school. A second strategy for developing belonging was the addition of healthy snacks into the daily programming, which proved to be an attractive social function that brought the children, youth and adults together[49]. As more mentor programs have been offered, different strategies for belonging have surfaced. For example, youth often share stories and experiences with the early years mentors. In the program running in Garden Hill First Nation, one of the high school mentors would often share music he created with the early years mentors.

After belonging is established, the model proposes that youth can work towards mastery. The Rec and Read program uses low organized games instead of competitive sports. This includes games such as Banana Tag, where everyone is always involved and playing (see Appendix 2 for examples). High school mentors are encouraged to take on leadership roles within the programming, which can include communicating with the children and teaching the games. Opportunities to peer teach are built into the programming days, thus allowing high school mentors to practice the skills needed to run an effective program[51].

The next proposed universal human need is independence. The Rec and Read program empowers youth by allowing them to create the program for the early years mentors. From the very start, high school mentors were seen "as strong individuals who were more than capable of making decisions that were right for them"[49]. The high school mentors are primarily involved in choosing the games and snacks for the program. Young people are not just seen as leaders for the future, but they can provide responsible leadership in the present[53].

The last proposed universal human need is generosity. An example of generosity within the Rec and Read program is that high school mentors volunteer their own time and energy for

the program. From the very start, this aspect of service learning has been viewed as a key motivational factor for why young people return each week to the mentorship program.

A second set of guiding principle is The Four R's, developed by Kirkness[54]. The Four R's presented by Kirkness are Respect, Relevance, Responsibility, and Reciprocity. Starting in the eastern quadrant of the medicine wheel, the program incorporates Respect through encouraging early years and high school mentors to be themselves, and promoting the strengths they offer to the program. It is about trusting one another to do our best[51]. In the southern quadrant, the program incorporates Relevance by creating a stress-free zone for Aboriginal youth to be active and involved in teaching activities that are important to themselves and their community. This includes teaching youth Traditional Aboriginal Games, such as Gentle Always Wins and Dog Soldier, which adds to the depth and breath of the activity outcomes experience in this program[49]. In the western quadrant, the program promotes Responsibility by encouraging the youth to develop the program themselves. They work together to understand and reduce systemic barriers (for example, by creating access to after school recreation spaces that are often limited for children and youth) by accepting responsibility for both themselves and their community[49]. In the northern quadrant, the program incorporates Reciprocity, as the high school mentors share their strengths, abilities and talents with each other. They volunteer their free time to deliver this program to the early years mentors and in doing so, they also learn from the children, illustrating a two-way reciprocity that aligns with Aboriginal values and teachings[51].

In terms of health promotion, this may be the first peer mentoring model focusing on Aboriginal youth that relies on high school students to deliver an intervention grounded in Indigenous teachings. Our research team proposed to adapt the Rec and Read peer mentoring program, currently named the Aboriginal Youth Mentorship Program (AYMP), into three

northern communities. Between 2009 and 2010 we piloted this study in the elementary school in Garden Hill First Nation, Manitoba and found that students participating in the program had a significantly lower increase in their waist circumference, compared to the control group (0.34cm vs. 2.87cm, $p < 0.01$)[56] over the winter school semester (Appendix 4). We also found that during the same time interval, BMI Z score significantly decreased in the intervention group, compared to the control group (-0.05 vs. 0.04, $p < 0.01$). It remained unclear if these effects would be observed in a larger sample of youth and what the contextual factors would be that contribute to these early positive findings.

While the urban Rec and Read Mentor Program emerged from a large, community-based interpretive research study that investigated a cultural approach to urban Aboriginal sport and physical activity[51], we have yet to conduct more interpretive inquiries regarding the experience of the AYMP in the northern programs[40,41,43,47]. We incorporate the term cultural approach as a means to recognize the complexity of the diverse cultural landscapes that Aboriginal youth bring with them as they participate in the mentorship programs. Nieto and Bode define culture as "the values, tradition, worldview, and social and political relationships created, shared, and transformed, by a group of people bound together by a common history, geographic location, language, social class, religion, or other shared identity[57]." Accordingly, youth mentors bring with them cultural manifestations that are both tangible (e.g., food, dress) and intangible (e.g., communication styles, family relationships)[57]. These manifestations are embedded within societal power relations that traditionally privilege the dominant (white, middle class, European) culture as the norm. As such, Rec and Read was originally designed to interrupt the oppressive social hierarchies that impact on Aboriginal youth's access to and experience of sport and physical activity in the community. The Indigenous worldviews and cultural teachings that

currently inform Rec and Read emerged over time as a result of a series of inter-connected qualitative studies.

We have yet to investigate the effect of the program on the high school mentors and their lived experiences as mentors. Most peer mentoring studies have focused their energy and attention on the mentees, rather than the mentors[45-47]. However, there has been some evidence that shows volunteering can have positive effects on the health of youth[58]. One study found that social support, including friends and peers, has been shown to be an important factor associated with changes in healthy diet behaviors and physical activity[59]. Another study found that volunteering reduced BMI (0.39; 95% CI, -0.07 to -0.71), cholesterol (log10 mean difference, -0.03; 95% CI, -0.003 to -0.059), and inflammatory markers in high school students, and promoted positive health behaviours[58]. Similar data do not exist for Aboriginal youth delivering peer mentoring interventions in rural Aboriginal communities. We will overcome this limitation in the literature by using the established qualitative photovoice method to explore the contextual factors associated with being a mentor in the AYMP program.

Community-based Participatory Action Research

There has long been a history of unethical research conducted with Aboriginal people, in particular, helicopter type research, whereby scientists collect data in communities, use the data for scientific publication and do not consult with or report findings back to the community[60]. Researchers have visited communities with predetermined research questions, collect data and leave the community without presenting results back to those who provided the data[61]. The type of research is “oppressive, paternalistic, unethical, and insufficient”, leaving little benefit for the communities and often creating harm. More recently, changes to ethical protocols have illustrated how communities have had a more positive experience with research when they are

involved in the process, have their voices heard and is important to them[61]. A research approach that is a good fit to establish those principles is community-based participatory action research.

The KSDPP has been a revolutionary project that exemplifies the adoption of community-based participatory action in university-community partnerships for research[62]. To ensure the project was a successful partnership between researchers and the community, four principles were put in place: 1) The community members were equal partners in the research project, 2) The evaluation and intervention components of the project were designed and implemented together, 3) There needed to be flexibility and adaptation in the program and intervention, 4) The project needed to be a learning opportunity for everyone[62]. The community also created a Code of Research Ethics, which outlines the processes for approval, data collection and management, dissemination and knowledge translation[62]. This study also paved the way for The First Nations Principles of Ownership, Control, Access and Possession (OCAP) of data[63].

The SLHDP used a number of these principles in the Code of Research Ethics to create successful sustainable projects in the community[64]. They aimed to create partnerships that are rooted by mutual respect, shared decision-making and ownership of the project and results, and the ability to adapt the interventions to increase their relevance to the community. These principles are parallel with The First Nations Principles of OCAP, meaning that Aboriginal peoples own, control, access, and possess all of the research information collected in studies[63].

Our research team has worked diligently to follow The First Nations Principles of OCAP and create respectful partnerships with the communities we work with. We created an advisory committee made up of teachers, elders, young adults and stakeholders. This committee was involved in the decision-making process, as well as approval of all decisions related to the research study. Also, at least one member of the committee was asked to attend presentations

regarding the project. All presentations and publications were reviewed and approved by the advisory committee before it is shown to the public.

Limitations of Previous Efforts

As noted by the Canadian Diabetes Association guidelines, interventions designed to address T2D needs to respect the cultural integrity of Aboriginal peoples within their communities[39]. While the other school based interventions have cultural aspects embedded within them, they did not produce results to indicate they are effective in attenuating the risk factors for T2D[40,42]. With regard to the Healthy Buddies© program, the peer mentoring approach was effective in reducing risk factors, however, the sustainability of this program is limited due to its reliance upon delivery within the school day. Also, although one Healthy Buddies study tried to incorporate culturally relevant material, including questionnaires, they did not change the program to be more culturally relevant[47]. Given the limitations of these previous interventions for youth, this thesis research seeks to investigate the health benefits of the AYMP in relation to T2D, using both quantitative and qualitative research activities.

Summary

T2D is one of the fastest growing chronic illnesses worldwide and disproportionately affects Indigenous people from all continents. In Manitoba, the incidence of T2D in youth is 12-25 fold greater than rates in other provinces in Canada[13,14]. The majority of these youth are Aboriginal and live in northern remote communities[13].

Few studies have explored the effects of culturally informed peer mentoring interventions on T2D prevention in Aboriginal communities. AYMP is a communal, relationship-based mentorship program where high school mentors plan and deliver an afterschool physical activity, nutrition and education program for early years children. Findings from the two studies outlined

in the next chapters will be used to 1) inform the delivery of AYMP in relation to T2DM by enhancing our understanding of how the youth experience the program, and 2) illustrate the efficacy of culturally-based peer mentoring in mediating the risk factors for T2DM.

METHODS

The purpose of qualitative research is to get a deep understanding of a specific topic through first hand experience, truthful reporting, and quotations of actual conversations[65]. Also, it attempts to understand how participants derive meaning form their surroundings, and how their meaning influences their behavior. It provides comprehensive insight into the setting of a problem, generating ideas and/or hypotheses for later quantitative research[66].

The purpose of quantitative research is to explain phenomena by collecting numerical data that are analyzed using mathematically based methods[67]. It is to generalize results from a sample of the population of interest and identify statistical relationships. Typically, quantitative data have larger sample sizes and specific variables that are studied.

Research Aims and Hypothesis

The primary aim of this study was to determine the health benefits for children and youth participating in AYMP, using both quantitative and qualitative methodologies. In addressing this question, we explored how AYMP can reduce waist circumference and increase self-efficacy in First Nations youth in grade 4 attending school in rural sites in Manitoba. We do not yet fully understand why the improvements in waist circumference occur, and qualitative methods were used to help understand the contextual factors that may have contributed to this outcome obtained through the lens of Aboriginal youth delivering the program. We also expanded our pilot study to see if AYMP will still reduce waist circumference and increase self-efficacy among Aboriginal youth in grade 4 compared to youth not participating in the program when the program is scaled up from 1 community to 2. As such, this thesis presents the findings of two inter-connected studies. Both studies employed a post-positivistic epistemological approach and

are designed to acknowledge both the biological and social factors that contribute to T2DM in Aboriginal youth, as interpreted within a socio-ecological framework.

STUDY 1 – A Qualitative Investigation of the Experience of Being a Mentor in the Aboriginal Youth Mentorship Program

Research Question

The primary research question is: "How do the Aboriginal high school mentors understand their experience of the Aboriginal Youth Mentorship Program, including how the program helps in relation to diabetes prevention and how it works?"

Research Design

For the interpretive aspect of the study, we chose to use photovoice to engage the high school mentors, as it is a commonly used method where people can identity, represent and enhance their community through photography[68]. Photovoice falls within the qualitative research paradigm and applies interpretive approaches to increase our understanding of a phenomenon, in this case, the experience of AYMP by high school mentors[69]. During photovoice, participants use cameras to take pictures and capture their experiences and understandings[70]. They later talk about their pictures in a group setting. Photovoice builds trust, balances power, creates ownership and builds capacity[70]. It can also help increase participant involvement during group discussions.

The voices of Aboriginal youth are valuable to understanding health and health related outcomes[71]. The photovoice project included high school mentors from Wabowden, Manitoba. I chose this group in place of the early year mentors and high school mentors from other communities because I have worked with them the most and built a stronger bond with the school-community. All high school mentors from Mel Johnson School in Wabowden, Manitoba were invited to participate in this study, regardless of how long they were in the program. There were four phases to the photovoice research activities.

Phase I

The first two phases were preparation for data collection where high school mentors had the opportunity to learn about photovoice and decide if they wanted to participate in the research project. The first phase occurred in Winnipeg, Manitoba on November 28th, 2013. Elder Mary Courchene provided an opening to the morning activities, which included a smudging ceremony. Using methods developed by Dr. Heather McRae during her PhD research[72], we organized a workshop with the youth to describe the photovoice process and facilitated an activity applying what they learned. Specifically, students were given cameras and asked to take pictures related to health as part of the workshop activity. Next, students were asked to describe the photo (Appendix 5). After the workshop, the high school mentors were then given consent forms that invited them to continue participating in the project (Appendix 6).

Phase II

High school mentors that provided consent were invited to the second phase of the study, a practice session. Students were broken into two practice sessions. We did not record these sessions or use them in any way for the research project. However, we used this practice session as an opportunity for high school mentors to think about the photovoice project and the questions we may be discussing. This session took place in Wabowden, Manitoba, and incorporated photos of mentorship activities taken throughout the year by the teachers and students. We used this collection of photos are practice for the actual data collection, which took place in phase III. We printed these photos and presented them at the practice session. Using our two theoretical frameworks (i.e. Circle of Courage® and Four R's), we provided the high school mentors with a large poster of the Medicine Wheel and asked them to place pictures in the components they believe the picture best fits. They were then asked what was happening in the photo and why

they chose that picture and the specific component. Having the high school mentors interpret their own photos allowed them to construct their own meanings and helped the research team understand their cultural perspectives[71]. It also allowed us to gain a better understanding of how the theoretical concepts are experienced within the AYMP. We then asked the high school mentors what they thought of this practice activity. Due to their positive response, we decided to use the same technique for the third phase of the study. The final phase involved member checking, which took place after the transcription of the data was complete and themes were identified.

Data Collection

Phase III

The third phase was completed in May 2014, after the final week of the AYMP intervention at Mel Johnson School. All of the high school mentors were given cameras and asked to take pictures for 14 days that represented: 1) "what mentorship or being a mentor means to you"; 2) "what diabetes means to you"; and 3) "what affects mentorship has had on your health (emotional, mental, physical, and spiritual health)" (Appendix 7). After the 14 days, high school mentors were given the opportunity to look through their photos and select pictures they would like to share. High school mentors were also given the opportunity to attend a private interview or focus group session. We had three sections of questions: Mentoring, Type 2 Diabetes, and Culture (Appendix 8). The photos they agreed to share were printed and brought to the session. The poster with the Medicine Wheel was used again and high school mentors were asked to place their pictures in the components. Photos were used to help facilitate the conversation, and enable the participant's textual voices to emerge. When we began talking

about their pictures, further discussion resulted as they shared the meaning of their photos. These conversations were audiotaped for later transcription.

Research Analysis

Data and photos were kept locked electronically and only accessible to study staff. Participants had the option to remain anonymous or waive their right to anonymity. All of the participants consented to removing their anonymity, as they wanted their names associated with the research project. Transcript Divas Transcription Services based in Toronto, Canada were used to transcribe the data. I then double-checked the transcripts, by reading through the transcript as I listened to the tapes. The transcripts were then read for both common and divergent themes[65]. All of the data was cut and pasted into small narratives or specific statements. As they were read through, they were divided into themes. First, we organized all the data that was specific to diabetes and mentorship. Then we did the same process within those themes to find subthemes; that is, common and divergent perspectives were grouped together and read in relation to the research questions. This method followed recommendations by Patton[65]. These themes were presented in a narrative account that sought to describe the meaning of AYMP from the perspective of the high school mentors. Our relationship with AYMP and the high school mentors, as well as the research literature, were used to inform the analysis of the data.

Phase IV

The themes were also presented to the high school students on three separate occasions to ensure trustworthiness of the data and findings. Students were given the opportunity to add, change, agree, or disagree with the themes that emerged from the focus groups and photovoice discussion. Also, we picked a few photos to help identify and emphasize themes that had

emerged. All of the above activities were in accordance with the ethics protocol H2014:076 approved by the Health Research Ethics Board at the University of Manitoba, in accordance with the Declaration of Helsinki. Findings for a key themes related to the meaning of AYMP in relation to T2D and T2D prevention are presented in a research paper format.

Strengths and Limitations to Photovoice

Photovoice is a common research method used to answer a variety of questions. It has three main goals[73]. First, photovoice enables people to address strengths and concerns of a specific topic. Second, photovoice enables researchers and participants to engage in conversation and helps direct dialogue. Third, it helps reach policy makers and people in positions to create change[73]. Also, photovoice "is a successful decolonizing community-based method that builds trust, balances power, creates ownership and builds capacity[70]." It also allows researchers to be "humble learners", and allows participants to be the experts[70]. Limitations to photovoice include the cost of materials, the time required to collect the data[74] and the risk of "photo elicitation", a form of bias whereby participants provide photos and narratives in an area they expect will please the researcher and not reflect their true experience. Finally, participants may be worried about having the "best" pictures, or have difficulties presenting their ideas through photos[74].

Positionality of the Researcher:

Being reflexive is highly recognized within social science research[75]. Personal reflexivity helps to address a researcher's values, assumptions, experiences, and aims, and seeks to understand how those principles can affect one's research[76]. To remain reflexive, you must know yourself and how you affect and are changed by the research[76]. I am not Aboriginal and did not share the same life experiences or cultural traditions and views as the young people within the communities I worked with. As much as I tried to recognize and learn what it was like growing

up Aboriginal and the supports, strengths, stigmas and barriers these youth experience every day, I did not live their lives and would never completely understand.

Two life experiences shaped my interest and knowledge in research and this research project. My first life experience started when I was born into a family of physical scientists. My father is a professor in computer science, my mother is a mathematician, and my older sister is a surgeon. My entire life has been black or white, right or wrong, with no shades of grey or uncertainty. In high school, I was not allowed to take courses in social sciences, unless they were mandatory for graduation. This has shaped my interests, because all I know are the physical sciences, and that those sciences are "truth". Because of my strong physical science background, I understand quantitative data and statistical analysis more than I do qualitative research. I believe that this life experience is a great asset, but has also held me back from expanding my knowledge of qualitative research and other ways of knowing.

My second life experience began when I started working with Dr. Jonathan McGavock during a fieldwork placement course before completing my undergraduate degree. I worked on AYMP, and I began to think about research differently. I enjoyed going to communities, and meeting people, especially the high school mentors and grade 4 students. After speaking with many of the youth, grade 4 students, parents, and various community members, I realized how much this program has meant for the communities we work with. Many teachers and parents told me the changes they have seen in the youth and grade 4 students that no questionnaire or survey could ever answer. I started to look at research questions differently, and that is why I decided to do a thesis with two research methods. That being said, it was difficult for me to not always jump to logic or literal meanings.

Researchers must constantly locate and relocate themselves within their work[77]. I made sure to continually reflect about how my past life experiences shaped how I viewed this project. I am a post-positivist at heart, and believed that my voice, thoughts, and beliefs should not play a role in the research discussion. I also realized that in interpretive research, I co-constructed the research findings with the high school mentors. As such, I attempted to ensure their voices were represented as authentically as possible and relied on the high school mentors to help me accurately describe their data.

To remain true to the community-based participatory action approach, the high school mentors and I had equal ownership of the data. However, if I decided to use any of their photos for any purpose, including presentations, I would show the high school mentors the finished product for their approval. If they did not approve, I would either modify the presentation with any suggestions they made or remove the photo. I understand that there may have been a power imbalance as I was older than the youth, I had a higher level of education and was more immersed within the overall project. To emphasize our equal partnership, I remained in close contact with the youth to maintain our relationships and continued to build trust. I ensured that there was equal decision making on the themes and context of the study and if there was disagreement about how I interpreted or presented their ideas, I used their interpretation.

STUDY 2 – The Effect of the Aboriginal Youth Mentorship Program on Measures of Type 2 Diabetes Risk in Children - a Quasi-experimental Crossover Trial

Research Question

The primary hypothesis is that AYMP is effective in attenuating waist circumference and increasing self-efficacy in Grade 4 students participating in the program, when compared to a control group. The secondary hypothesis is that AYMP will reduce BMI Z score and increase students' civic responsibility in students participating in the program, compared to the control group.

Research Design

Design:

We used a non-randomized cross over experimental trial (Appendix 9) to test the quantitative study hypothesis. This experimental design was used instead of a randomized control trial because communities did not feel comfortable withholding the program from students wanting to participate in the same grade. In the first year of the program (2012-2013), consent forms were given to all grade 3 and 4 students (Appendix 10). Students in grade 4 were invited to participate, while students in grade 3 acted as our control group. In the second year of the program (2013-2014), the groups crossed over and the intervention was offered to the grade 4 students who acted as the controls the previous year. The grade 4 students from the first year (who were now grade 5 students) served as controls during the second year.

This cross over design was approved by the communities, and allowed us to have a control group matched for period and geography. This study was conducted in accordance with

the ethics protocol HREB: H2008:060 for the AYMP study approved by the Health Research Ethics board at the University of Manitoba, in accordance with the Declaration of Helsinki.

Population:

We recruited students in grades 3 and 4 from elementary schools in Garden Hill First Nation and Sagkeeng First Nation. All students were invited to participate in the program, but we excluded data from students who may not respond to the intervention or could not participate in components of the program. This included children with injuries that would limit physical activity. The intervention was delivered when students were in grade 4 and they served as controls if they were in grades 3 and 5 in year 1 and 2 of the intervention, respectively.

The grade 4 students were targeted for the intervention for four primary reasons: 1) the majority of students in grade 4 were in tanner stage 1 and would not experience puberty-related weight gain; 2) the previous study with this research population showed that attendance is higher in grade 4 students than other grades[56]; 3) the previous study showed that grade 4 students are typically old enough to perform low organized games that may be included in the intervention[56]; and 4) retention rates in the intervention are higher among grade 4 students than other grades[56].

Intervention:

The Aboriginal Youth Mentorship Program was delivered in both schools for approximately 20 weeks between January and May in the 2012-2013 and 2013-2014 school years. High school mentors volunteered their time and developed and delivered a weekly after-school peer-mentorship program which incorporated a healthy snack, 45 minutes of moderate to vigorous physical activity, and educational readings or games. We invited all high school students to volunteer. While we attempted to recruit high school students who were not involved

in sports or after-school activities, we did not exclude any students who wanted to participate. Teachers suggested certain students who would benefit most from the program. We made an effort to personally invite them, but their involvement was voluntary.

High school mentors met twice a week during the semester to plan and deliver the intervention. During the first weekly meeting was a planning session during which high school mentors developed a program for the grade 4 students to deliver later that week. They decided what food and activities they would like to perform and who would be responsible for those tasks. The second meeting involved the delivery of the intervention to grade 4 students, as the high school mentors delivered the program they developed. At the end of meeting, the high school mentors met and discussed how the program went. At the end of the meeting, the high school mentors met in a circle to review what went well, what did not, as well as what they would like to try for the next session. This delivery model aligned with the urban Rec and Read Mentor programs.

Control Condition:

In the 2012-2013 school year, grade 3 students were the control group. In the 2013-2014 school year, the grade 4 students who received the intervention in year 1 crossed over to grade 5 and were the control group. They received "standard of care" which included, physical education according to provincial guidelines, access to school-provided meals and activities before and after school offered by the school or the community.

Outcomes:

The primary outcome measure was waist circumference Z score while the secondary outcome measure was BMI Z score. To answer the primary hypothesis, anthropometric data

were collected prior to and immediately following the intervention. Height was collected twice in centimeters using a Seca 217 stadiometer. Weight was collected in duplicate in kilograms using a Seca 899 flat scale. Waist circumference was collected in duplicate at the height of the iliac crest. The average of the 2 measurements were used to analyze the data and Z score were created to facilitate comparisons between boys and girls across multiple ages. Body Max Index (BMI) was calculated from height and weight measurements.

Exploratory outcome measures included several factors related to the social determinants of health, specifically social environments and social support networks. In addition to the anthropometric data, we asked all the students to answer two questionnaires around self-efficacy. Self-efficacy is one's belief in their ability to complete tasks and reach goals. The first questionnaire, Children's Self-efficacy in Peer Interactions, measured the child's perceptions of their ability to be successful in social interactions. This questionnaire offers both conflict and non-conflict situations and was validated for children in grade 3-8[78]. This questionnaire was used as it showed promising results to identify changes resulting from participation in intervention programs and was easy to administer[78]. The second questionnaire, Civic Responsibility Survey, measured a child's community awareness, knowledge, and investment in helping to improve their community. This questionnaire was validated for students in elementary school[79] (Appendix 11). This questionnaire was used because community members on our advisory committee were interested in civic responsibility as an intervention outcome. We also asked the students participating in the program to answer the Sense of Belonging Scale at the end of the intervention. This scale measured a sense of belonging in AYMP using five questions. This questionnaire was validated for students in grades 3-12[80] (Appendix 12).

<u>Time:</u>

The intervention was delivered for five months between January to May in two consecutive school years (2012-2013 and 2013-2014), each with a seven month wash out period.

Confounding or Interaction Variables:

Age: Age was adjusted for by using Z scores for waist circumference and BMI.

Sex: We adjusted for sex, even though we used Z scores, which adjust for age and sex already, because sex can still impact the change in scores. That is, girls may be more likely to gain Z scores without treatment[81].

Period Effect: Period effect was controlled for in the final analysis in the linear regression model.

Data Analysis

All statistical analyses were conducted using R statistical software and SPSS Version 22. Data was presented as means and standard deviations or means and confidence intervals unless otherwise stated. Due to our unique research design and complex data set, we were not able to assume normality, and had to account for carry-over and period effects. A Linear Mixed Effects Model provided the ability to account for all of these factors when testing for groupwise differences in the outcome measures. The intervention group data was pooled from grade 4 students in year 1 and year 2 of the program. The control group data was pooled from grade 3 students in year 1, and grade 5 students in year 2 of the program.

Waist circumference and BMI was converted to waist circumference Z score, and BMI Z score respectively, to control for differences in age and sex. Waist circumference was converted to waist circumference Z score (WC Z score) based on normative data from age and sex matched children from the NHANES III database. Body Max Index Z score (BMI Z score) was calculated from height and weight measurements and converted to z scores based on data from age and sex

matched children with the WHO database. Weight Z scores were calculated based on data from age and sex matched children from the Centers from Disease Control and Prevention. We also calculated waist-height ratio Z scores (W-Ht ratio Z score) using the NHANES III database. In our pilot study, a sample size of 150 students, with a 1:2 ratio of control:intervention, was enough to detect changes in waist circumference and BMI Z score. Findings are presented in a research paper format in study 2.

STUDY 1- Aboriginal Youth, Peer Mentoring, and Diabetes Prevention: Inserting "Hope" into the Discourse

Abstract

Objectives: The aim of this study was to work collaboratively with Aboriginal youth to 1) understand youths' perception of Type 2 Diabetes (T2D); 2) explore understandings around T2D prevention and management; and 3) explore the role of a culturally informed after school peer mentoring program in T2D prevention.

Methods: This qualitative study took place in spring 2014 in Wabowden, Manitoba. Photovoice research methods were used to explore the meanings of T2D and the Aboriginal Youth Mentorship Program (AYMP). Eight youth in grades 8 to 11 were divided into two focus groups to participate in this study.

Results: Results indicate that youth have an accurate understanding of the biological determinants of T2D and T2D complications. However, they were very hopeful that T2D could be prevented or managed through nutrition and physical activity. They believe that AYMP can help with T2D prevention, through learning positive health behaviors, but also by enhancing social determinants of health related to education, employment and social support networks.

Conclusion: Findings from this research study show that AYMP may be a successful program in teaching positive lifestyle behaviors while supporting acquisition of important social determinants of health; the combined biological and social outcomes can benefit students in reducing their risk for T2D.

Introduction

Understanding the Causes of Type 2 Diabetes

Type 2 Diabetes (T2D) is one of the fastest growing chronic illnesses worldwide, affecting people of all ages and social classes[1]. In Canada, the prevalence of T2D among adults has increased by 70% in the last decade[6]. Worldwide, Indigenous people are disproportionately affected by T2D. In Canada, the prevalence rate of T2D is 2.5 to 5 times higher than the general population, and Aboriginal people experience higher rates of morbidity and mortality due to an increase in diabetes-related complications[1,7]. Diabetes was unknown to Aboriginal peoples in Canada until the 1940s[9].

The increasing prevalence of T2D is not restricted to adults; rates have been increasing in children and adolescents since the first reported case in the mid 1980's[10]. Currently, children as young as 8 years old are being diagnosed with T2D[11]. While the development of T2D was once considered impossible in children, there has been an increase in prevalence over the past three decades[12]. In Manitoba, the incidence of T2D in youth is 12-25 fold greater than rates in other provinces in Canada[13,14]. The majority of these youth are Aboriginal and live in northern remote communities[13]. Also, there is a greater prevalence in females than males[12]. Youth with T2D have a higher risk of diabetes-related complications, and present complications sooner than youth with Type 1 Diabetes (T1D)[16].

The prevention and management of T2D include lifestyle choices related to weight such as eating healthy foods and being physically active[82]. While the traditional lifestyle of Aboriginal peoples was very active and included walking, gathering berries, hunting and fishing, many of these traditional practices have been lost due to the impacts of colonization and acculturation to western influences[19,83].

To better understand T2D, we also need to consider the Social Determinants of Health (SDOH)[20]. These include early life, education, employment and working conditions, food security, gender, health care services, housing, income and its distribution, social safety net, social exclusion, unemployment and employment security, and Aboriginal status[20]. Of these, education is significant as it is directly correlated with income and education credentials are required now for people to be competitive in the labor market[20]. About 50% of First Nations people, living in First Nations communities, have not graduated from high school[25]. Despite the decrease in drop out rates across Canada, drop out rates for Aboriginal students is higher than for non-Aboriginal students. Manitoba has the lowest school attendance rates among Aboriginal students, compared to any other province in Canada, where only 33.7% of students graduate high school[29]. First Nations schools receive significantly less funding than provincial public schools, which impacts the quality of education available for students.

Employment and health are positively correlated[20]. Job and income insecurity have negative effects on an individual's health and can include a decrease in physical activity, increase in smoking, poor diet, and a loss of social support[84]. Aboriginal peoples are less likely to participate in the workforce, and for those that do, they have a higher unemployment rate than the Canadian average (19.1 vs. 7.1)[26]. One factor preventing Aboriginal peoples from entering the workplace, is social exclusion, which may result in anxiety, low self esteem and feelings of hopelessness[26]. Women and Aboriginal people are among the groups in Canada identified as higher risk of experiencing social exclusion[20]. A recent study showed that 32.6% of Aboriginal people had personally experienced racism in the last year[26]. Over 50% stated that it had some impact on the self-esteem. Social exclusion defines the inability of certain subgroups to participate fully in Canadian life due to structural inequalities in access to social, economic,

political and cultural resources[20]. A barrier to learning and wellness is the lack of sense of belonging and social connections. When adults are impacted by these factors, their children's health is also affected.

Type 2 Diabetes: The "sugar disease"

For diabetes prevention initiatives to be effective, they must respect Aboriginal culture, ways of knowing, and perspectives[39]. Yet, few studies have explored how Aboriginal people understand T2D. Of these, many have found that Indigenous people around the world coin T2D the "sugar disease"[83,85-88]. Aboriginal people believe that it is introduced from the outside of the community[88]. They often consider the "five White foods (sugars, salt, milk, lard and flour)" as foreign to Indigenous people around the world[88]. Elimination of these foods is essential to preventing T2D. However, this is difficult as traditional food practices (hunting, fishing…) are difficult to replicate in cities where many Aboriginal peoples have migrated to and currently live[83]. Traditional food practices are also difficult in communities as "pollution and other consequences of white manipulation and destruction of the environment, such as through hydroelectric projects and other development initiatives" have negatively impacted the land[86]. They also believe that food additives, chemicals and pollution also cause T2D, as these are not common in the Indigenous world[88].

T2D has many impacts on Aboriginal peoples. "The diagnosis of diabetes depends strictly on the sweetness of the blood, yet the lived experience of the disease can include many features[87]." These include mental distress, such as depression, anxiety, and inability to concentrate. Some Aboriginal peoples in Manitoba believe that T2D is a he/she rather than an it. They also believe that people who have passed away, were "taken" by their T2D[89]. There is a need for cultural approaches to diabetes prevention. Partnerships between community leaders,

health care professionals and funding agencies are essential to engage entire communities and promote change to prevent the risk of diabetes[39].

Cultural Approaches to Diabetes Prevention

Community-based researchers in the Faculty of Kinesiology and Recreation Management at the University of Manitoba developed a culturally informed peer mentoring physical activity program that may help reduce the risk of T2D in youth. The program is called the Rec and Read/The Aboriginal Youth Mentorship Program for All Nations (AYMP), and was first developed as a participatory action research project that invited Aboriginal youth from north Winnipeg to co-create a physical education leadership program at their school[51]. Combining the need for culturally-relevant, theoretically-based physical activity spaces for Aboriginal youth with a desire to address the under-representation of Aboriginal students in faculties of physical education and kinesiology throughout Canada, Rec and Read/AYMP has emerged as an award-winning after school physical activity, nutrition and education program[49].

Since the pilot of its first program in 2006, Rec and Read/AYMP has been offered over 50 times in Manitoba schools, involving 1500+ high school and elementary students and 230 university students and community mentors. In 2010, Rec and Read was first adapted for delivery in a northern First Nation community as part of an interdisciplinary research project investigating the efficacy of culturally based peer mentoring approaches to diabetes prevention. Pilot research findings were promising, illustrating meaningful reductions in risk factors for diabetes among First Nations youth who participated in AYMP[56].

AYMP is grounded in a strengths-based approach to youth health and considers the social challenges that Aboriginal youth face[50,51]. It is informed by Aboriginal teachings and worldviews that target four components of wellbeing that relate to healthy weights: healthy food, healthy

play, education, and healthy fun. AYMP recruits high school students to develop and deliver an after school peer-mentorship program to children in a neighboring elementary school during the months of January to May. An underlying philosophy of AYMP is that all youth have leadership potential and as such, all high school students are invited to volunteer in the program.

High school mentors meet twice a week. On the first day, high school mentors plan a program of activities for the students that incorporates a healthy snack, 45 minutes of moderate to vigorous physical activity, and educational readings or games. They decide what food and activities they would like to incorporate, and who will be responsible for leading each of the tasks. On the second day, the high school mentors meet with the elementary students, usually grades 3-5, and deliver the program activities they planned. At the end of the activity day, the high school mentors gather to discuss how the program went. Using a de-briefing circle format, each mentor provides her or his perspective about what went well, what did not go well, and what the group might try for the next week's activities.

Cultural teachings are foundational to the training and preparation of high school mentors, which are set within a Medicine Wheel format (see Appendix 1). Two key Indigenous teachings guide the mentorship activities: the Circle of Courage® and The Four R's[53,54]. Collectively, the high school mentors promote belongingness through respect of all participants across age groups; mastery through attention to relevant activities; independence through the sharing of responsibility for all aspects of the program; and generosity through reciprocity, where everyone learns for and from each other. These key program components and how they are interpreted have been informed by our work with Ojibway Elder Mary Courchene and Aboriginal educators. We also infuse traditional Aboriginal games passed on to the high school mentors by a local knowledge keeper.

While the theoretical model was first developed with significant input from urban Aboriginal youth, our research team has yet to investigate how high school mentors in our northern programs understand their experience of AYMP, including how the program helps in relation to diabetes prevention and how it works. In order to address these questions, we initiated a photovoice project involving high school students in AYMP at one northern mentor site.

Methods

All high school mentors from Mel Johnson School in Wabowden, Manitoba were invited to participate in this study. Wabowden is a small town of approximately 550 people. It is located in northern Manitoba, about 630 kilometers from Winnipeg. It is about 110 kilometers from Thompson. Aboriginal people represent 71% of northern Manitoba (Statistics Canada). All of the high school mentors provided consent and took part in the photovoice project. Students were given the opportunity to remove their anonymity. All students approved to do so. We had nine students; four males and five females from grades 8 to grade 11 participate.

Each student was given a camera and asked to take pictures for the next two weeks (i.e. 14 days). We asked them to take photos that represented: 1) what diabetes means to you; and 2) what affects mentorship has had on your health (emotional, mental, physical, and spiritual health). After the 14 days, high school mentors were given the opportunity to look through their photos and select pictures they would like to share. High school mentors were also given the opportunity to attend a private interview or focus group session. All of the high school mentors chose focus group sessions.

The AYMP site coordinator divided the students into two groups, based on how comfortable they felt with each other. One student was missing from the focus group sessions; therefore we interviewed eight students in the end. The photos they agreed to share were printed

and brought to the session. The poster with the Medicine Wheel was used and high school mentors were asked to place their pictures in the components. When we began talking about their pictures further discussion resulted as they shared the meaning of their photos. Having the high school mentors interpret their own photos allowed them to construct their own meanings and helped the research team understand their cultural perspectives. It also allowed us to gain a better understanding of how the theoretical concepts are experienced within the AYMP.

The final phase was member checking, done after the transcription was completed and themes emerged. Students were involved in editing all copies of the paper. Finally, the final copy of this paper was shared with the students and teachers, and they approved of the paper and all the interpretations.

Results

Youth Perceptions of Type 2 Diabetes

To better understand how youth relate AYMP to Type 2 Diabetes, we first needed to know how they define diabetes. When asked, what is diabetes, youth said, "high blood pressure… disease of the blood… high cholesterol… not good for your blood, heart." Most of the youth did not know the difference between Type 1 and Type 2 Diabetes, however they all assumed that their family members had Type 2 Diabetes, as that was the type they most commonly hear about. When asked what they thought people's perceptions about people with diabetes were, Shelley-May said, "hereditary," Andi said "overweight," and Alexander said, "eating poorly." All responses pointed to individual lifestyle factors.

When asked how they learned about diabetes, and specifically how they knew that healthy eating and physical activity helps prevent and/or control diabetes, all of the youth agreed that they learn about it in their grade 9 health class. They also learned it from AYMP and

through TV. Many remarked that most of their learning took place when they were at conferences, such as the National Aboriginal Diabetes Association conference in November 2013 and the 5th Conference on Recent Advances in the Prevention and Management of Childhood and Adolescent Obesity in October 2014. They had been invited to these conferences as guest speakers to share their experience in the mentor program.

When asked what diabetes meant to them, Jonah replied, "blood clot, your sugar goes out of balance." In a follow up interview, we asked youth to elaborate more on the term blood clot. Andi said, "blood gets too thick and doesn't get to some parts of your body." The other youth nodded. Alexander said, "checking your blood sugar," and that, "when your sugar goes out of balance … you can lose a leg or something." Shelley-May added that "you get sick." We asked her to elaborate and she said that "you feel weak, have nerve damage… body is not working as well, [it is] giving up." She said it was more like a "long term sick, not just a cold" and that it "gets worse and worse if you don't do anything." Andi said, "and then when you have diabetes you have to watch that kind of stuff [sugar] and then like it kinda gets difficult 'cause you can't just eat what you want, you have to like make sure that you know." All of the youth agreed that T2D was not something they would want anyone to have.

Diabetes Provokes Fear

The general feeling that came up relating to diabetes was fear. Geena said that diabetes is scary, because "you can't get rid of it." The other youth agreed with her, saying "there's no going back." Jonah added that it is "unpredictable" and that people wish "they never gone down that path." They also agreed that it is not fun. Alexander's father has T2D, and he said, "I don't know, doesn't seem fun to have… I know he's always poking his finger with some stuff."

Shelley-May agreed, and said that diabetes “doesn’t seem like something you would want to have” and that it would be difficult.

Figure 4. It Is Never Too Late To Make Changes

Yet, It Is Never Too Late

Shelley-May said, “but just because you have it, doesn’t mean you can’t do anything. You can still eat healthy and be active.” She showed a picture with a check mark for water, and an x for coke (Figure 4). She said changes like that could help. We then asked the other youth what someone with diabetes could do. They all agreed that diabetes can be controlled through lifestyle; the largest influences being physical activity and healthy eating. Jonah said that people with diabetes could “try preventing it from causing more serious damage” simply by just “eating healthier and being a little more healthier actively.” For Jonah, active includes activities that involve running to make you sweat (Figure 5.) Shelley-May said that, “you will always have

diabetes, but can treat it, like you can slow it down, and eat healthy to not suffer from diabetes." They also said, "you don't need to be on medication," because you can exercise and eat healthy.

Figure 5. How To Keep Active

Type 2 Diabetes is Preventable

When asked if they thought diabetes could be prevented, all of the youth said yes. They agreed that physical activity and healthy eating contributed the largest in T2D prevention. The youth described healthy eating as eating more fruits and vegetables, limiting fats and carbohydrates, such as rice and bread, and having treats in moderation (ex. at a birthday). Shelley-May said, "so if you have healthy eating and regular diet, stuff like that, and exercising, then you have less chance of having diabetes unless it's like hereditary." Everyone agreed. They said that physical activity "keeps you healthy" and you have a lower chance of getting T2D.

The (Yet to be Realized) Potential of Diabetes Education

Everyone knew someone, mostly a relative that had T2D. They all agreed that if they had the chance to share their knowledge with someone with T2D, they would try to. Having said that, none of the youth had yet shared their knowledge. Geena said she would tell them "that you can control it … by doing like some physical activity and eating right." Everyone agreed with her. When asked why they have not shared anything yet, the youth said they had not had the opportunity. Jonah said he would like to tell someone, "they could try preventing it from causing more serious damage… just by eating healthier and being a little more healthier actively." He elaborated, "that's something I would tell them, I never got any chance to talk to them yet." Everyone agreed with Jonah. These responses suggest opportunities for knowledge exchange with families and circles of friends in the future.

We asked the youth if people in the community talk about their diabetes and they all agreed that it was very private, involving "just family and people you can trust." When asked why, Tarance said that he thought, "people feel embarrassed or ashamed of their diabetes." Shelley-May offered further elaboration, saying that, "people would judge them, say they didn't live their life right, always ate bad, drank." When asked what happens when people keep their diabetes to themselves, Andi cautioned, "they don't learn what they can do to change their diabetes."

AYMP Can Reduce the Risk of Type 2 Diabetes

During the focus groups, the high school mentors began talking about diabetes before it was even asked about. One of the earliest occurrences was when we talked about the mentor's favorite part of the program. Geena said her favorite part of the program was "kids learning more and getting physically active." When asked why that was important to them, Geena replied, "to

prevent diabetes." The other youth agreed with what she was saying. When asked how AYMP relates to diabetes, Geena said, "the activities we do, like the healthy eating, physical activity and learning." Charlie added, "cause if you don't do that [eat healthy and be physically active], that's a good way to get diabetes." Everyone agreed with Charlie. Andi agreed that the mentorship program relates to diabetes. When asked how, she replied:

> "because you're teaching the kids like at a young age to eat healthy and stay physically active because if they don't, like if, um,… Well I don't know how to say it. Like if no one kinda teaches them to be healthy and stay active then they won't and then when they get older its gonna be harder for them to change, like to now do that."

Shelley-May agreed and added, "I think she's right. So they make it a habit for them now, keep doing it."

The program also had a positive influence on the high school mentors. For Alexander, AYMP helped teach him about healthy foods and what to eat. He lost 32 pounds after joining the program. Before the program, Alexander mentioned that he didn't care what he was eating, "but now I just eat this stuff [points to picture of lettuce]" (Figure 6). For Savannah, she learned about cooking and making healthy foods for her family. The high school mentors called her a "chef."

AYMP and the Social Determinants of Health

The youth also discussed other ways the program has helped them. Although they did not recognize this, they were talking about some of the social determinants of health. Geena said that mentorship has helped develop her social skills, such as "talking to people," which will help her get jobs in the future. Tarance acknowledged this point and added that the program has helped him be more responsible. Savannah spoke about her comfort levels being around others within

Figure 6. Alexander's Favorite Foods

the program and how these changed over time. She explained that “in the beginning of the program I wasn’t so comfortable around the kids and the mentors and by me getting used to being around everybody I got more comfortable.”

Some students talked about different job opportunities that came up, since adults in the community saw them in the program. These jobs included helping out at community events, such as bingo nights and being asked to babysit. Andi said parents “respect me enough to ask and they know that I do a good job with it [AYMP] and that the kids like me and they want me to babysit them.” The youth also discussed how AYMP has helped them in terms of education. They said they heard from teachers that students were coming to school more, because they were “excited about the program.” They also felt that they learned a lot from the program, like what it is like to

“be a role model,” to be respectful, and Andi said “listening and recognizing when students need help.”

Relationally, students also felt like they expanded their social network. Charlie said that he “feels responsible over them [early years mentors]” and if they need help “they can ask me for something.” He gave an example of one day, when he came across an early years mentor whose bike chain came off. The little boy asked Charlie to help him, and Charlie “put it back on for him so he can keep going.” Charlie felt that the boy could ask for help because he knew him from AYMP. The high school mentors also talked about how the program has brought everyone together. High school mentors became friends with other high school mentors, but also with the early years students. Also, early years mentors became friends with each other. Geena said “some of the kids in the mentorship program didn’t even talk to each other before but I see them always talking now.” The other high school mentors agreed that this program has helped build relationships within and across age groups. The benefits of these relationships, as well as the perceived education and employment outcomes, were appreciated by youth

Discussion

Many themes emerged during this photovoice project; each one illuminated the youth’s perspectives in relation to diabetes. With respects to eating and physical activity, youth were very knowledgeable about the importance of healthy eating and being active. They believed physical activity and good nutrition were optimal for positive health. They learned about healthy eating, physical activity and T2D through different environments, including school, home, the community and their involvement with AYMP.

Few studies have investigated youths’ perceptions of T2D, and more specifically, how a cultural approach to peer mentoring might influence T2D. Despite associating diabetes with

emotions that elicit fear, the perspectives shared by the high school mentors also depicted a hopeful view regarding the prevention and management of diabetes. Some of the views of the youth were consistent with previous studies while others were not. The high school mentors shared common perceptions of who gets diabetes, i.e. people who are not active and who do not eat well. Similarly, a study involving Aboriginal children in grades 4-6, found that when asked who might get diabetes, 65% of children chose drawings of an obese individual[90].

The youths' observations about diabetes prevention also matched other research describing how Aboriginal peoples respond to and/or manage their diabetes. The role of diet was reinforced as a key factor in relation to diabetes prevention[88]. Regarding physical activity, another investigation illustrated how Aboriginal participants began to exercise and increase their physical activity in order to control their diabetes[86]. However, some studies found that people did not believe as positively about diabetes management. In one previous study, Aboriginal adults compared diabetes to a death sentence. They wrote that, "he will try to kill you, of course… I guess I will have diabetes until he kills me[86]."

By comparison, the youth seemed more hopeful than the adults when asked similar questions about diabetes management and prevention[86,88]. They communicated a general message that "it is never too late" to address the lifestyle factors that influence one's diabetes. This is different than what other researchers have found. Joe and Young described members of American Indian tribes and Alaska Native communities who felt that getting diabetes was inevitable and they seemed hopeless about the disease. They felt it was only a matter of time until they were diagnosed[85].

Significantly, the high school mentors that participated in the current intervention seemed more hopeful regarding T2D prevention as compared to adults in other studies[85,86]. The youth

seemed very optimistic about diabetes prevention and management, have educated ideas about healthy foods, and were keen to share knowledge about healthy living with others, even though they had yet to do so. They also acknowledged that there is room for more communication within the community about diabetes prevention as the fear of stigma limits conversations. Telling people to eat a healthy diet, and why it is important, seems simple; however food intake is very complex and contains key dimensions, including availability of food, and one's ability to purchase it[33].

The complexity of diabetes prevention and management is one reason why the youths' perceptions about the impact of AYMP on diabetes prevention are so important. Although they did not mention SDOH specifically, the youth made reference to important ways that AYMP has helped them, which included education, employment, and social supports. They believed that participation in the mentorship program motivated school attendance and taught important skills like being a responsible role model for children. Given the lower graduation rates for Aboriginal youth in Manitoba, this is an important observation. In terms of diabetes education, high school mentors clearly saw the connection between the mentorship they provided in relation to physical activity and healthy eating, and the reciprocal health benefits not only for the children but also for themselves. Significantly, individual high school mentors spoke to their personal development; one lost 32 pounds in the program and another developed cooking skills that she later shared with her family.

The high school mentors also spoke to the valuable skills they learned that would enhance their employment opportunities within the community. These included communication skills and personal attributes such as being responsible and showing care towards children. In fact, the high school mentors appeared to genuinely embrace their roles in developing supportive

social bonds, not only with the children but also amongst each other as high school mentors. They believed the school's social environment was enhanced through the relationships developed within and across age groups.

These findings resonate with earlier qualitative studies that documented the perspectives of urban Aboriginal youth who helped to create the first mentorship programs. Clearly, the addition of diabetes prevention as a unifying principal was well received by the northern high school mentors, adding a meaningful and relevant health promotion component to the mentor programs. The similarities between how this group of high school mentors described cultural aspects such as belongingness (via social networks), mastery (via enhanced skills and knowledge), independence (by exercising leadership in the program) and generosity (by giving of themselves in support of their younger peers and community) in relation to that of their peers in the urban programs affirms the cultural foundations of the peer mentoring approach.

Conclusion

This project makes a valuable contribution to the limited literature by increasing our knowledge about Aboriginal youths' perceptions of health, T2D and peer mentoring as a cultural approach to diabetes prevention in youth. Youth in AYMP communicated a good understanding of the biological factors related to T2D and T2D prevention and management. They were hopeful that individuals could make positive life choices that would decrease their risk for diabetes or help individuals manage their diabetes. They also agreed that AYMP has been successful in teaching about positive behavioral changes related to eating and physical activity. They have seen results in themselves and the early years mentors, which gives them hope for the future. Significantly, AYMP also gave them education, employment, and social support networks that they perceived would help them in their future lives. This is crucial as peoples'

behaviors are embedded within their life and work environments; as such, health and wellness interventions need to move beyond a singular focus on individual behavior to address income distribution and other social determinants, such as social supports[20].

As a cultural approach, AYMP resonates with the richness of traditional communal band societies where self-esteem was developed when community members contributed by sharing and contributing to the well-being of others. By drawing on the collective strengths of the high school mentors within AYMP, it is clear that relational, culturally based peer mentoring approaches hold much potential as a diabetes prevention initiative.

In the future, it would be beneficial to expand this project to culturally diverse AYMP sites to deepen our understanding of how youth perceive diabetes and diabetes prevention within their mentoring roles. Findings from this project show that AYMP may be an effective program for teaching positive lifestyle behaviors while supporting acquisition of important social determinants of health; the combined biological and social outcomes can benefit students in reducing their risk for T2D. It also shows that youth can be powerful advocates for the prevention and management of T2D.

STUDY 2- The Effects of the Aboriginal Youth Mentorship Program on Risk Factors for Type 2 Diabetes

Abstract

Background: Aboriginal youth are at greater risk of Type 2 Diabetes (T2D) compared to non-Aboriginal youth. Few programs have been developed to reduce the risk of T2D in Aboriginal youth living in rural communities. The goal of this study was to assess the efficacy of an after-school, peer mentoring program on waist circumference (WC) and BMI Z scores, and self efficacy.

Methods: A non-randomized cross over experimental trial was performed on 192 children in two First Nations communities during the 2012-2013 and 2013-2014 school years. Grade 4 students were offered a 5 month intervention led by high school mentors between January and May of each school year; students in the control group received standard curriculum. The main outcome measures were WC and BMI Z scores.

Results: Seventy-one children (mean ± SD; age: 9.8 ± 0.5 years; BMI Z score: 1.75 ± 1.4; WC Z score: 1.26 ± 0.83) participated in the study. At baseline, WC Z score, BMI Z score, rates of overweight/obesity, sex and self efficacy were not significantly different between groups. After the intervention, the change in WC Z score (adjusted treatment effect: -0.084 [95% confidence interval (CI): -0.164 to -0.004]; $p < 0.05$) was significantly lower in the intervention group compared to the control group. There were no significant changes in BMI Z score and self efficacy.

Conclusions: This peer mentoring after school program is effective for attenuating age-related increases in waist circumference in Aboriginal children. These findings further support growing evidence that peer mentoring is a promising strategy for improving health outcomes in children.

Introduction

Aboriginal youth represent a significant and growing population in Canada and have much to offer in terms of their contributions to their own health and the health and wellness of others. At the same time, they are at a greater risk for Type 2 Diabetes (T2D) and obesity than non-Aboriginal youth[7]. In Manitoba, the incidence of T2D in youth is 12-25 fold greater than rates in other provinces in Canada and the majority are Aboriginal[13,14]. Youth with T2D have a higher risk of diabetes-related complications, and present complications sooner than youth with Type 1 Diabetes (T1D)[16]. Therefore prevention programs are needed to address this significant heath burden.

Few school based programs have been developed and tested that are aimed at reducing the risk for T2D in Aboriginal youth, especially those living in rural communities[40-42]. Fewer still involve interventions that are peer-led and reliant upon the strengths, energy and talents of the youth themselves[47]. Two Canadian studies, which focus on community-based participatory action models, aimed to promote healthy eating and an active lifestyle[41,64]. They both suggest that community-based participatory action models are important for engaging communities and youth in prevention students. However, their models are not effective at reducing the risk of T2D. We believe that peer mentoring is the key to attaining behavior changes that lead to improvements in risk factors for T2D.

Building on the successes of a communal, relationship based approach to Aboriginal youth mentoring in an after school physical activity program, the Aboriginal Youth Mentorship Program (AYMP), we are evaluating a peer-led approach for diabetes prevention. A pilot study performed on the AYMP found that participants in the program had a significantly lower increase in their waist circumference and BMI Z score, compared to those in the control grades[56].

It remains unclear if these effects will be observed in a larger sample of youth and what other factors may contribute to these early positive findings. To address these issues, we scaled up to two communities, to test the hypothesis that AYMP will be effective in attenuating waist circumference and BMI Z scores for Grade 4 students participating in the program. Furthermore, we hypothesized that changes in adiposity would be associated with increases in self-efficacy related to peer interactions, and civic responsibility.

Methods

Study Design and Population

Using a community based participatory action model, we performed a non-randomized cross over experimental trial to test the study hypothesis. This experimental design was used in place of a randomized control trial, as communities did not feel comfortable withholding the program from students wanting to participate in the same grade. In the first year of the program (2012-2013), consent forms were provided to all grade 3 and 4 students and their parents. Students in grade 4 were invited to participate, while students in grade 3 acted as our control group. In the second year of the program (2013-2014), the groups crossed over and the intervention was offered to the grade 3 (who are now grade 4) students who acted as the controls the previous year. The grade 4 students from the first year (who were now grade 5 students) were the controls during the second year. We also gave new consent forms out to the grade 4 and 5 students. This design was approved by the communities, and allowed us to have a control group matched for period and geography.

Two communities participated in the program, Garden Hill First Nation, MB and Sagkeeng First Nation, MB. Garden Hill First Nation is a remote Oji-Cree First Nation in northeast Manitoba with approximately 3000 residents and one of the highest rates of T2D in

youth in Canada. Sagkeeng First Nation is an Ojibwe First Nation 120 kilometres north of Winnipeg, MB with approximately 3300 residents. The Research Ethics Board at the University of Manitoba approved the protocol in accordance with the Declaration of Helsinki.

Intervention

The Aboriginal Youth Mentorship Program was delivered between January and May in the 2012-2013 and 2013-2014 school years. High school mentors volunteered their time and developed and delivered an after-school peer-mentorship program which incorporated a healthy snack, 45 minutes of moderate to vigorous physical activity, and educational readings or games. High school mentors met twice a week. The first meeting was to plan sessions for children that included: (1) peer teaching of low-organized games and activities; (2) sharing of knowledge about healthy foods to prepare for the children; and (3) peer teaching of educational games and activities. The next meeting would include the grade 4 students, as the high school mentors deliver the program they developed. At the end of this meeting, the high school mentors would gather and discuss how the program went. Using a de-briefing circle format, they reviewed what went well, what did not, as well as what they would like to try for the next session. The only requirement was that the program included a healthy snack, delivery of 45 minutes of supervised moderate to vigorous physical activity, and an educational game or activity.

Outcome Measures

The primary outcome measure was waist circumference Z score and BMI Z score was a secondary outcome measure. To answer the primary hypothesis, anthropometric data were collected prior to and immediately following the intervention. Waist circumference was collected in duplicate at the height of the iliac crest. The average of the 2 measurements was used to analyze the data. Waist circumference was converted to waist circumference Z score (WC Z

score) based on normative data from age and sex matched children from the NHANES III database. Height was collected twice in centimeters using a Seca 217 stadiometer. Weight was collected in duplicate in kilograms using a Seca 899 flat scale. Weight Z scores were calculated based on data from age and sex matched children from the Centers from Disease Control and Prevention. Body Max Index Z score (BMI Z score) was calculated from height and weight measurements and converted to Z scores based on data from age and sex matched children with the WHO database. We also calculated waist-height ratio Z scores (W-Ht ratio Z score) using the NHANES III database.

Exploratory outcome measures included self-efficacy as it relates to peer interactions and civic responsibility. Self-efficacy is one's belief about his/her capabilities to complete tasks and reach goals[91]. Children completed two questionnaires, related to the sense of belonging and two key social determinants of health. The first questionnaire, Children's Self-efficacy in Peer Interactions, measured the child's perceptions of their ability to be successful in social interactions. This questionnaire offers both conflict and non-conflict situations and is validated for children in grade 3-8[78]. The second questionnaire, Civic Responsibility Survey, measures a child's community awareness, knowledge, and investment in helping to improve their community. This questionnaire has been validated with students in elementary school[79]. We also asked the students participating in the program to answer the Sense of Belonging Scale at the end of the intervention. This scale measures a sense of belonging in AYMP using five questions. This questionnaire was validated for students in grades 3-12[79].

Data Analysis

Data are present as means and 95% confidence intervals (CIs) or proportions. Differences between study groups at baseline were tested with Independent Sample t tests, or Mann-Whitney

tests. Mixed effects regression models with random subject effect to account for repeated measures were used to test for group-wise differences in the change in outcome measures over the 5-month intervention, adjusting for year, sex and repeated measures. A p value of <0.05 was considered statistically significant, and all analyses were performed using SPSS version 22, and R.

Results

Between 2012 and 2014, a total of 555 (Year 1: 287, Year 2: 268) grade 3-5 students were invited to participate in the study, and 235 (Year 1: 95, Year 2: 140) returned consent forms. Over the 2 waves of data collection, 19 participants (Year 1: 12, Year 2: 7) were not present during preliminary data collection. We collected preliminary data on 216 participants (Year 1: 83, Year 2: 133). Of the 216 participants, 192 participants had complete data (control: n= 71; intervention: n=121) and 52% were female (Table 1).

At baseline, no differences were observed for sex, WC Z score, BMI Z score, Weight Z score, W-Ht ratio Z score, Peer Interaction and Civic Responsibility between participants in the intervention and control group. At baseline, participants in the control group were older compared with participants in the intervention group (p <0.001). The highest possible scores for peer interactions total, subscale conflict, and subscale non-conflict are 88, 40, and 48, respectively[78]. The highest possible score for civic responsibility is 30[79].

Anthropometric measures

Measures of adiposity are presented in Table 2 with both unadjusted and adjusted measures. Consistent with our primary hypothesis, the change in WC Z score declined by 0.092 [95% CI: -0.168 to -0.016] with the intervention group, compared to the control group (p <0.05). This remained consistent after adjusting for year, sex and repeated measures (-0.084 [95% CI: -

0.166 to -0.003]; p <0.01). Measures for BMI Z score, weight Z score and waist-height ratio Z score in the intervention group were not significant when compared to the control group. We adjusted for sex, even though we used Z scores, as girls may be more likely to gain Z scores without treatment[81].

Table 1. Baseline Characteristics

Variable	Control	Intervention	p value
N	71	121	
Age (yrs)	10.45 ± 0.86	9.80 ± 0.49*	< 0.001
Weight Status			
Normal (%)	22.9 (n=16)	30.8 (n=37)	0.49
Overweight (%)	24.3 (n=17)	20.8 (n=25)	0.49
Obese (%)	52.9 (n=38)	48.3 (n=59)	0.49
Sex (Male/Female)	42/58	51/49	0.23
WC Z score	1.42 ± 0.87	1.26 ± 0.83	0.21
BMI Z score	1.86 ± 1.41	1.75 ± 1.40	0.61
Weight Z score	1.64 ± 1.3	1.67 ± 1.40	0.87
W-Ht ratio Z score	1.34 ± 0.89	1.17 ± 0.84	0.11
Peer Interactions Total	60.94 ± 9.76	60.43 ± 8.90	0.73
• Subscale Conflict	29.86 ± 5.01	30.45 ± 3.92	0.42
• Subscale Non-conflict	31.19 ± 6.51	30.32 ± 6.08	0.37
Civic Responsibility	23.51 ± 3.56	23.05 ± 3.45	0.29

Continuous variables are presented as mean ± SD; categorical variables are presented as percentages per group. * p < 0.05 significantly different from the control group

Self-Efficacy and Civic Responsibility

Self-efficacy in peer interactions and civic responsibility are presented in Table 3 with both unadjusted and adjusted measures. Total scores for peer interaction, as well as subscale conflict and subscale non-conflict were not significant when compared to the control group. This was consistent with unadjusted and adjusted means. Similar results were found for unadjusted measures for civic responsibility. We could not perform adjusted measures for civic responsibility, as we cannot rule out carryover effect. This is a limitation of the study design.

Table 2. Measures of Adiposity

Variable		Unadjusted Measures			Adjusted Measures		
		Estimate	CI	p	Estimate	CI	p
WC Z score	Intercept	0.038	-0.023 to 0.099	0.22	0.021	-0.083 to 0.125	0.69
	Intervention	-0.092	-0.168 to -0.016	0.02	-0.084	-0.164 to -0.004	0.04*
BMI Z score	Intercept	-0.002	-0.059 to 0.056	0.96	-0.049	-0.148 to 0.048	0.32
	Intervention	0.051	-0.021 to 0.123	0.16	0.064	-0.013 to 0.140	0.11
Weight Z score	Intercept	-0.039	-0.039 to 0.0275	0.74	0.030	-0.025 to 0.085	0.28
	Intervention	0.019	-0.023 to 0.060	0.37	0.003	-0.039 to 0.046	0.88
W-Ht ratio Z score	Intercept	0.038	-0.031 to 0.102	0.28	-0.034	-0.150 to 0.082	0.56
	Intervention	-0.080	-0.166 to 0.006	0.07	-0.053	-0.143 to 0.037	0.25

Mixed effects regression models for the change in scores are adjusted for year, sex, and repeated measures. * $p < 0.05$ significantly different from the control group

Table 3. Measures of Self-efficacy and Civic Responsibility

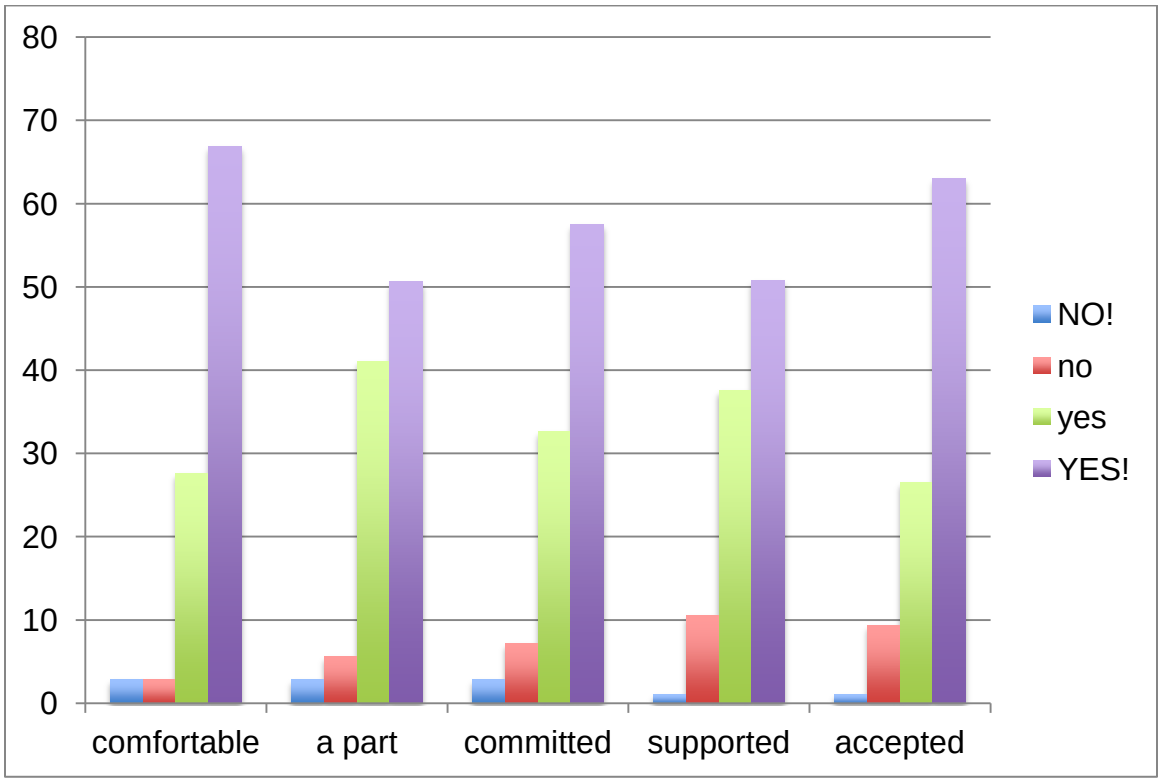
Variable		Unadjusted Measures			Adjusted Measures		
		Estimate	CI	p	Estimate	CI	p
Peer Interaction	Intercept	1.67	-0.93 to 4.30	0.20	5.87	1.60 to 10.14	0.008
	Intervention	-0.88	-4.10 to 2.37	0.59	-2.44	-5.79 to 0.91	0.16
Subscale Conflict	Intercept	0.39	-0.93 to 1.72	0.56	1.38	-0.79 to 3.56	0.22
	Intervention	-0.76	-2.40 to 0.87	0.36	-1.18	-2.91 to 0.56	0.19
Subscale Non-conflict	Intercept	1.34	-0.35 to 3.02	0.12	3.96	1.21 to 6.71	0.006
	Intervention	-0.22	-2.32 to 1.88	0.84	-1.15	-3.25 to 0.95	0.29
Civic Responsibility	Intercept	0.57	-0.38 to 1.52	0.23	-	-	-
	Intervention	-0.87	-2.04 to 0.31	0.15	-	-	-

Mixed effects regression models for the change in scores are adjusted for year, sex, and repeated measures.

Sense of Belonging

Students were asked 5 questions around their sense of belonging in AYMP at the end of the intervention. The majority of students answered that they: 1) felt comfortable in the program; 2) felt a part of the program; 3) felt committed to the program; 4) felt supported in the program; and 5) felt accepted in the program (Figure 7).

Figure 7. Sense of Belonging



Discussion

This data supports previous trials by validating that exposure to a peer mentoring program, in particular, the Aboriginal Youth Mentorship Program, can attenuate central adiposity[45,46]. Specifically, the data presented here support our pilot study[56]. Strengths of this study design include having a community based participatory action model and a control group in the same community. Although our research design was not as strong as a randomized

controlled trial, we improved our design by having a control group in the same community, as both groups are exposed to the same educational, socio-demographic and geographic settings.

Our study was important, as the communities had very high rates of childhood obesity (approximately 50%) and T2D. Waist circumference is one of the best predictors of several cardiometabolic conditions in children and adults, including T2D[92,93]. In Canada, Aboriginal children are more likely to experience central weight gain and display elevated waist circumference, relative to non-Aboriginal children[17,94]. Our pilot study observed that 72% of the participants were overweight or obese [56], a rate 3-fold higher than the Canadian average. We also found that participants in the program had a significantly lower increase in their waist circumference, compared to the control group (0.34 cm vs. 2.87 cm, $p < 0.01$). We also found that BMI Z score significantly decreased in the intervention group, compared to the control group (-0.05 vs. 0.04, $p <0.01$)[56]. We found similar results for waist circumference when we added a new community, and increased our sample size (0.51cm vs. 1.94cm, $p<0.05$). This suggests that peer mentoring is an effective approach for preventing central weight gain, and by addition, the risk of T2D in Aboriginal children.

Self-efficacy is an established determinant of behavior change. Interesting, we did not see any significant differences in self-efficacy in peer interactions and civic responsibility. This is surprising as self-efficacy is an important determinant of changes in physical activity levels and weight loss after lifestyle interventions[95-97]. Our pilot study also did not see significant differences in self-efficacy[56]. This may be due to the types of questionnaires we administered. Other programs have shown positive results for self-efficacy. Children exposed to the school-based component of the Sandy Lake Diabetes Prevention Program, which included peer role modeling opportunities (but not peer mentoring), exhibited significant improvements in dietary

self-efficacy in grades 3 to 5[40]. Additional studies are needed to better understand aspects of self-efficacy and how they translate into altered healthy living behaviors.

Although our large sample size, parallel control group, and equitable relationship with communities strengthens this study, there are several limitations that need to be addressed. First, as this was a quasi-experimental trail, there is a risk of selection bias related to self-selection to the intervention, and the age differences between study groups at baseline. Secondly, investigators who were collecting data were blinded to group allocation as much as possible; however it was difficult to hide which grade the students were in. This increased our risk of investigator bias. Third, we recognize that there is a potential risk of carryover effects for participants who crossed into the control group after receiving the intervention in year 1 of the study. We performed a subgroup analysis, for those 34 participants and we saw no evidence of a carryover effect ($p=0.44$). Fourth, we may not have used the best questionnaires to effectively evaluate self-efficacy. Using a more culturally relevant questionnaire, or using qualitative methods may help better understand the aspects of self-efficacy that affect behavior change.

Conclusion

The results of this project support the findings from the pilot study that suggested that a peer-led, after school program, specifically the Aboriginal Youth Mentorship Program, is effective for attenuating age-related increases in waist circumference in Aboriginal children. These findings further support growing evidence that peer mentoring is a promising strategy for improving health outcomes in children. AYMP is a cost-effective program, which is owned by the youth and communities. The project suggests that the AYMP is a successful model for behavior change in Aboriginal communities at risk of T2D and other cardiometabolic conditions.

CONCLUSION

In an effort to overcome the limitations of previous studies while responding to the Canadian Diabetes Association guidelines[39] that call for culturally appropriate experimental studies when working with Aboriginal communities, we have developed a research project that illustrates how AYMP can positively impact multiple layers of The Ecological Model for Understanding Obesity[17]. Importantly, the cultural approach to mentoring that was first delivered in the urban Rec and Read programs appears to engage northern high school mentors in meaningful and relevant ways.

At the Individual level, AYMP incorporates healthy snacks and physical activity for all mentors, which will contributes to positive impacts on health at the biological level. At the Interpersonal level, AYMP brings people together for active living and healthy foods through peer support. High school mentors and early years mentors form relationships with each other, and within their groups. The Aboriginal theoretical framework encourages respect and belonging, and the qualitative findings illustrate how the mentors appreciate the social support networks that were established.

At the Community Environments level, AYMP is a school-based program. It relies on creating an environment at school where physical activity and healthy food is promoted and leadership skills of youth are nurtured. From a theoretical perspective, the relevance of the program for the high school and early years students led to mastery of important skills, as well as acquisition of knowledge related to diabetes prevention. The volunteer efforts of the high school mentors and the skills that they acquired were perceived as contributing to their employment opportunities within the community. High school mentors also recalled helping early years

children outside of the program; these actions align with the Indigenous values of generosity and reciprocity that are articulated within AYMP.

At the Built Environment level, AYMP creates access to a recreational facility within its school. It creates a safe physical environment for students to come and be active. Within that space, youth take responsibility and demonstrate independence in carrying out the programming, thus providing an important community service. And at a society level, with the promotion of AYMP, our vision is to continue to produce research results that support a call for a culturally based peer mentoring program in every school and community in Manitoba. This will require changes to public policy, such that health and wellness problems are recognized as being primarily societal, versus individual. The recent release of the Truth and Reconciliation Final Report, which calls for government investment in culturally relevant sport and physical activity for Aboriginal children and youth, may provide a pathway to addressing the historical factors that have contributed to the rise in diabetes for Aboriginal children and youth.

Both of the studies show the positive effects of the AYMP. In the first study, high school mentors believed that AYMP could help reduce the risk of Type 2 Diabetes, both in themselves and in the early years mentors. The program not only teaches mentors about healthy eating and being physically active, but it also helps increase social determinants of health, such as employment, education, and social skills. The second study found that AYMP is successful in significantly decreasing waist circumference in early years mentors who participated in the program.

Using both quantitative and qualitative research questions to better understand the effects of AYMP is important because we are left with a more wholistic understanding of how AYMP works. For example, our quantitative self-efficacy data was not significant, and not in sync with

the results of our qualitative data. High school mentors said that the early years mentors were more involved in the program as time progressed, and said that students who did not talk would talk more, and would play the games more. Also, teachers and parents expressed positive changes in the student's self-efficacy. These contradictory findings encourage us to continue to develop further research questions that will tease out the important psychological and social variables that may enhance the mentor's experiences within the program.

Future AYMP approaches need to include more culturally relevant tools to measure self-efficacy. Follow-up qualitative research that invites early years mentors, teachers, and parents would also enhance our understanding of the impact of AYMP in relation to health and educational outcomes. Additionally, it is apparent that the program needs to run longer to see a larger effect. However, the program would need more funding in order to run longer. Continued research efforts that document the wholistic benefits of AYMP can support efforts to seek additional funding and resources for culturally based peer mentoring approaches like AYMP. At the public policy level, sustainability for AYMP could be achieved by integrating the mentorship program within the school curriculum (for example, as a student initiated course). Given the positive findings from the two studies in this thesis, this may be a policy investment worth advocating for. Peer mentoring community owned programs, such as AYMP, continue to appear to be attractive strategies for teaching health behaviors and improving health outcomes in children.

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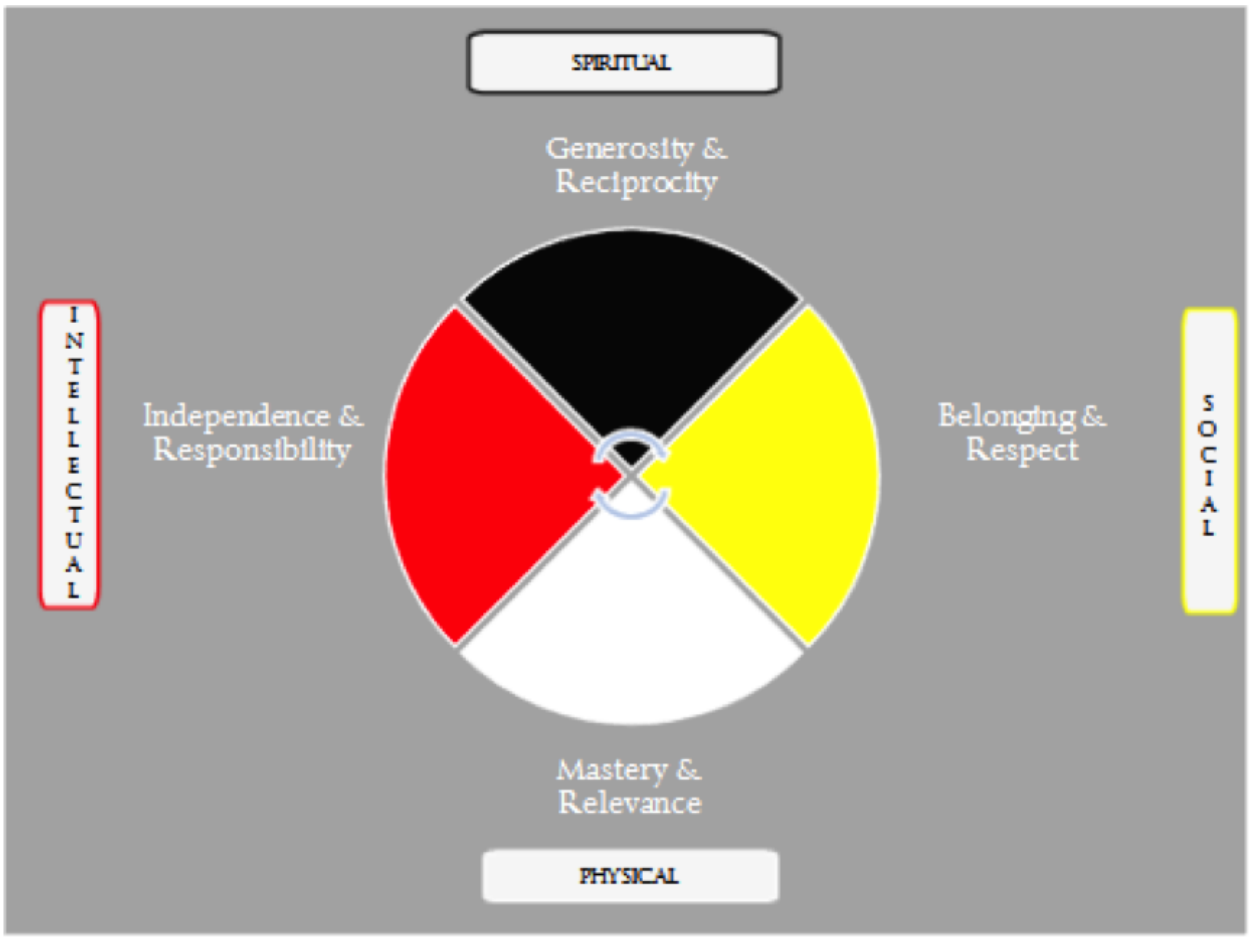
APPENDICES

Appendix 1: Framework for Aboriginal Youth Mentorship Program



Appendix 2: Rec and Read Mentor Manual

REC & READ MENTORSHIP PROGRAM

STAFF MANUAL

ã **ABORIGINAL YOUTH MENTORSHIP PROGRAM**
Faculty of Kinesiology & Recreation Management
University of Manitoba
R3T 2N2 Winnipeg, MB

Table of Contents

PART 1: PROGRAM PHILOSOPHY

History

The Rec and Read mentor program evolved out of a community-based research collaboration involving the Seven Oaks School Division, the Winnipeg School Division, and the University of Manitoba's Faculty of Kinesiology and Recreation Management.

The mentor program builds on the strengths, talents, and energy of Aboriginal youth. Offered as an after school program, Rec and Read provides a supportive, wholistic approach to children and youth physical activity, nutrition and education programming. While designed by and with Aboriginal youth, this program has applications for all young people living in diverse communities.

Mission

To develop and deliver relationship-based, communal mentor programs involving children, youth and adult allies from diverse cultural backgrounds.

Informed by Indigenous worldviews and practices, we seek to build on the strengths of youth from diverse populations to build healthy inclusive communities.

Vision

Creating a world where all children and youth have safe healthy places to be, belong, grow and give of themselves.

Values

Rec and Read staff and volunteers will:

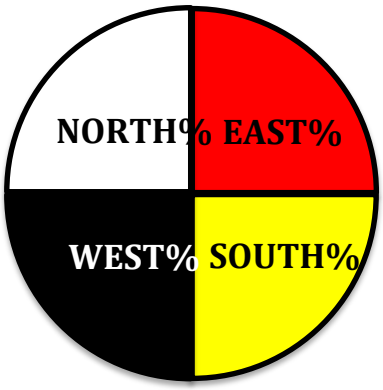
- Create a welcoming, safe and culturally affirming after school environment for youth from diverse populations.
- Educate and support physical activity, sport and recreation leaders and allies to become culturally relevant educators that can plan and facilitate relevant and meaningful programs for all youth.
- Tap into and nurture the leadership skills and educational success of youth from diverse populations while simultaneously developing career and post-secondary pathways, processes and strategies that will lift our youth to success.

Wholistic Worldview

Rec and Read is guided by Aboriginal cultural teachings and worldviews. These worldviews call attention to a circular wholistic understanding of the world and all of creation. This influence is evident in our relationship-based, communal approach to multi-age mentoring.

The Medicine Wheel teaches us that all things are interrelated, interconnected and synergistically work together to create balance. For example, Rec and Read relies upon a collective approach to mentoring whereby everyone involved mentors each other. Adults and youth learn from children as much as children learn from adults and youth.

The Medicine Wheel



NORTH
Spiritual
Elders
Night
Fire
Bear

WEST
Mental
Adults
Evening
Water
Eagle

EAST
Emotional
Children
Morning
Earth
Wolf

SOUTH
Physical
Youth
Afternoon
Air
Turtle

The Medicine Wheel is divided into four parts, each aspect representing one of the four directions. A key lesson of the Medicine Wheel is that individuals and communities need to live in balance. If one part is unhealthy or undeveloped, the other parts of the person or community will also experience some harmful effects. For example, if you are not feeling well (physical), you may feel frustrated (emotional), less able to do your school work (mental), and unhappy with your life in general (spiritual).

Diverse Teachings
There are numerous interpretations and teachings related to the Medicine Wheel. In our 2013 staff manual, we draw upon the Medicine Wheel teachings presented in *Integrating Aboriginal perspectives into curricula* (Manitoba Education and Youth, 2003). We are currently working with an Elder to ensure a consistent use of the Medicine Wheel in our printed work.

Guiding Principles

THE FOUR R's	THE CIRCLE OF COURAGE®[1]
East – Respect Respect is about trusting one another to bring our best forward. We both invite and expect each individual to share their strengths, abilities and experiences with the group. Respect begins when we recognize there are multiple ways of knowing and coming to understand the world.	**East – Belonging** A sense of belonging is nurtured when youth feel connected to the people and community around them. When we treat others as respected family members, we forge powerful social bonds that help keep youth from feeling alienated and alone.
South – Relevance Relevance asks us to look at "How will this activity impact the people and community involved?" and "Why is the program important?" To ensure activities are relevant, make sure staff, youth and community mentors are actively engaged in program planning, facilitation and delivery.	**South – Mastery** The purpose of mastery is personal growth, not superiority. It is important to create a safe, stress-free space with abundant and varied opportunities for youth to practice and hone their skills. When youth are successful in surmounting challenges, their desire to achieve is strengthened.
West - Responsibility A sense of responsibility is nurtured when youth are encouraged to work together to make a program, community or society a better place for everyone to live. Empowered youth feel a greater sense of responsibility to their family, friends, school, and community groups.	**West – Independence** Independence means respecting the choices of youth and encouraging them to make good decisions. Start from where youth are at, understand the factors that influence their actions and decisions and adapt your interactions accordingly.
North – Reciprocity Individuals and groups who recognize and utilize their personal and collective power in service of the greater good build strong communities. Youth feel important when they see how their actions benefit others.	**North – Generosity** When we live generously and express gratitude, we teach youth the impact and importance of these virtues in our community. Provide youth with opportunities to help others and to give thanks.

[1] The Circle of Courage is a model of youth empowerment grounded in Native child care philosophies. For more information about this model, please see the book Reclaiming Youth at Risk by Larry Brendtro, Martin Brokenleg, and SteveVan Bockern.

East: Respect / Sense of Belonging

Respect begins when we recognize there are multiple ways of knowing and coming to understand the world. When we treat others as respected family members, we forge powerful social bonds that help keep youth from feeling alienated and alone.

Principle	Principle in Action
Respect the strengths of youth participants	All participants are welcomed with respect; respect for the people they are and the strengths and abilities they possess.
Develop a sense of school and community belonging	Staff and youth mentors work together to *claim a sense of space/belonging* in the school and community.
Enhance physical activity and nutrition	Plan physical activity and healthy nutrition activities that are relevant, meaningful and fun for all participants.
Affirm the cultural identity of youth participants	When younger participants have role models who share similar cultural backgrounds and/or life experiences, we affirm the cultural identity, skills and experiences of all participants.

Create spaces of belonging

High school mentors may initially come to the program because someone has told them that it is a good idea. During the first few weeks, expect fluctuating attendance levels as high school mentors 'test out' the program.

Make sure to celebrate the presence of youth who are with us each day, while recognizing that for others this may not be their time or the activity for them. Share information about the program with interested high school mentors and ask them about the things they enjoy.

Quotes from mentors

"We came up with and learned games for the program. We did various activities to meet each other and develop relationships. We also plan for the program together."

"I remember some kids saying, 'I don't want to play that game or I don't know how to play that game'. I would then try to make it more interesting but easier…"

South: Relevance / Mastery

It is important to create a safe, stress-free space with abundant and varied opportunities for youth to practice and hone their skills. Make sure that youth and community mentors are actively engaged in program planning, facilitation and delivery. When youth are successful in surmounting challenges, their desire to achieve is strengthened.

Principle	Principle in Action
Build on the strengths of youth	Talk to youth about what they like and are good at. Find ways to incorporate their skills and talents into the program.
Create a safe physical activity space	Provide a safe space for youth to practice and nurture their skills. Be silly, have fun, and promote a sense of playfulness.
Connect emotionally through play	Use inclusive and cooperative games to help foster friendships among youth. If youth seem disconnected or upset, seek them out and find out if they are okay.
Reflect on experiences and interactions	At the end of the program, encourage youth to reflect on the skills and knowledge they are learning. If youth are quiet, give them time to find their voice. Silence is a natural part of finding one's voice.

Build safe, fun spaces

The goals of play include self-expression and connection with others. Make sure to include the ideas and opinions of all program participants as to what activities the group will be involved in.

Some youth may appear unwilling to share their ideas… Don't worry, relationships take time so keep them engaged. Keep talking with them and show them that you value their opinion. Sharing ideas often takes time and trust. If youth don't respond to questions, ask yourself why and what approach might work better.

Quotes from mentors

"I talked!.. I actually talked in front of the whole group today!"

"I learned how to cope with kids. Like the kids and their problems and the way they think and everything. Not what I thought but how they really were…"

West: Responsibility/Independence

A sense of responsibility is nurtured when youth are encouraged to work together to make a program, community or society a better place for everyone to live. Independence means respecting the choices of youth. To *encourage youth to make good decisions, understand the factors that influence their actions and decisions and adapt your interactions accordingly.*

Principle	Principle in Action
Nurturing respectful relationships with early years mentors	Reflect on your interactions with early year mentors. Think about how your words, actions and behaviours shape their responses.
Encouraging high school mentors to make positive decisions	Ask yourself if you are leading or facilitating the program. Think about the Circle of Courage and ask yourself "am I providing these type of opportunities for high school mentors?"
Building a strong mentor team with staff and volunteers	Mentor teams are like family, everyone should have a role and feel like they are important.
Welcoming community members and adult allies	Welcome community members and allies to the program. Introduce them and explain the program components and values. Be a Rec and Read ambassador✐!

Know when to lead and when to let go…

At the start of the program, staff may need to take a more active leadership role. As time goes on, it is important for staff to step back and let youth take ownership of the program. *This is a crucial part of the learning process for high school mentors*.

Make the program a safe space for youth to test their skills. Turn small mistakes into learning moments. In debriefing circles, staff can share what they have learned from high school and early year mentors.

Quotes from mentors

"It's cool getting into a conversation with a kid where you both can talk about just what ever."

"I shared my knowledge, time and energy."

North: Reciprocity / Generosity

Individuals and groups who recognize and utilize their personal and collective power in service of the greater good build strong communities. Youth feel important when they see how their actions benefit their group or community. Provide youth with opportunities to help others.

Principle	Principle in Action
Become a role model	The most powerful teachers/leaders are those whose everyday deeds and words are in harmony with the values they promote.
Develop intercultural education skills	Culture shapes our thoughts, behaviours and experiences. Intercultural skills require understanding and celebrating our differences as well as challenging social inequity and injustice.
Be aware and accountable	Use inclusive language and activities. Be true to your word and follow through with your commitments. Make your team and youth participants a priority.
Share intercultural strengths	Take what you learn about being a culturally relevant recreation leader and intercultural ally and practice these values on a daily basis.

Be the change you wish to see in the world (Gandhi)

Encourage high school and early year mentors to take ownership of the program. Continually reflect on your own leadership and facilitation skills.

If youth are not listening, ask yourself what you might be doing (thoughts, words, and actions) that might contribute to their reactions. Encourage all mentors to reflect on what it means to live generously.

Quotes from mentors

"When the mentors identified me as a friend I gained more confidence in teaching them and being around them."

"I used to be a very quiet person so I am glad I was able to be a leader and gain confidence…"

PART 2. PROGRAM LOGISTICS

Access and Engagement

Access to safe physical activity and recreational spaces are limited due to:

- The priority placed on competitive school sports (e.g., practices and games).
- Barriers to sport membership (e.g., fees, equipment, transportation, etc).
- Poor communication regarding available local and community recreation programs.
- The notion that sport is a neutral social space (e.g., sport is colour and culture 'blind').

Everyday racism and discrimination is subtle and can be hard for youth participants to talk about. Youth may feel uncomfortable talking to sport leaders who do not share their cultural background or understand their lived experiences. In these situations, it is important for sport leaders to be proactive and approachable. Ask youth participants about their day, seek their input on program activities, talk openly about issues such as racism, homophobia, and discrimination, and let them know – through your words and actions – that you are their friend and ally.

Who Participates?

Based on our experiences and the relationships we developed with our school partners, we recommend the following as a general guideline:

High School Mentors

We recruit high school students who are interested in working with children and providing leadership within a physical activity context. In developing Rec and Read, we originally targeted Aboriginal youth participants. Today, we welcome a wide array of youth into the program.

In terms of numbers of youth mentors, "6-12" seems to be a good number. The key is to work towards developing a strong core of regular mentors who attend each week.

Early Years Mentors

We ask early years teachers to identify children they believe would 'most benefit' from participating in the program. Because we want the program to be enjoyable for all participants, we encourage teachers to recommend early years students with diverse strengths, abilities and needs. We have noticed that students from Grades 2 to 5 participate well in the program.

Dependent on how many youth mentors are interested in the program, a 1:2 (high school / early year mentor) ratio works well. If you begin with only 4-6 mentors, consider inviting 8-12 children and gradually add younger children as your program becomes more stable and your youth mentors, more confident.

Adult Allies

Typically, mentor teams are composed of 2-3 staff at each program site. The team composition usually consists of university students and community members (former high school mentors).

Where possible, we try to find staff who have experience working well with youth from diverse populations or who have an educational background. We also appreciate when staff have access to a vehicle but this is not a requirement.

Hiring former high school mentors provides many tangible benefits to the program.

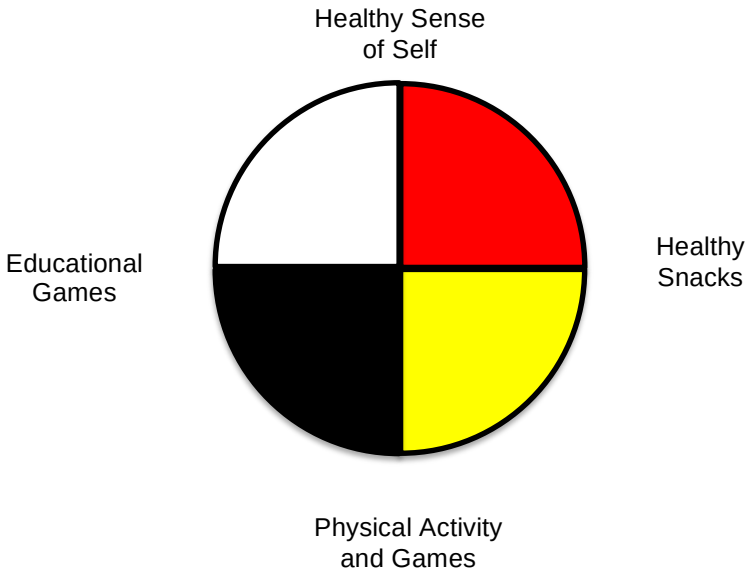
- Current high school mentors see that their participation in the program can lead to tangible outcomes, such as a part-time job and educational opportunities in the future.
- Community mentors understand the program 'inside and out'. They are from the community, they know teacher champions and potential new recruits, they understand the perspective of high school mentors, and they want to give back to their community.

Other adults
Where possible, support from volunteers, or education/university educators or allies can add to the overall strength of the program. For example, a kindergarten teacher often dropped by the mentor program to just chat with the youth; having this informal support really helped students build a sense of belonging with adults in the school.

PART 3. PROGRAM AT A GLANCE

Rec and Read connects the notion of *recreation* with *education*; these are seen as inter-connected and representative of a wholistic approach to positive child and youth development. Our time together in the mentor program follows a similar schedule from day to day and from week to week. Each day we have a healthy snack, engage in physical activities, and then move into educational games and activities. As the program wraps up we set aside time to reflect on how the day went.

Four Primary Components of the Program



A Sample Weekly Schedule

Day	Time	Description	Location
Day 1	3:30 – 5:30 p.m.	Planning day with high school mentors	High school
Day 2 *(fall)*	3:30 – 5:30 p.m.	Planning and practice day with high school mentors	High school / Elementary school
Day 2 *(winter)*	3:30 – 5:30 p.m.	Games & activities with younger students	Elementary school

Day 1. Planning day with high school mentors

A typical planning day looks like this, but can vary:

3:30 - 3:40 p.m.	Youth arrive and food preparation (everyone helps)
3:40 - 4:15 p.m.	Sharing food, catching up and planning (get to know each other, start mentor-related activities)
4:15 - 5:00 p.m.	Gym time (playing games, planning activities)
5:00 - 5:30 p.m.	De-brief and play some more ☺!

Program planning often begins with people signing up for particular parts of the program. The day is often planned as the mentor group enjoys a light snack. After planning and snack, the mentor group will move into the gym to try out the activities. For this run-through, mentors who volunteered to lead activities (during the planning and snack session) will take the lead, having the other mentors participate as if they were the younger students.

Day 2 (FALL). Activity day with high school mentors

For the first weeks of the program in the fall, youth and adult mentors meet twice a week to plan and prepare for the overall mentor program. The focus of the first day (and few weeks) is often recruiting / introducing mentors to the Rec and Read model and playing fun games. We use the same model as we do for Day 1, however we usually provide practice time for high school mentors to lead activities as well as introduce key programming values through group activities like:

- Strengths Inventory: brainstorm and share strengths.
- Good Mentor/Bad Mentor: discuss things that a mentor should do [*good mentor*] or avoid [*bad mentor*].

The length of this training period depends upon the dynamics of each particular group, and the time it takes everyone to get to know each other. During this time, find ways to get high school mentors to take ownership of the program and to practice learning activities. In recent years, we have also introduced a number of training opportunities for staff and high school mentors such as First Aid/CPR, Aboriginal coaching module, etc.

Note: Depending upon the availability of the gym, high school mentors may choose to move to the partner elementary school to practice and play games.

Day 2 (WINTER). Activity day with early years mentors

3:30 – 3:45 p.m.*	Everyone gathers for a healthy snack. Food preparation is the first task for all mentors.
3:45 - 4:15 p.m.	Everyone plays low organized games in the gym. Games are taught by the youth mentors, supported by staff.
4:15 - 4:50 p.m.	Everyone gathers in the main room for educational opportunities (e.g., board games, reading, crafts, etc.)
4:50 - 5:00 p.m.	Clean up and prepare for home time.
5:00 - 5:30 p.m.	Team de-brief with high school mentors and staff.

**Please note: High school mentors may need permission to leave classes early to prepare snacks or to travel to the early year's school. As well, early years students come to the program quickly (right after the bell!) so it is important for staff to arrive early.*

Summary: Initial planning phase with high school mentors

Build relationships over discussion and healthy food

- Develop a protocol for the start-up of each day (e.g., who prepares the food; make list of snacks for the next day),
- Develop an attendance list (use a journal for students to sign in),
- Get to know each other; Claim space within the school: post photos, posters, etc,
- Ask high school mentors if they want to smudge and if they say yes, talk to teacher champion for permission.

Begin gym activities

- Combination of mixer, trust, and cooperative games
- Low organized games (LOG)
- Traditional Aboriginal games (TAG)

Begin leadership development activities

- Strengths inventory and Good Mentor/Bad Mentor activity
- Practice teaching to peers in the gym (in 2's, youth mentors lead the activity for the day while the others pretend to be children)
- Review and begin filling out learning passport
- Participate in leadership development workshop (e.g., CPR/First Aid, Traditional Aboriginal Games, Coaching modules, etc)

Introduce 'sharing circles' for planning and de-briefing

- Provide opportunities for youth to share their personal perspectives, ideas and experiences with regard to how the program is going. De-briefing conversations follow each activity day with the children, which are often facilitated through a sharing circle.

Summary: Day of programming with early years mentors

Develop a specific plan for each week. Assign responsibility for:

- Food preparation (arrive early),[2]
- Meeting and greeting the children,
- Take attendance,
- Leading the gym and classroom activities,
- Seeing the children off, and
- De-briefing.

Budget

The following budget applies to one mentor site (elementary and high school) with activities offered two times per week. Figures are based on 12 high school mentors and 3 adult allies (fall) and then adjusted to include the addition of 15-25 early years children on Day 2 during the winter session. Note: A shorter program costs less money.

Estimated Total

Estimate of Costs: *$11,100.00 for a 30-week program (ONE site)**

Salaries ~$6,990.00	**Food ~$2400.00**	**Supplies ~$300.00**	**Special Activities ~$1,410.00**
$6,990/3 adult mentors	$80/week of the program (2 days)	Education and Gym	Specialty workshops, training, etc.

Food

Neechi Commons (based on 2008 costs)	**Cost**
5 x loaves of banana bread @ $4.00 each	$20.00
6 x 11 boxes of juice &/or skim milk @ 2.00	$12.00
1 x bag of apples @ $4.00, 1 x bag of oranges @ $4.00	$8.00
Total	$40.00

**For the same menu offered with 25 early years students, double the amount for a total of $80.00*

List of nutritious foods

Fruits	**Vegetables**	**Carb**	**Protein**	**Beverage**
Apples Bananas Oranges Grapes Berries Melon	Cucumbers (sliced) Carrots (cut) Cherry tomatoes Celery	Bannock Banana bread Cookies Crackers Granola bars	Cheese Puddings *Bannock pizza *Veggie & fruit trays	Water (with a slice of lemon or orange) Milk Soy milk Juices

*Typical foods and special occasion foods (marked with an *)

Education Games

Approximate cost: $200.00

[2] Early year students generally arrive at 3:30pm so it is important for staff to show up at 3:15pm to prepare snack and welcome early years mentors.

Example games include: flashcards, Mad Libs, books, etc.

Gym Equipment
Approximate cost: $100.00
A bare minimum of equipment and facility space needs are: an open gym, a large bag of gator (soft) balls, 4-8 pylons, a parachute, and gymnastics mats.
**In the past the early years schools have offered access to their gym equipment, provided that it was well taken care of and properly put away.*

Salaries
Approximate costs: $233.00 per week or $6,990.00 for a 30-week program.
Hire 3 adult mentors to coordinate program at 6 hours per week (4 hours of programming with high school mentors, and 2 hours of planning and/or de-briefing). At $12.00/hour, this is a cost of $216.00 per week, plus benefits (add 8%).

Special Activity Costs
Approximate cost: $1,410.00
Types of expenses:

- Specialty workshops such as Traditional Aboriginal Games, etc
  - ($150.00/workshop)
- Bus fare for events
  - ($200.00 for a 30 week program)
- Special identification forms,[3] assistance during personal emergencies, etc
  - ($150.00/site)
- First Aid/CPR certification: staff, high school mentors
  - ($75.00/person X 10 people = $750.00)
- Criminal Record Check for staff and volunteers
  - ($40.00/person X 4 people = $160.00)

[3] We have noticed that many mentors (staff and high school) require financial assistance to acquire important employment or education-related identification forms. These identification forms may include: birth certificate, driver's license, Aboriginal status card, etc.

PART 4. SAMPLE GYM ACTIVITES

On the first day of your program, ask high school mentors which games they played as children. They will come up with a list of ideas that you can immediately start playing, such as What time is it Mr. / Mrs. Wolf,[4] Frozen tag, and other playground games and activities. Start with their games and then add new games to the list each week.

Safety Tips for Games

- Ensure all youth listen to the instructions for each game.
- Clearly state the boundaries (stay away from the walls and any other obstacles).
- Provide all students with a signal that you use to get their attention (e.g., 1-2-3, "eyes on me!")
- For 'dodge ball' type games use rules that promote safe play
- Have youth aim below the waist.
- Encourage older, stronger students to throw with their non-dominant/weaker arm.
- Set up clear boundaries and watch closely for any students who might not feel comfortable in a game.

Tag Games

Frozen Tag	When caught, "freeze" with arms out. You're unfrozen when someone runs under your arms to free you.
Line Tag	Everyone must run along a line. Taggers carry a coloured pinny; if tagged, pass the pinny on. No tagging the tagger.
Colour Tag	Divide group into four teams each with a different colour pinny. Call out a colour to be 'it'. If tagged, sit down. You are freed and back in the game when a teammate picks you up by the hand.
Blob Tag	Like chain tag, when caught, join hands. Eventually, the line of taggers becomes bigger and bigger chain until everyone is linked up…
Banana Tag	When caught, raise arms above head to make your body like a banana. To be freed, a teammate unpeels the banana by pulling one arm down. When both arms are "peeled", you're free!

Traditional Aboriginal Games and Activities

[4] Make up your own variations for the games; change the names (using both genders, as in Mr. and Mrs. Wolf; Simon and Simone Says, etc), change the rules, but keep it simple and fun.

Ring on a String	Place a ring on a piece of rope about 8 feet long. Put a small ring or a circular rope. Have 6+ people hold the rope in a circle. One player goes in the centre and tries to follow the ring as the others try to pass it around in an attempt to trick the player in the centre. After a given time, the game stops and the player in the centre gets to choose 3 hands that he/she thinks the ring might be in.
Dog Soldier	The dog soldier stands in a hoop with a flag for a tail in his/her back pocket. He/she has a coup stick (we use a pool 'noodle' with additional padding). Others circle the dog soldier and try to take the flag without getting touched by the coup stick. If a player gets hit they have to do something before continuing to play (e.g. wait 3 seconds, go touch a wall, do 3 jumping jacks etc.) If someone gets the flag without getting hit, they become the dog soldier.
Gentle Always Wins	Two students hold opposite ends of a rope with their feet close together in a squat position. The object is to get your opponent to let go of the rope or lose his/her balance.
Inuit Wrestling	Two students hold on to the same stick with one hand. They stand side by side with their feet pointing in opposite directions. The object is to get your opponent to let go of the stick or move his/or feet by getting him/her off balance.
Foxtail Games	Target shooting: Throw and catch for points (catching the foxtail close to the head is 1 point, in the middle is 2 points, and at the tip of the tail is 3 points – no point for catching the head); Ultimate foxtail – like the Frisbee game but using foxtails.

Ball Manipulation Games

Dr. Dodge Ball	Two teams on each half of the gym, each with a Doctor to save players hit by the ball. Each team throws balls at players on the opposite team. If hit, sit down and wait for the Doctor to rescue you (by pulling you on a mat, holding your hand, or coming to get you on a scooter).
Pin Ball	Place a set of plastic bowling pins on the center line of the gym, length-wise. Have Team One stand on both sides of the gym, facing the center line - their job is to knock down as many pins in 2 minutes as possible; Team Two stand on either side of the pin, an arms-length away, and uses their feet to protect the pins from being knocked down. After two minutes, count the remaining pins and then switch sides to try and beat each team's score.
Asteroids	Two teams, one with gator balls, one without. Arrange mats at each corner of the gym, such that Team One can run from mat to mat in a circle. Team Two tries to hit Team One members as they run from mat to mat. If hit below the waist, the runner returns to the last mat and tries to run again. Count how many full circles each team member can run.

Zoo Dodgeball	Divide the group into two teams and have each team go to opposite sides of the centre line. Designate a "zoo" on each side using lines on the floor or mats. When you get hit, you must go to the zoo on the other side. If you catch a pass from a teammate while in the zoo, you can return to your team. (Alternate version: when one person catches a ball, all the zoo 'animals' are free).
One arm circle "hockey"	Have 6 players form a circle. They stand with their feet very wide, touching the side of the shoe of the person next to them making a circle. A player outside of the circle throws a dodge ball into the middle. The players now have to attempt to score on each other by knocking the dodge ball through another player's legs. Players can block shots using one arm only, and knock the ball through other player's legs with this same arm. Once you have been scored on you retrieve the ball; the player standing outside the circle takes your place and you throw the ball into the middle and wait until another player gets scored on.

Additional Games and Activities

Ladder Races	In a row, partners sit on the floor with their legs straight in front of them and with their feet touching together on a given line. The next pair sits next to them about a meter away with their feet meeting at the same line. Once all pairs are lined up side-by-side it should look like a ladder. Give each pair a number. The leader calls a number. When a pair's number is called, they quickly stand up and race through the "ladder" to the end, then beside the ladder on either side and then back through the ladder stepping between the legs of the other students, until finally returning to their original spots. Repeat and call all numbers.
Obstacle Course	Set up based upon the ideas of the high school mentors and the available equipment. Be sure that the course is developmentally appropriate for children and safe.
Scavenger Hunt	Make a list of items to collect and send students outside for an adventurous hunt for each item.
Parachute Games	*Traffic Lights*: Red light (stop shaking), Yellow Light (shake slowly), Green Light (shake fast). *Cat and Mouse:* One student (mouse) crawls under the parachute while another (cat) crawls on top trying to catch the mouse while the others shake the parachute. *Make a tent*: Kids have fun sitting inside and this is also a good way to tell stories or provide instructions about the next activity). *Life Guard*: Students sit in a circle holding the parachute at their waist with their feet extended underneath the parachute. The shark (player) is underneath the parachute and the lifeguard (player) walks around the outside of the circle. The lifeguard's job is to save the players when the shark pulls their feet under the water (parachute). Players can yell 'help' when they are being attacked. If pulled under, the player becomes another shark.

Educational Games & Activities

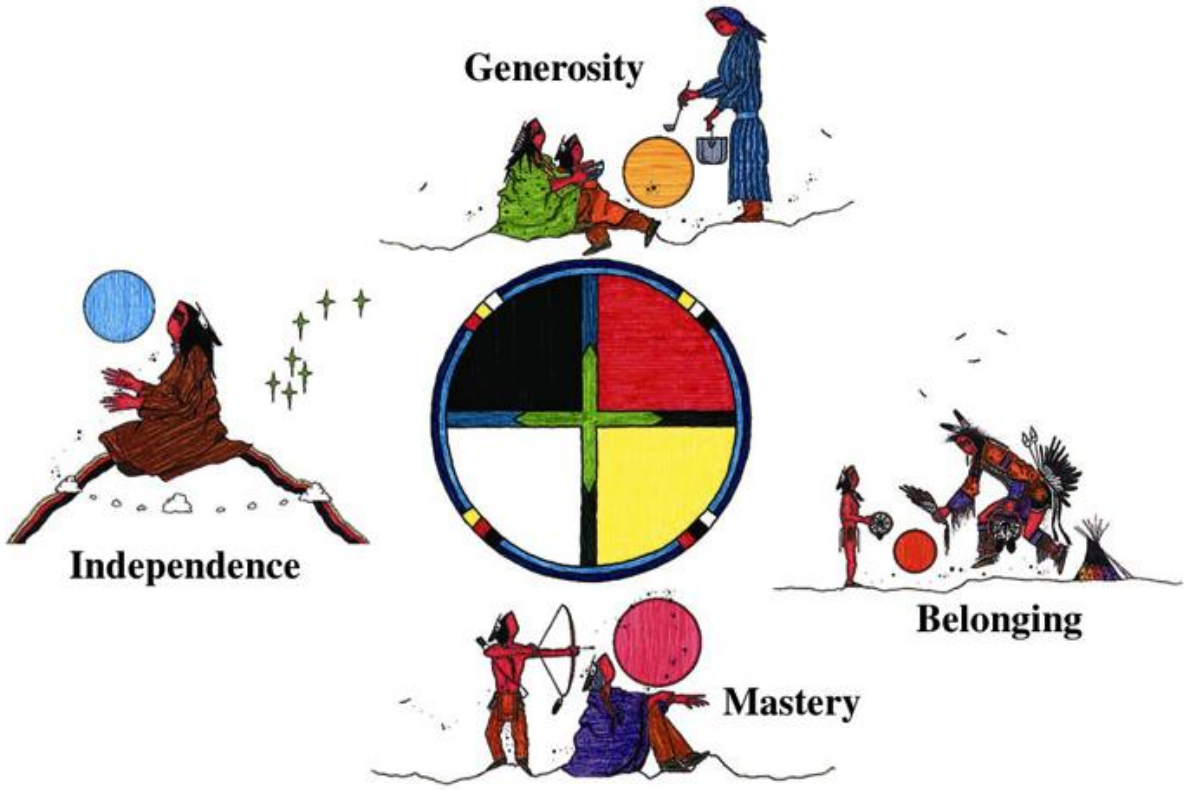
Playing a variety of board games allows for groups of 3-4 older and younger students to build relationships while having fun and learning. Some games encourage the development of math skills (adding and subtracting), patterns and logical thinking, problem solving skills, basic literacy (the vocabulary used for various body parts), memory, elements of chance and probability, as well as interpersonal skills.

Here is a list of games we found work well with children and youth. While we highlight the obvious connections to learning, the games provide more than one element of learning…

Math/Patterns	Literacy	Problem solving	Others
Snakes and Ladders	Cranium	Twister	Pictionary (art)
Connect Four	Reading one-on-one[5]	Jenga	Bingo Name Game
Battleship	Mad Libs	Checkers	Crafts
Dice	Cross Words	Scavenger Hunt	Memory games
Playing Cards	Reading books	Mazes	Human pretzel

[5] Younger mentors love to read with high school mentors. Make sure to find a quiet place for mentors to read together.

Appendix 3: Circle of Courage ® Philosophy



This image and the following information about the Circle of Courage® was obtained with permission from https://www.reclaiming.com/content/about-circle-of-courage. To learn more about the Circle of Courage®, please visit the website or book, Brendtro, L., Brokenleg, M., & Van Bockern, S. (2002). Reclaiming youth at risk (Rev. ed.). *Bloomington, IN: National Educational Service*.

The Circle of Courage® is a model of youth empowerment supported by contemporary research, the heritage of early youth work pioneers and Native philosophies of child care. The model is encompassed in four core values: belonging, mastery, independence, and generosity. The central theme of this model is that a set of shared values must exist in any community to create environments that ultimately benefit all.

In 1990, Dr. Larry Brendtro, Dr. Martin Brokenleg, and Dr. Steve Van Bockern, Augustana College faculty, Sioux Falls, South Dakota, published *Reclaiming Youth at Risk: Our Hope for the Future*. The authors suggested that children who are often referred to as "alienated", "troubled" or "difficult" are at risk because they live in an environment that is hazardous - one that breeds discouragement. By contrast, an environment that promotes courage is one that fosters changes to meet the needs of the young person and society and subsequently reclaims youth at risk.

The model is represented by a circle - the medicine wheel - that is divided into quadrants. The circle is sacred and suggests the interconnectedness of life. Likewise, it expresses the sacredness of the number four - the four directions, the four elements of the universe, and the

four races. Each quadrant of the CIRCLE OF COURAGE stands for a central value - belonging, mastery, independence, and generosity - of an environment that can claim and reclaim all youth. It represents the "cultural birthright for all the world's children."

The Circle of Courage is a philosophy that integrates the best of Western educational thought with the wisdom of indigenous cultures and emerging research on positive youth development. The circle suggests the importance of the shared values of belonging, generosity, independence, and mastery. While the four dimensions of the Circle of Courage can be described individually, they must be viewed as one. Ideas from the book *Reclaiming Youth at Risk: Our Hope for the Future* offer insight on understanding the four values:

Belonging:

In Native American and First Nations cultures, significance was nurtured in communities of belonging. Lakota anthropologist Ella Deloria described the core value of belonging in these simple words: "Be related, somehow, to everyone you know." Treating others as kin forges powerful social bonds that draw all into relationships of respect. Theologian Martin Marty observed that throughout history the tribe, not the nuclear family, always ensured the survival of the culture. Even if parents died or were not responsible, the tribe was always there to nourish the next generation.

Mastery:

Competence in traditional cultures is ensured by guaranteed opportunity for mastery. Children were taught to carefully observe and listen to those with more experience. A person with greater ability was seen as a model for learning, not as a rival. Each person strives for mastery for personal growth, but not to be superior to someone else. Humans have an innate drive to become competent and solve problems. With success in surmounting challenges, the desire to achieve is strengthened.

Independence:

Power in Western culture was based on dominance, but in tribal traditions it meant respecting the right for independence. In contrast to obedience models of discipline, Native teaching was designed to build respect and teach inner discipline. From earliest childhood, children were encouraged to make decisions, solve problems, and show personal responsibility. Adults modeled, nurtured, taught values, and gave feedback, but children were given abundant opportunities to make choices without coercion.

Generosity:

Finally, virtue was reflected in the preeminent value of generosity. The central goal in Native American child-rearing is to the teach the importance of being generous and unselfish. In the words of a Lakota Elder, "You should be able to give away your most cherished possession without your heart beating faster." In helping others, youth create their own proof of worthiness: they make a positive contribution to another human life.

Appendix 4: Pilot Paper

PEDIATRICS®
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Peer Mentoring for Type 2 Diabetes Prevention in First Nations Children

Pinar Eskicioglu, Joannie Halas, Martin Sénéchal, Larry Wood, Elma McKay, Stephanie Villeneuve, Garry X. Shen, Heather Dean and Jonathan M. McGavock

Pediatrics 2014;133;e1624; originally published online May 12, 2014;
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Peer Mentoring for Type 2 Diabetes Prevention in First Nations Children

WHAT'S KNOWN ON THIS SUBJECT: Type 2 diabetes mellitus is one of the fastest growing pediatric chronic illnesses worldwide and disproportionately affects indigenous people from all continents.

WHAT THIS STUDY ADDS: These data support the growing body of evidence that peer mentoring is an attractive strategy for teaching health behaviors and improving health outcomes in children.

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KEY WORDS
Aboriginal health, obesity, type 2 diabetes

ABBREVIATIONS
AYMP—Aboriginal Youth Mentorship Program
CI—confidence interval
T2DM—type 2 diabetes mellitus

Ms Eskicioglu collected and analyzed the data, and wrote the manuscript; Dr Halas contributed to the study design and acquisition of funding, and revised the manuscript; Dr Sénéchal and Ms Villeneuve analyzed the data and wrote the manuscript; Mr Wood helped design the study and revised the manuscript; Mrs McKay helped design the study and collect data and revised the manuscript; Drs Shen and Dean contributed to the study design and revised the manuscript; Dr McGavock conceptualized and designed the study, participated in data collection, conducted the analysis, and wrote the manuscript; and all authors approved the final version of the manuscript as submitted.

This trial has been registered at www.clinicaltrials.gov (identifier NCT01820377).

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(Continued on last page)

abstract

OBJECTIVE: The goal of this study was to assess the efficacy of an after-school, peer-led, healthy living program on adiposity, self-efficacy, and knowledge of healthy living behaviors in children living in a remote isolated First Nation.

METHODS: A quasi-experimental trial with a parallel nonequivalent control arm was performed with 151 children in Garden Hill First Nation during the 2010–2011 and 2011–2012 school years. Fourth grade students were offered a 5-month, peer-led intervention facilitated by high school mentors between January and May of each school year; students in the control arm received standard curriculum. The main outcome measures were waist circumference (WC) and BMI *z* score. Secondary outcome measures included healthy living knowledge and self-efficacy.

RESULTS: Fifty-one children (mean ± SD age: 9.7 ± 0.4 years; BMI *z* score: 1.46 ± 0.84) received the intervention, and 100 children were in the control arm. At baseline, WC (79.8 vs 83.9 cm), BMI *z* score (1.46 vs 1.48), and rates of overweight/obesity (75% vs 72%) did not differ between arms. After the intervention, the change in WC (adjusted treatment effect: –2.5 cm [95% confidence interval (CI): –4.1 to –0.90]; $P = .002$) and BMI *z* score (adjusted treatment effect: –0.09 [95% CI: –0.16 to –0.03]; $P = .007$) were significantly lower in the intervention arm compared to the control arm. The intervention arm also experienced improvements in knowledge of healthy dietary choices (2.25% [95% CI: –0.01 to 6.25]; $P = .02$). Self-efficacy was associated with the change in WC after the intervention ($\beta = -7.9$, $P = .03$).

CONCLUSIONS: An after-school, peer-led, healthy living program attenuated weight gain and improved healthy living knowledge in children living in a remote isolated First Nation. *Pediatrics* 2014;133: e1624–e1631

Type 2 diabetes mellitus (T2DM) is one of the fastest growing pediatric chronic illnesses worldwide and disproportionately affects indigenous people from all continents.[1,2] In Canada, Aboriginal youth comprise ~50% of new cases of T2DM presenting to pediatric endocrinology clinics.[3] The disproportionately increased risk for T2DM in Aboriginal youth may be explained by the interaction between environment and lifestyle behaviors,[4,5] exposure to T2DM in utero,[6] early life events such as the family feeding environment, and genetic factors.[7,8] Several additional factors, common among Aboriginal people, cannot be ignored, including food insecurity, poverty, legacies of colonialism, and acculturation.[9,10] These factors compound physiologic risk factors and likely contribute to the high rates of T2DM seen in Aboriginal youth. The unique clustering of social, historical, and physiologic risk factors that Aboriginal youth encounter necessitate the use of novel, culturally relevant approaches for T2DM prevention.

Despite the increasing rates of T2DM among Aboriginal youth, very few prevention trials exist that are tailored to the unique needs of this vulnerable pediatric population.[11] The two landmark community-based interventions conducted in Canada (The Sandy Lake Diabetes Prevention Program[12] and the Kahnawake Schools Diabetes Prevention Program[13]) led to increased physical activity levels and improved healthy living behaviors; however, they failed to reduce T2DM-related end points, particularly adiposity.[11] Studies by our group and others have recently demonstrated that peer-led interventions are successful at eliciting behavior changes that lead to improved health outcomes in children, in particular weight status.[14–16] Previous community-based interventions tailored to Aboriginal children have not included a peer-mentoring model; therefore, the efficacy of a peer-mentoring approach for attenuating weight gain and risk factors for T2DM in Aboriginal children remains unclear.

In light of the positive effects of peer mentoring on obesity-related outcomes in other settings,[14–16] we partnered with a remote First Nation in northern Manitoba to pilot a community-based participatory action experimental trial to test the hypothesis that an after-school, peer-led mentoring program would attenuate weight gain and improve healthy living knowledge and behaviors in children in primary school. Furthermore, we hypothesized that changes in adiposity would be associated with improvements in healthy living knowledge and behaviors and self-efficacy.

METHODS

Study Design and Population

The research project was conducted through a partnership between study investigators and stakeholders in Garden Hill (Kistiganwacheeng) First Nation that followed the principles of participatory action research[17] and the Canadian Institutes of Health Research guidelines for ownership, control, access, and possession of data.[18] Garden Hill First Nation is a remote Oji-Cree First Nation in northeast Manitoba with ~3500 residents and one of the highest rates of T2DM in youth in Canada. In response to the high rate of pediatric T2DM and its complications, representatives of the health authority approached the research team in 2006 to develop a prevention program for youth. After years of formative work and relationship building, the research team and community stakeholders agreed to pilot a peer-mentoring program that was culturally appropriate for First Nations youth. We piloted a nonrandomized experimental trial with a parallel nonequivalent control group to test the study hypotheses. In the fall of the 2010–2011 and 2011–2012 school years, students in grades 4 and 5 from the Kistiganwacheeng Elementary School were invited to participate in the study, with the knowledge that an after-school program would be offered to grade 4 students and that grade 5 students would serve as the control group. Written informed consent was provided by parents and verbal assent was acquired from children before participation. The research ethics board at the University of Manitoba approved the protocol in accordance with the Declaration of Helsinki.

Intervention

A 90-minute, peer-led after-school program was offered once a week to students in grade 4 between January and May in the 2010–2011 and 2011–2012 school years. The curriculum for this Aboriginal Youth Mentorship Program (AYMP) was developed by teachers and Aboriginal youth in Winnipeg in 2006 to provide a communal, relationship-based wholistic approach to physical activity, nutrition, and education programming.[19–21] The theoretical framework for the curriculum was informed by the Circle of Courage[22,23] and the Four R's model.[23] Specifically, the curriculum was designed to build on the strengths of Aboriginal youth as they assume a leadership role in their community. Four different areas of well-being were also incorporated: healthy food, healthy play, education, and healthy relationships (Fig 1).

The curriculum was delivered by mentors in grades 7 through 12 from the neighboring high school. All high school students were invited to volunteer, with no limit to the number of mentors involved. There were no specific criteria to be a mentor, but all student mentors were enrolled in high school and regularly attended classes. There were 3 to 4 elementary students to each high

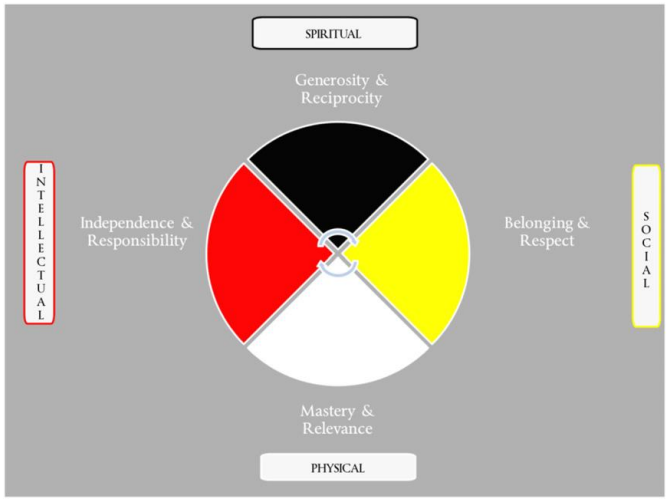

FIGURE 1
AYMP theoretical framework. AYMP is designed to improve wholistic health in youth by providing programmatic components that are targeted at a child's social health (novel relationships and role modeling of healthy behaviors through snacks); physical health (physical activity); mental health (intellectual games and teachings of health); and spiritual health (having fun).

school mentor. During the 2010–2011 school year, one of the research assistants moved to Garden Hill First Nation to train the mentors by using the *Rec & Read Mentorship Program, Staff Manual* (Supplemental Information). The following year, a recent high school graduate, who was a mentor the year before, became the adult mentor. High school mentors met weekly to plan sessions for children that included: (1) peer teaching of low-organized games and activities; (2) sharing of knowledge about healthy foods to prepare for the children; and (3) peer teaching of educational games and activities. High school mentors developed the weekly program components on their own. The only requirement was the provision of a healthy snack, delivery of 45 minutes of supervised moderate to vigorous physical activity, and supervised provision of an educational game or activity. A list of examples of healthy snacks and games was included in the staff manual. The control arm consisted of students in grade 4 who were unable to participate in the intervention and students in grade 5. No students were excluded from participation in the study.

Outcome Measures

The primary outcome measure was waist circumference, which was measured in duplicate to the nearest 0.5 cm by using a flexible tape measure in a standing position at the peak of the iliac crest. Waist circumference is a clinically relevant outcome in children because it is a robust predictor of T2DM and cardiometabolic health.[24] The secondary outcome measure was BMI *z* score, which was calculated from height and weight measurements and converted to a *z* score based on normative data from age- and gender-matched children in the United States by using specialized software (Epi Info, Centers for Disease Control and Prevention, Atlanta, GA). Children were categorized as healthy weight, overweight, or obese according to age- and gender-specific BMI thresholds established by the International Obesity Task Force.[25] Body weight was measured to the nearest 0.1 kg in duplicate by using a digital scale (Seca 869; Seca Corporation, Chino, CA). Height was measured to the nearest 0.1 cm in duplicate by using a standard stadiometer (Seca 217; Seca Corporation). All measurements were taken in light indoor clothing.

The exploratory outcomes assessed included self-reported measures of self-efficacy as well as physical activity and healthy eating knowledge using a reliable and validated tool used in previous school-based peer-mentoring interventions.[15] Body satisfaction was also assessed by using a visual Likert scale depicting silhouettes of 7 body types ranging from very lean to overweight, and children were asked to select the body image that they most resembled and another that they most desired resembling.[26] Body satisfaction was treated as a continuous variable and was calculated as the difference between desired body type and perceived body type. A score of zero reflected that the child was satisfied with his or her body type; a positive score would indicate a desire to be larger; and a negative score would indicate a desire to have a smaller body type.

Data Analysis

Data are presented as means and 95% confidence intervals (CIs) or proportions. Differences between study arms at baseline were tested with independent sample *t* tests. Linear mixed effects models with repeated measures were used to test for group-wise differences in the change in outcome measures over the 5-month intervention, adjusting for baseline differences in age, gender, and adiposity. To test for associations between the change in waist circumference and measures of healthy living, we performed a stepwise multiple

linear regression analysis to investigate the independent association of the changes in both waist circumference and BMI *z* score and healthy living behaviors, knowledge, and self-efficacy. We did not use an intention-to-treat analysis because participants were not randomized to control or intervention arms. An interaction term was created to determine if the effects of the intervention differed between boys and girls, considering the differences in gender at baseline. We observed no significant interactions between the intervention and gender; therefore, all analyses were performed with data from boys and girls pooled. A *P* value $<.05$ was considered statistically significant, and all analyses were performed by using SAS version 9.2 (9.2) (SAS Institute, Inc, Cary, NC).

RESULTS

Between 2010 and 2012, a total of 237 grade 4 and 5 students were invited to participate in the study, and 180 returned consent forms and performed baseline testing. Over the 2 waves of data collection, 29 participants did not return for follow-up testing. Among the 151 youth with complete data (control: $n = 100$; intervention: $n = 51$), 58% were girls and 72% were overweight or obese (Table 1). At baseline, no differences were observed for waist circumference, BMI *z* score, or overweight/obese prevalence between children in the intervention and control arms. At baseline, children in the control arm were older and displayed lower self-efficacy scores compared with youth in the intervention arm ($P < .05$).

Measures of adiposity stratified according to study arm are presented in Table 2. The change in waist circumference was significantly lower in children who received the intervention (0.34 cm [95% CI: −0.96 to 1.64]) compared with the control arm (2.87 cm [95% CI: 1.92 to 3.82]; $P < .01$) (Fig 2). The change in BMI *z* score over time was also significantly attenuated in the intervention arm (−0.05 [95% CI: −0.11 to 0.002]) compared with the control arm (0.04 [95% CI: −0.001 to 0.08]; $P < .01$) (Fig 3). When analyses were restricted to overweight and obese children ($n = 109$), children in the intervention arm experienced a significant attenuation in waist circumference compared with children in the control arm (0.40 cm [95% CI: −1.05 to 1.85] vs 2.58 cm [95% CI: 1.50 to 3.67]; $P < .02$). No differences in BMI *z* score were observed in subgroup analyses restricted to overweight/obese youth.

TABLE 1 Baseline Characteristics

Variable	Control ($n = 100$)	Intervention ($n = 51$)
Age, y	10.4 ± 0.7	9.7 ± 0.4*
Sex (female/male)	51/49	38/13*
Grade (4/5)	36/64	51/0*
Waist circumference, cm	83.9 ± 15.7	79.8 ± 12.6
BMI *z* score	1.48 ± 0.94	1.46 ± 0.84
Weight status, %		
Normal	28 ($n = 28$)	25 ($n = 13$)
Overweight	15 ($n = 15$)	25 ($n = 13$)
Obese	56 ($n = 56$)	50 ($n = 25$)
Healthy food knowledge, %	76.2 ± 12.3	69.8 ± 13.6*
Physical activity knowledge, %	74.6 ± 24.3	58.7 ± 21.2*
Self-efficacy, %	82.6 ± 16.0	87.3 ± 12.2*
Body image (ideal self − current self)	−0.64 ± 1.02	1.06 ± 1.11

Continuous variables are presented as mean ± SD; categorical variables are presented as a percentage of the total study arm or *n*. *$P < .05$ significantly different from the control group.

Measures of knowledge of healthy living behavior, self-efficacy, and body image are presented in Table 3. Children in the control arm displayed better knowledge of healthy foods ($P = .006$) and physical activity ($P < .001$) compared with students in the intervention arm at baseline. Self-efficacy scores were similar in the control arm at baseline compared with students in the intervention arm ($P = .07$). Knowledge of healthy foods ($P = .021$) and body image ($P = .04$) increased significantly in the intervention arm compared with the control arm. With regard to body image, children in the intervention arm experienced a greater improvement in body satisfaction than children in the control arm (0.34 [95% CI: 0.05 to 0.63]; $P = .045$).

The results of a multiple linear regression analysis designed to determine the predictors of the change in waist circumference and BMI *z* score are presented in Table 4. After controlling for age, gender, and baseline weight, the change in self-efficacy was the best predictor of the change in waist circumference over the 5-month intervention (β: −8.21; SE: 4.19; $P = .03$). Neither the change in self-efficacy nor the change in healthy living knowledge was associated with the change in BMI *z* score.

DISCUSSION

The data presented here support previous trials in children and adolescents by demonstrating that exposure to a peer-mentoring program attenuated central adiposity and improved healthy living knowledge.[14–16] The data expand on previous community-based experimental studies in Aboriginal communities[11] by including a control arm recruited from the same community, exposed to the same geographic, sociodemographic, and educational settings, and that was closely matched for outcome measures before the intervention. Our results are also novel because the intervention was delivered in a remote First Nation with very high rates

TABLE 2 Effect of the AYMP on Measures of Adiposity in Children From a Rural First Nation

	Control (n = 100)		Intervention (n = 51)		Group-wise Comparisons		
	Before	After	Before	After	Effect	95% CI	P
All children							
BMI z score	1.26 (1.19 to 1.34)	1.30 (1.23 to 1.38)	1.27 (1.17 to 1.37)	1.22 (1.11 to 1.32)	−0.09	−0.08 to −0.09	.007
Waist circumference, cm	80.0 (78.4 to 81.6)	82.9 (81.2 to 84.5)	77.8 (75.6 to 80.1)	78.2 (75.9 to 80.5)	−2.5	−2.6 to −2.5	<.001
Overweight/obese children only	Control (n = 71)		Intervention (n = 38)		Group-wise Comparisons		
	Before	After	Before	After	Effect	95% CI	P
BMI z score	1.73 (1.65 to 1.83)	1.74 (1.65 to 1.83)	1.66 (1.60 to 1.77)	1.63 (1.52 to 1.74)	−0.04	−0.04 to −0.03	.13
Waist circumference, cm	85.2 (82.1 to 88.2)	87.8 (84.8 to 90.7)	82.0 (78.4 to 85.6)	82.4 (78.8 to 86.0)	−2.2	−2.3 to −2.2	.02

Data are presented as adjusted means (95% CIs). Linear mixed effects models for the change in BMI z score were adjusted for baseline weight category (normal weight, overweight, and obese); the analysis for the change in waist circumference was adjusted for age, gender, and baseline weight category. Effect indicates treatment effect.

of childhood obesity (60%–73%) and T2DM.[27] Finally, our data support previous community-based interventions for First Nations children[12] by demonstrating that self-efficacy can be improved with a school-based healthy living intervention.

Central adiposity is a well-established risk factor for several cardiometabolic conditions in children, including the metabolic syndrome, impaired glucose tolerance, and T2DM.[24,28] In Canada, First Nations and Métis children are more likely to experience central weight gain and display elevated waist circumference, relative to non–First Nations children.[9,29] We recently completed a cluster randomized controlled trial demonstrating that a peer-led, classroom-based healthy living curriculum was effective at attenuating waist circumference in a sample of both First Nations and non–First Nations children in Manitoba.[14] The data from the present study support these findings and extend them by demonstrating that using a peer-led approach which is culturally tailored to First Nations children is feasible and effective when delivered in a remote, isolated setting. Furthermore, although the effect size was modest, compared with intensive clinic-based weight loss programs, it was greater than those seen in previous school-based interventions[30,31] and would translate into a 12% reduced risk of metabolic syndrome.[32]

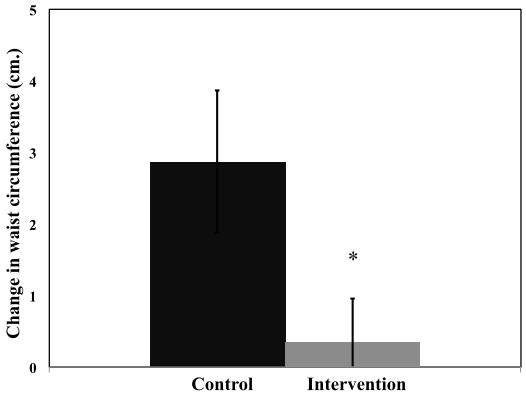

FIGURE 2
Change in waist circumference in children who received the intervention (AYMP) and control subjects. Analyses were adjusted for age, gender, and baseline weight categories (normal weight, overweight, and obese). *$P < .05$.

Taken together with the observed reduction in BMI z score, these data provide preliminary evidence that peer-based mentoring is an effective approach for preventing weight gain (particularly central weight gain) and, by extension, the risk for T2DM in First Nations children.

Similar to other participatory action community-based interventions for First Nations children, exposure to healthy living teaching improved healthy living knowledge and behaviors. For example, the Kahnawake Schools Diabetes Prevention Project elicited significant improvements in physical activity and decreased screen time in children aged 6 to 11 years.[13] The Sandy Lake Diabetes Prevention Program, a comprehensive school-based education program delivered in a remote Oji-Cree community with geographic and genetic similarities to Garden Hill First Nation, enhanced healthy living knowledge and behavior in students aged 7 to 11 years.[12] Our data expand on these studies by demonstrating that a peer-led approach is equally effective for improving healthy living knowledge and enhancing both self-efficacy and body image in First Nations children, 9 to 10 years of age, living on reserve in a remote setting. Because peer-mentoring models are cost-effective and require minimal resources, this option may be an attractive and sustainable model for the delivery of healthy living information for First Nations children

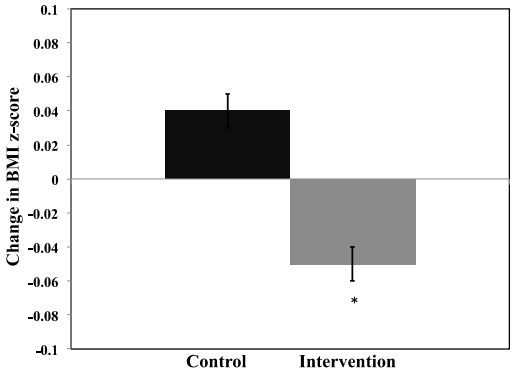

FIGURE 3
Change in BMI *z* score in children who received the intervention (AYMP) and control subjects. Analyses were adjusted for baseline weight categories (normal weight, overweight, and obese). $*P < .05$.

living in remote, isolated communities where travel and resources are prohibitive for conventional T2DM prevention programs.

Self-efficacy is an established determinant of behavior change.[33–35] Self-efficacy is also an important determinant of changes in physical activity levels[34] and weight loss after lifestyle interventions.[35] Children exposed to the school-based component of the Sandy Lake Diabetes Prevention Program, which included peer role modeling opportunities (but not peer mentoring), exhibited significant improvements in dietary self-efficacy in grades 3 to 5.[12] The observation that overall self-efficacy increased after exposure to a peer-mentoring intervention, and was associated with changes in waist circumference, suggests that it may be an important determinant of success associated with healthy living interventions tailored to First Nations children. Additional studies are needed to better understand the aspects of self-efficacy (ie, self-efficacy for making dietary versus physical activity changes) that are enhanced by peer mentoring and how they translate into altered healthy living behaviors.

The present study is strengthened by a longstanding equitable community–university partnership, a relatively large sample size, and the addition of a parallel control arm that was closely matched to the intervention arm before the intervention. Despite these strengths, several limitations need to be addressed. First, because this was a quasi-experimental trial, there is a risk of selection bias related to self-selection to the intervention and age differences between the study arms at baseline. In an effort to minimize selection bias, the control arm was selected to match as closely as possible to the intervention arm for several confounders, including baseline weight, body fat distribution, and sociodemographic variables. Also, we had different gender ratios between the groups (intervention: 3 female subjects, 1 male subject; control group: 1:1). Although we observed no significant interaction across gender, the imbalance is an unavoidable weakness to the design. Second, investigators were only partially blinded to group allocation when assessing outcome measures, thus increasing the risk of investigator bias. Specifically, they were aware that all grade 5 students were in the control arm; however, they were unable to distinguish students in grade 4 who received the intervention from those who did not. Third, we recognize that there is a potential risk of carryover effects of the intervention for youth who crossed over to the control arm after receiving the intervention in year 1 of the study. We performed a subgroup analysis, removing the 13 students who crossed over to the control arm after receiving the intervention, and the effect size and statistical significance remained unchanged. Fourth, the instruments we used to quantify healthy food knowledge and physical activity were rather crude relative to the gold standard 3-day food records, and they may not have been sufficiently sensitive to detect small changes in dietary habits. Fifth, parental involvement was limited. Although parents were invited to observe the program, there was no established curriculum for parents to use to support the healthy living behaviors promoted during the program. Finally, because this study was a pilot project, it was not sufficiently powered to test for

TABLE 3 Effect of AYMP on Knowledge of Healthy Living Behaviors, Self-Efficacy, and Body Image in Children From a Rural First Nation

Variable	Control (n = 100)		Intervention (n = 51)		Group-wise Comparisons		
	Before	After	Before	After	Effect	95% CI	P
Healthy food knowledge, %	76.9 (74.2 to 79.5)	73.3 (70.3 to 76.2)	68.9 (65.1 to 72.7)	71.2 (67.3 to 75.1)	6.1	1.0 to 11.1	.02
Physical activity knowledge, %	75.3 (70.7 to 80.0)	76.9 (71.9 to 82.0)	57.5 (50.9 to 64.2)	62.3 (55.6 to 69.1)	3.6	−3.8 to 11.1	.34
Self-efficacy, %	83.2 (79.8 to 86.4)	88.4 (84.2 to 92.7)	87.1 (82.5 to 91.6)	94.3 (89.2 to 99.4)	2.4	−3.3 to 8.3	.40
Body image (ideal self – current self)	−0.64 (−0.82 to −0.46)	−0.66 (−0.85 to −0.47)	−1.06 (−1.32 to −0.80)	−0.71 (−0.98 to −0.44)	0.37	0.01 to 0.72	0.045

Data are presented as adjusted mean and (95% CI). All the analyses were adjusted for age, gender, and baseline weight. Effect indicates treatment effect.

TABLE 4 Independent Determinants of the Change in Waist Circumference and BMI *z* Score After Exposure to AYMP

Variable	β	SE	*P*
Change in waist circumference			
Age	−0.81	1.01	.42
Gender	1.27	1.16	.27
Weight	−0.85	0.65	.19
Knowledge of physical activity	−0.85	2.52	.73
Knowledge of healthy eating	2.35	4.05	.56
Self-efficacy	−7.90	4.59	.03
Body image	−0.41	0.62	.50
Change in BMI *z* score			
Age	−0.00	0.03	.82
Gender	0.01	0.05	.72
Weight	−0.03	0.02	.22
Knowledge of physical activity	−0.07	0.11	.50
Knowledge of healthy eating	0.15	0.18	.38
Self-efficacy	−0.01	0.20	.94
Body image	0.01	0.02	.66

differences in multiple outcome measures. Despite these limitations and in light of the strategies used to overcome them, we are confident that, short of a randomized controlled trial, this study provides important insight into the effectiveness of a novel peer-mentoring approach for weight management and the promotion of healthy living behaviors in First Nations children at significant risk of obesity and T2DM.

CONCLUSIONS

The results of this pilot project suggest that a peer-led, after-school program grounded in a strengths-based approach is effective for attenuating the age-related increases in waist circumference and weight gain, and improving both knowledge of healthy dietary choices and self-efficacy in First Nations youth living in a remote northern setting. These data support the growing body of evidence that peer mentoring is an attractive strategy for teaching health behaviors and improving health outcomes in children. They also provide a cost-effective model of successful behavior change for a pediatric population at significant risk of T2DM and other obesity-related chronic diseases.

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In agreement with the AYMP Code of Research Ethics, this article was reviewed, discussed, and approved by the following stakeholders and members of the Advisory Committee: Eric Wood (Public Health Director), Larry Wood (Aboriginal Diabetes Initiative worker), Maggie Flett (Health Director), Buddy Beardy (Chief), Annalee Johnson (elementary school principal), Leanne Chornaby (elementary school vice-principal), Madeline Little (high school vice-principal), Wilfred Fiddler (high school principal), Beatrice MacPherson (Health Counselor), Ernie McDougall (Education Director), and Russell Harper (Education Counselor).

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(Continued from first page)

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POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

Peer Mentoring for Type 2 Diabetes Prevention in First Nations Children

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DOI: 10.1542/peds.2013-2621

Appendix 5: Photovoice Assignment

Title of Photograph: _____

Name of Photographer: _____

Date of photo (your best estimate): _____

(One photo per description sheet. If you need to more space, write on back)

What is seen here? (describe what you see)	e.g., The swing set near my house is completely rusted. Or, this is the front door to the local neighborhood centre.
What is <u>really</u> happening? (the unseen 'story' behind the image)	e.g., They shut down the sport field because no one was using it but we couldn't use it because it was fenced and locked.
Describe how the image is related to health and wellness.	
Why is this image important to you?	

Appendix 6: Photovoice Consent Form

Northern Lights Physical Activity Program: Aboriginal Youth Mentorship Program

UNIVERSITY OF MANITOBA

HREB: H2014:076
Date of Approval: April 28, 2014
Date of Expiry: March 24, 2015

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

Title of Study: The Lived Experience of Being a Mentor in the Aboriginal Youth Mentorship Program

Study Staff Contacts: Dr. Jonathan McGavock, 204-480-1359
Garden Hill First Nation -- Mr. Larry Wood, 204-456-2926
Sagkeeng First Nation -- Mr. Allan Courchene, 204-367-4109
Wabowden -- Ms. Bonnie Monias, 204-689-2620

Purpose of Study: The purpose of this project is to understand the lived experience of high school mentors participating an afterschool program called the Aboriginal Youth Mentorship Program (AYMP). We want to know what it was like for your child to be a mentor for younger students. We want to see how it affected different parts of your child's life (i.e. friendships, school, family etc.) By interviewing mentors, we hope to get a better understanding of what it was like for your child as a mentor and how it may have affected different parts of their life. The information we get from these interviews will help us make the program better for future mentors.

Why Are You Being Given This Document:
Your child is being asked to participate in a research study because they were a mentor in the AYMP program this year. Please take your time to review this information and ask the study staff any questions that you have. You can talk about this study with your friends and family before you decide if you want your child to be part of this study. Please ask the study staff to explain any words or information that is not clear to you. You can also ask about how your information will be kept confidential. Being part of this study is not part of the regular program, and it is up to you whether your child participates in this study or not (eg. Your child can still be a mentor even if they decide not to be part of the interviews for this part of the study).

Study Procedures:
The goal of this study is to understand what the experience of being a mentor was like for your child. We want your child to tell us, in their own words, how being a mentor may have changed life for them at home, at school or with your friends. Simply, we want your child to tell us their story about what it was like being a mentor. To help your child tell their story you can choose one of two methods. One is called Photovoice, the other is called the Anishinaabe Symbol-Based Reflections.

If you choose Photovoice, we will provide your child with a camera for 2 weeks and ask them to take some pictures. Your child will use the pictures to tell their story about what their life was like or how it changed while your child was a mentor.

If you choose the Anishinaabe Symbol-Based Reflection Method your child will be asked to create a symbol that best reflects their story as a mentor.

Both methods will make it easier for your child to tell us their story about being a mentor.

After the photos are developed (Photovoice) or after your child finishes making their symbol (Anishinaabe Symbol-Based), we will do interviews with your child and other fellow mentors. There are two phases of interviews:

1. Phase 1 will be one-on-one interviews. We will be asking questions about pictures that your child took. We will also ask your child some questions about the program, and what impact it has had on them in the different areas of your life.

2. Phase II will be with other mentors from your child's school. We will be asking your child to come together and talk in a group with other mentors from their school (focus group). In this group we will ask your child more questions about the program. We will also ask your child if the information we gathered from Phase 1 was accurate.

The interviews will be about one hour long, and the focus groups will be about 90 minutes long. Both will be tape recorded. Your child will be free to talk about anything they like during these interviews and the information we gather will be kept private. Also, if there are things your child does not want to talk about, they do not have to.

We will do the interviews and focus groups in the high school in your community. Your child will be able to be interviewed by themselves, in a focus group, or both. Everything that your child tells us will be kept confidential and will only be used to help us understand how being a mentor affected their life. The interview tapes will be typed into a computer and stored as a document. We will not use your child's name in this document.

When all of the interviews are done, we will let your child know what we found, and give them the chance to tell us more about what they talked about if they want.

All of your child's personal information will be kept confidential, and will only be looked at by members of the research team. Any information that identifies your child will be kept separate from the interview information. All of the information will be kept in a locked cabinet in a locked office that only the researchers use. At the end of this research project we will destroy all computer and paper records that have your identifying information.

If your child does not want to remain anonymous, you will have the opportunity to decide what information can be shared with the public at the end of this consent form.

Your child can stop being part of this study at any time. However, if your child would like to stop being in the study, we would like your child to talk to research and study staff first. If your child decides to stop early or decides they do not want to participate, it will not affect their participation in the program as mentors.

Risks:

There are no risks associated with participating in this study. Your child may feel uncomfortable with some of the questions that will be asked of them. If that happens, your child has the right to not answer.

Benefits:
There may be no direct benefit to your child from being in this study. When the interviews and focus groups are finished, we hope to understand what the affects of the program are on the high school mentors, which can help us adapt the program accordingly.

Costs:
There is no cost to participating in this study.

Payment for Participation:
Your child will be given $25 for each study visit. Your child will also be provided with a healthy meal during the interviews.

Confidentiality:
The interview will be tape recorded; however, your child's name will not be recorded on the tape. Your child will be given a code and that will be recorded on the tape and used when the interviews are typed up. If your child wants the tape recorder turned off at any time; or prefer not to have it present, your child can tell the study staff. The tapes will be destroyed in five years. Your child's name and personal information will not be part of the written report of the research. All of your child's information and interview responses will be kept private. The researcher will not share your child's responses with anyone who is not on the research team. However, focus group interviews preclude absolute confidentiality, as other participants in the focus group will know who you are.

The University of Manitoba Health Research Ethics Board and the Canadian Institute of Health Research may look over study records to make sure everything is going as it should be.

Voluntary Participation/Withdrawal from the Study:
Your child's decision to take part in this study is totally up to you and your child. Your child may refuse to participate or they may quit at any time. Your child's decision to participate or withdraw form the study will not affect their involvement in the program. If the research study team and staff feel that it is in your child's best interest to take them out of the study, they will remove your child without your consent.

Questions: For questions before, during, and after this study contact the study doctor (Jonathan McGavock, 204-480-1359) or the study community co-investigator (names and contact numbers listed on first page). For questions about your child's rights as a research participant, you may contact The University of Manitoba, Research Ethics Board Office at: (204) 789-3389.

Statement of Consent

- I have read and understand this consent form.
- I have discussed any questions about the study with study staff.
- The risks and benefits have been explained to me.
- I have not been influenced by study staff to participate in the study.
- I understand that I will be given a copy of this consent form after signing it.
- I understand that my child's participation in this study is voluntary and that he/she may choose to withdraw at any time.
- I freely agree for my child to participate in this study.
- I understand that information regarding my child's personal identity will be kept confidential, unless I approve it can be used.
- I understand that focus group interviews preclude absolute confidentiality.
- I authorize The University of Manitoba Research Ethics Board, the Canadian Institutes of Health Research to access my child's study records for quality assurance purposes.

By signing this consent form, I have not given up any of the legal rights that my child has in this study.

I agree that my child may participate in this study: Yes ___ No ___

I agree for my child to be contacted for future follow-up to this study, Yes ___ No ___

Participant's printed name: _____

Participant's signature _____ D ate _____

Parent/legal guardian's signature _____D ate _____

(day/month/year)

Parent/legal guardian's printed name: _____

Please answer the following questions:

This section should be filled out by the parent/legal guardian and participant:

1. Please indicate whether you wish for your **IMAGE** and **COMMENTS** to appear in the photovoice project / Exhibit (please circle ONE response):

YES NO

2. Please indicate whether you wish for your **NAME** to appear in the photovoice project / Exhibit (please circle ONE response):

YES NO

3. Please indicate whether you wish for your **IMAGE** and **COMMENTS** to appear in Pinar Eskicioglu's Master's study, presentations and publications.(please circle ONE response):

YES NO

4. Please indicate whether the University of Manitoba can keep your **IMAGE** presentations and publications *three years* following the research study (please circle ONE response):

YES NO

Participant's printed name: _____

Participant's signature _____ Date _____

Parent/legal guardian's signature _____Date _____

_____(day/month/year)

Parent/legal guardian's printed name: _____

FOR STUDY STAFF USE:

I have fully explained this study to the students and parents and believe that they understand the consent.

Study staff signature _____ Date _____

(day/month/year)

Study staff printed name: _____ Role in the study:_____

Appendix 7: Photovoice Guidelines

Photovoice:

We will be providing you with a camera to take pictures for the next 14 days.

Please take pictures about:

1. What mentorship or being a mentor means to you
2. What diabetes means to you
3. What affects mentorship has had on your health (emotional, mental, physical and spiritual health)

You may take pictures of your community, family and friends. Please refrain from taking photos of strangers or people you do not know. You must ask permission from everyone that you take pictures of and explain why you are taking their picture.

Please read and adhere to the following guidelines for taking pictures of other people:

(1) Do not take pictures of other people without their consent. If you take a picture and see someone in it, please approach them and obtain consent from them for using the picture. A consent form for people who end up in your pictures is provided.

(2) If you take a picture of someone and do not have or get their consent to use it, you MUST delete it. We have attached forms for individuals in pictures to sign, which would give us consent to use their photo.

(3) Avoid taking pictures of scenes or people that you feel are private moments.

(4) Be honest with people that you are taking pictures for the purpose of the project. Tell them you want to describe the effects of the mentor program on your community and possibly why you want to take their picture.

(5) Inform them that the picture may be published in a paper, presented in the community or shared at a conference. If they want their identify hidden we can promise to hide their face.

Please keep all the photos on the camera until the 2 weeks is over. You will have the opportunity to look at them all on a computer and decide which ones you want us to see. You can make two files. One file for photos you would like us to see, and another file that you would like to keep for yourself. Photos that you do not like can then be discarded. I will print out all the photos that you would like me to see. Multiple copies will be made; 1 for us, 1 for you, and extras for individuals in the photos to keep. Please select about 10-15 pictures that you would like to share with us.

Appendix 8: List of Focus Group Questions

Section 1: Mentoring

Engagement Questions:

1. What is a mentor? What does it mean to be a positive mentor?
2. What does mentorship mean to you?

Exploration Questions:

3. What has your experience been like being a mentor within the school environment?
4. What has your experience been like being a mentor within your home/family environment?
5. What does emotional health mean to you?
    a. Has mentorship changed/affected your emotional health?
6. What does physical health mean to you?
    a. Has mentorship changed/affected your physical health?
7. What does mental health mean to you?
    a. Has mentorship changed/affected your mental health?
8. What does spiritual health mean to you?
    a. Has mentorship changed/affected your spiritual health?

Exit Questions:

9. Do you have anything else to say about what being a mentor has been like for you?

Section 2: Type 2 Diabetes

Engagement Questions:

10. What does diabetes mean to you?
11. Do you know anyone with diabetes? What do you think diabetes is like for them?

Exploration Questions:

12. How do you think diabetes affects your health? Overall health?
13. Did you or did you not learn anything about diabetes from the program?
14. Did you or did you not share any of your learnings about diabetes with anyone? With who?

Exit Question:

15. Do you have anything else to say about what you have learned about diabetes or how it has affected your life? Is there anything I forgot to ask or missed that you would like to share?

Section 3: Culture

Engagement Questions:

16. Tell me about your cultural background
17. What does the medicine wheel mean to you?

Exploration Questions:

18. Do you see a relationship between culture and health? And what does that relationship mean to you?
19. What is your relationship with the medicine wheel? Do you use it in your life?

Exit Questions:

20. Do you have anything else to say about your culture and the medicine wheel? Is there anything I missed that you would like to add?

Appendix 9: Project Timeline

Year 1 – 2012/2013				Year 2 – 2013/2014			
Grade	Pre assessment	Intervention	Post assessment	**Grade**	Pre assessment	Intervention	Post assessment
Date	Jan 2013	01/13-05/13	May 2013	**Date**	Jan 2014	01/14-05/14	May 2014
Grade 3	X	O	X	**Grade 4**	X	X	X
Grade 4	X	X	X	**Grade 5**	X	O	X

X = will receive measurement or intervention during that study period.

O = will not receive the intervention during that study period but will be measured.

Appendix 10: AYMP Consent Form

Northern Lights Physical Activity Program: Youth Mentorship Program

UNIVERSITY OF MANITOBA

HREB: H2008:060
Date of Approval: March 28, 2014
Date of Expiry: March 28,2015

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

Title of Study: Northern Lights Physical Activity Program for Management of Type 2 Diabetes Early in Life: Aboriginal Youth Mentorship Program

Study Staff Contacts: Dr. Jonathan McGavock, 204-480-1359
Garden Hill-- Mr. Larry Wood, 204-456-2926
Sagkeeng-- Mr. Allan Courchene, 204-367-4109
Wabowden-- Ms. Bonnie Monias, 204-689-2620

Purpose of Study: In this project high school students will serve as peer-mentors for younger students to find out if the Youth Mentorship Program can improve students' learning and actions related to health (e.g. physically active, healthy eating and self-esteem).

What will my child have to do if he/she participates?
High school student mentors will be paired with younger students in grades 4-6 to help teach about healthy lifestyles and provide peer-lead physical activity and healthy eating activities. Your child's fitness and understanding of healthy living will be measured initially and then a second time at the end of the study period. These measurements will be used to see if the use of peer-mentors caused any changes in health awareness or health behavior.

Participation in the study will be from November 2013 to April 2014.

If your child is an elementary school student participant, they will take part in the following:

- Measured for height, weight, waist and hip.
- Wearing a step counter for 7 days to measure how many steps they take.
- Answering questions about healthy living, self-esteem and peer-interactions.
- Attend lunch-hour or afterschool teaching/nutrition/activity program

Teachers and parents of elementary school participants:

- Teachers will fill out a questionnaire about your child's performance in class.
  - Please note: information collected by the teacher will not be shared with you or child
- You, as the parent or guardian, will be asked to fill out a questionnaire about your physical activity, eating habits, socioeconomic status, and attitudes and behaviors.

If your child is a high school student peer-mentor, they will take part in the following:

- Wearing a step counter for 7 days to measure how many steps they take.
- Mentor orientation/training session
- Answering questions about peer interactions, and their community
- Attend and facilitate afterschool healthy living program with the study staff
- Attend interview/focus group discussion

There will be no blood collected for this study and data will be presented to the community and approved by Chief and Council before it is shared with others.

Risks and Benefits: The risk for injury to your child for this study is no greater than taking part in a regular physical education class.

We hope the data will help us understand how this program can improve health in children. The program may also help your child learn about making healthy choices.

Costs: There is no cost to participate in this study.

Confidentiality: The information gathered will be private. We will not share your child's name or their data with anyone. If the Information is shared with other scientists; your child's name will not be used. All records will be locked and accessed only by study staff.

Voluntary Participation/Withdrawal from the Study: Your decision to have your child take part in this study is your choice. You may take your child out of study at any time.

Medical Care for Injury Related to the Study: If your child becomes injured or sick because of this study, all health treatment will be available at no cost. You are not waiving any of your legal rights by signing this consent form or releasing the investigator(s) or the sponsor(s) from their legal and professional responsibilities.

Questions: For questions before, during, and after this study contact the study doctor (Jonathan McGavock, 204-480-1359) or the study community co-investigator (names and contact numbers listed on first page). For questions about your child's rights as a research participant, you may contact The University of Manitoba, Research Ethics Board Office at: (204) 789-3389.

Statement of Consent

- I have read and understand this consent form.
- I have discussed any questions about the study with study staff.
- The risks and benefits have been explained to me.
- I have not been influenced by study staff to participate in the study.
- I understand that I will be given a copy of this consent form after signing it.
- I understand that my child's participation in this study is voluntary and that he/she may choose to withdraw at any time.
- I freely agree for my child to participate in this study.

- I understand that information regarding my child's personal identity will be kept confidential.
- I authorize The University of Manitoba Research Ethics Board, the Canadian Institutes of Health Research to access my child's records for quality assurance purposes.

By signing this consent form, I have not given up any of the legal rights that my child has in this study.

I agree that my child may participate in this study: Yes ___ No ___

My child is participating as a: Elementary school student participant _____
High school student mentor _____

I agree for my child to be contacted for future follow-up to this study, Yes ___ No ___

Participant's (your child) printed name: _____

Parent/legal guardian's signature _____Date _____
(day/month/year)

Parent/legal guardian's printed name: _____

Teacher Signature (after consent form is returned) _____

FOR STUDY STAFF USE:
I have fully explained this study to the students and parents and believe that they understand the consent.

Study staff signature _____ Date _____
(day/month/year)

Study staff printed name: _____ Role in the study:_____

Appendix 11: Child Questionnaire Pre

ID: _____
School ID:_____
Date:_____
Administrator Initials:_____

Child Questionnaire- Pre

Title: Aboriginal Youth Mentorship Program

To be read by an assessment administrator

Confidentiality:

Your privacy will be respected. Your name and your initials will not be shared with anyone without your permission and your parent's written permission. This form has nothing to do with your school marks or grades or your report card. Your teacher and your principal will not know the answers. Your parents or guardians will not know your answers. We want to know what you think about yourself, others and your community. Your answers are whatever is true for you. There are no wrong answers. Researchers at the University of Manitoba are interested in what you think and feel and how that may change this school year.

Consent:
Your parent/guardian has given permission for you to answer these questions. If you agree to answer this questionnaire please fill it out. If you do not agree, just tell your teacher and that's okay. Tell your teacher or the person in the front of the class from the University. You will not get in trouble if you don't answer the questions.

Peer-Interactions:

Circle the response that best describes how well you can do the following things. HARD! Means it is *really* hard for you and EASY! means it is *really* easy for you, hard and easy means it is a little bit hard or easy for you.

1	Some kids want to play a game. Asking them if you can you play is___?__ for you.	HARD!	Hard	Easy	EASY!
2	Some kids are arguing about how to play a game. Telling them to stop is __?___ for you.	HARD!	Hard	Easy	EASY!
3	Some kids are teasing your friends. Telling them to stop is __?___for you.	HARD!	Hard	Easy	EASY!
4	You want to start a game. Asking other kids to play the game is___?__ for you.	HARD!	Hard	Easy	EASY!
5	A kid tries to take your turn during a game. Telling the kid it's your turn is __?__ for you.	HARD!	Hard	Easy	EASY!
6	Some kids are going to lunch. Asking if you can go with them is ___?__ for you.	HARD!	Hard	Easy	EASY!
7	A kid cuts in front of you in line. Telling the kid not to cut is ___?___for you.	HARD!	Hard	Easy	EASY!
8	A kid wants to do something that will get you into trouble. Asking the kid to do something else is __?___for you	HARD!	Hard	Easy	EASY!
9	Some kids are making fun of someone in your classroom. Telling them to stop is ___?__ for you.	HARD!	Hard	Easy	EASY!
10	Some kids need more people to be on their teams. Asking to be on the team is ___?___for you.	HARD!	Hard	Easy	EASY!
11	You have to carry some things home from school. Asking another kid to help you is ___?__ for you	HARD!	Hard	Easy	EASY!
12	A kid always wants to be first when you play a game. Telling the kid that you are going first is ___?___for you.	HARD!	Hard	Easy	EASY!
13	Your class is going on a trip and everyone needs a partner. Asking someone to be your partner is ____?___ for you.	HARD!	Hard	Easy	EASY!
14	A kid does not like your friend. Telling the kid to be nice to your friend is __?__for you.	HARD!	Hard	Easy	EASY!
15	Some kids are deciding what game to play. Telling them what game you like is __?__ for you.	HARD!	Hard	Easy	EASY!
16	You are having fun playing a game but other kids want to stop. Asking them to finish playing the game is __?__ for you.	HARD!	Hard	Easy	EASY!
17	You are working on a project. Asking another kid to help is ___?___ for you.	HARD!	Hard	Easy	EASY!
18	Some kids are using your play area. Asking them to move is __?__for you.	HARD!	Hard	Easy	EASY!
19	Some kids are deciding what to do after school. Telling them what you want to do is __?__ for you.	HARD!	Hard	Easy	EASY!
20	A group of kids wants to play a game that you don't like.	HARD!	Hard	Easy	EASY!

	Asking them to play a game that you like is __?__ for you.				
21	Some kids are planning a party. Asking them to invite your friend is __?__ for you	HARD!	Hard	Easy	EASY!
22	A kid is yelling at you. Telling the kid to stop is __?__ for you.	HARD!	Hard	Easy	EASY!

Community:

Please say whether you disagree or agree with each sentence. Circle the answer that best matches your answer.

1	I feel like I am a part of the community.	Disagree	Agree a little	Agree a lot
2	I pay attention to news events that affect the community.	Disagree	Agree a little	Agree a lot
3	Doing something that helps others is important to me.	Disagree	Agree a little	Agree a lot
4	I like to help other people, even if it is hard work.	Disagree	Agree a little	Agree a lot
5	I know what I can do to help make the community a better place.	Disagree	Agree a little	Agree a lot
6	Helping other people is something everyone should do, including me.	Disagree	Agree a little	Agree a lot
7	I know a lot of people in the community, and they know me.	Disagree	Agree a little	Agree a lot
8	I feel like I can make a difference in the community.	Disagree	Agree a little	Agree a lot
9	I try to think of ways to help other people.	Disagree	Agree a little	Agree a lot
10	Everyone should pay attention to the news, including myself.	Disagree	Agree a little	Agree a lot

Appendix 12: Child Questionnaire Post

ID: _____
School ID:_____
Date:_____
Administrator Initials:_____

Child Questionnaire-POST

Title: Aboriginal Youth Mentorship Program

To be read by an assessment administrator

Confidentiality:

Your privacy will be respected. Your name and your initials will not be shared with anyone without your permission and your parent's written permission. This form has nothing to do with your school marks or grades or your report card. Your teacher and your principal will not know the answers. Your parents or guardians will not know your answers. We want to know what you think about yourself, others and your community. Your answers are whatever is true for you. There are no wrong answers. Researchers at the University of Manitoba are interested in what you think and feel and how that may change this school year.

Consent:
Your parent/guardian has given permission for you to answer these questions. If you agree to answer this questionnaire please fill it out. If you do not agree, just tell your teacher and that's okay. Tell your teacher or the person in the front of the class from the University. You will not get in trouble if you don't answer the questions.

Peer-Interactions:

Circle the response that best describes how well you can do the following things. HARD! Means it is *really* hard for you and EASY! means it is *really* easy for you, hard and easy means it is a little bit hard or easy for you.

1	Some kids want to play a game. Asking them if you can you play is___?__ for you.	HARD!	Hard	Easy	EASY!
2	Some kids are arguing about how to play a game. Telling them to stop is __?___ for you.	HARD!	Hard	Easy	EASY!
3	Some kids are teasing your friends. Telling them to stop is __?___for you.	HARD!	Hard	Easy	EASY!
4	You want to start a game. Asking other kids to play the game is___?__ for you.	HARD!	Hard	Easy	EASY!
5	A kid tries to take your turn during a game. Telling the kid it's your turn is __?__ for you.	HARD!	Hard	Easy	EASY!
6	Some kids are going to lunch. Asking if you can go with them is ___?__ for you.	HARD!	Hard	Easy	EASY!
7	A kid cuts in front of you in line. Telling the kid not to cut is ___?___for you.	HARD!	Hard	Easy	EASY!
8	A kid wants to do something that will get you into trouble. Asking the kid to do something else is __?___for you	HARD!	Hard	Easy	EASY!
9	Some kids are making fun of someone in your classroom. Telling them to stop is ___?__ for you.	HARD!	Hard	Easy	EASY!
10	Some kids need more people to be on their teams. Asking to be on the team is ___?___for you.	HARD!	Hard	Easy	EASY!
11	You have to carry some things home from school. Asking another kid to help you is ___?__ for you	HARD!	Hard	Easy	EASY!
12	A kid always wants to be first when you play a game. Telling the kid that you are going first is ___?___for you.	HARD!	Hard	Easy	EASY!
13	Your class is going on a trip and everyone needs a partner. Asking someone to be your partner is ____?___ for you.	HARD!	Hard	Easy	EASY!
14	A kid does not like your friend. Telling the kid to be nice to your friend is __?__for you.	HARD!	Hard	Easy	EASY!
15	Some kids are deciding what game to play. Telling them what game you like is __?__ for you.	HARD!	Hard	Easy	EASY!
16	You are having fun playing a game but other kids want to stop. Asking them to finish playing the game is __?__ for you.	HARD!	Hard	Easy	EASY!
17	You are working on a project. Asking another kid	HARD!	Hard	Easy	EASY!

	to help is ___?___ for you.				
18	Some kids are using your play area. Asking them to move is __?__for you.	HARD!	Hard	Easy	EASY!
19	Some kids are deciding what to do after school. Telling them what you want to do is __?__ for you.	HARD!	Hard	Easy	EASY!
20	A group of kids wants to play a game that you don't like. Asking them to play a game that you like is __?__ for you.	HARD!	Hard	Easy	EASY!
21	Some kids are planning a party. Asking them to invite your friend is __?__ for you	HARD!	Hard	Easy	EASY!
22	A kid is yelling at you. Telling the kid to stop is __?__ for you.	HARD!	Hard	Easy	EASY!

Community:

Please say whether you disagree or agree with each sentence. Circle the answer that best matches your answer.

1	I feel like I am a part of the community.	Disagree	Agree a little	Agree a lot
2	I pay attention to news events that affect the community.	Disagree	Agree a little	Agree a lot
3	Doing something that helps others is important to me.	Disagree	Agree a little	Agree a lot
4	I like to help other people, even if it is hard work.	Disagree	Agree a little	Agree a lot
5	I know what I can do to help make the community a better place.	Disagree	Agree a little	Agree a lot
6	Helping other people is something everyone should do, including me.	Disagree	Agree a little	Agree a lot
7	I know a lot of people in the community, and they know me.	Disagree	Agree a little	Agree a lot
8	I feel like I can make a difference in the community.	Disagree	Agree a little	Agree a lot
9	I try to think of ways to help other people.	Disagree	Agree a little	Agree a lot
10	Everyone should pay attention to the news, including myself.	Disagree	Agree a little	Agree a lot

Sense of Belonging:

Circle the answer that shows how much you agree with the following statements. NO! means you disagree a lot, no means you disagree, yes means you agree, and YES! means you agree a lot.

I feel comfortable at the mentor program	NO!	no	yes	YES!
I feel I am a part of the mentor program.	NO!	no	yes	YES!
I am committed to the mentor program.	NO!	no	yes	YES!
I am supported at the mentor program.	NO!	no	yes	YES!
I am accepted at the mentor program	NO!	no	yes	YES!