Kica-Wasimisinanahk Miyo-ayawin ~ Our Children's Health. Promoting Physical Activity and Nutrition Through a Health Promoting School-Based Intervention in a Métis Community

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Abstract

First Nations and Métis children living in Canada continue to experience disproportionately high levels of obesity and type 2 diabetes (T2D) compared to the general Canadian child population (Young 2003; Oster and Toth 2009). Evidence supports the need to develop and implement culture-based physical activity and nutrition health programming in order to support the adoption of healthy lifestyles among First Nations and Métis school-aged children (Macaulay, Paradis et al. 1997; Potvin, Cargo et al. 2003; Ng, Young et al. 2010). Culturally relevant health promoting interventions have been created in collaboration with First Nations communities; however, given that Métis populations have unique cultural characteristics that differ from First Nations groups, there is strong rationale for developing, implementing and evaluating culture-based health programs in collaboration with Métis communities that take a preventative approach with school-aged children. Therefore, the purpose of this research was to evaluate the impact of a Métis culture-based comprehensive school health program on the physical activity and nutrition knowledge, attitudes, beliefs and behaviours of Métis children, using participatory action research (PAR).

Initially, relationships were built and nurtured with the participating community and collaborations commenced to develop and implement a Métis culture-based school health program. Métis community members' input was sought to develop a series of 17 culturally relevant physical activity and nutrition health promoting lessons. The participating teacher delivered these lessons to one split class of Grade 3 and 4 Métis students (age 8 and 9 years; n=16) attending the local elementary school once per week over a 4-month timeframe. Overall, children were taught about healthy eating and physical activity and how a healthy lifestyle can prevent obesity and diabetes.

Physical activity and nutrition knowledge, attitudes, beliefs and behaviours among the Métis children were measured prior to and following the implementation of the health program. A group of 21 age-matched students attending separate Grade 3 and 4 classes acted as a comparison standard care group and did not receive health promotion programming. A variety of qualitative and quantitative methods were used including interviews (focus groups; individual with children and teachers), questionnaires (food frequency; knowledge, attitude and beliefs; physical activity questionnaire (PAQ-C)), accelerometry (using Actical accelerometers), and photovoice (using digital cameras).

Physical activity data showed that participating students were more physically active than students who did not receive the intervention. Participating students spent significantly fewer minutes in sedentary activities compared to a comparison group post-intervention, 495 min/day compared to 527 min/day respectively. Moderate-to-vigorous physical activity (MVPA) levels did not significantly decrease in students participating in the intervention, while a comparison group experienced significant decreases in MVPA levels. This suggests that the intervention was successful in preventing a decline in MVPA levels that may normally be observed.

Nutrition data revealed no statistically significant differences between the two groups. However, greater improvements were measured in the reported consumption of low nutrient dense foods such as cakes, cookies, pie, doughnuts and pop beverages. Fifty percent and 46% of intervention participants improved their consumption of "pop drinking" and "cakes, cookies, pie and doughnuts", respectively. Student perceptions and awareness of healthy foods were positively impacted following the health programming.

Although the primary purpose of the project was to evaluate the effectiveness of a school health program on physical activity and nutrition knowledge, attitudes, beliefs and behaviours, an important component of the research was also to evaluate the process of using PAR methods in collaboration with a Métis community. My reflections on using PAR methods integrated my personal observations, experiences, interactions and feedback received from the participating teacher and community research team members throughout the project. The successes and challenges of using PAR methods included the importance of (1) building rapport with the community; (2) maintaining flexibility regarding research timelines; (3) respecting reciprocity of exchanging knowledge and action between the community and myself; and (4) finding balance to ensure that the community was actively participating.

The overall results of this study indicate that a comprehensive school health program can improve physical activity levels and can influence awareness of healthy foods among Métis children. The active engagement of the community ensured the integration of Métis culture, enhanced the sustainability of the program in the community, and largely influenced my learning of engaging in collaborative, Métis community-based research that will be lasting for me as a researcher in the future.

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Dedication

I dedicate this thesis to my partner, Brad. Throughout this Ph.D. journey, you were always there to listen and offer support and valuable insight into my work, and to take on the added tasks that accompany single parenting when I was up north or away at conferences. You always kept me motivated and uplifted at difficult times and celebrated the successful and positive times. Thank you.

I also want to dedicate this thesis to my parents, Joan and Farook, and my parents-in-law, Cathy and Trent. I want to thank and acknowledge you for everything you have done for my family and myself. You have provided me with tremendous support over the past several years, always lending an ear, never doubting the path I have chosen, and importantly for providing such an amazing care environment for Olive and Hamish at times when we needed extra childcare. I am forever grateful to you for all of this and more.

Finally and importantly, I dedicate this thesis to my children, Olive and Hamish. I thank you for your love of life, your energy and for always keeping me in the moment and allowing me to see the world through your young eyes. I dedicate this work to your current and future health.

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List of Abbreviations

T2D – Type 2 Diabetes

CSH – Comprehensive School Health

HPS – Health Promoting School

APS – Aboriginal Peoples Survey

CCHS – Canadian Community Health Survey

CHMS – Canadian Health Measures Survey

RHS – First Nations Regional Longitudinal Health Survey

BMI – body mass index

WC – waist circumference

CDC – Centers for Disease Control and Prevention

PAR – Participatory Action Research

NDSS – National Diabetes Surveillance System

MVPA – moderate to vigorous physical activity

WHO – World Health Organization

JCSH – Joint Consortium for School Health

AVHPSP – Annapolis Valley Health Promoting Schools Project

AS! BC – Action Schools! B.C.

KSDPP – Kahnawake Schools Diabetes Prevention Program

NCCAH – National Collaborating Centre for Aboriginal Health

PA – Physical Activity

PAQ-C – Physical Activity Questionnaire for Children

KAB – Knowledge, Attitudes, Beliefs

GD – Gestational Diabetes

KT – Knowledge Translation

SLHDP – Sandy Lake Health and Diabetes Program

OCAP – Ownership, Control, Access and Possession

FFQ – Food Frequency Questionnaire

MOU – Memorandum of Unerstanding

SPHERU – Saskatchewan Population Health and Evaluation Research Unit

LNDF – Low Nutrient Dense Foods

CHAPTER 1
INTRODUCTION AND REVIEW OF LITERATURE

1.1 Introduction

Obesity is widely prevalent in the adult population and it is increasingly affecting children and adolescents. In 2004, 26% of children and adolescents living in Canada between the ages of 2 and 17 were overweight while 8% were considered obese (Shields 2005). As rates of pediatric obesity continue to rise (Shields 2005; Tremblay, Shields et al. 2010), children are spending less time engaging in moderate-to-vigorous physical activity and more time in sedentary activities (Tremblay, Shields et al. 2010; Colley, Garriguet et al. 2011). At the same time, children and adolescents are consuming diets that contain large proportions of food that are energy-dense, high in sugar but low in nutrients (Garriguet 2004; Shields 2005; Storey, Forbes et al. 2009; Storey, Hanning et al. 2009). This combination of factors is believed to be a primary influence on the increased prevalence and incidence of obesity and diabetes among young children and adolescents in Canada (Tremblay and Willms 2003; Janssen 2005; Shields, Tremblay et al. 2010; Tremblay, Shields et al. 2010; Colley, Garriguet et al. 2011).

There are certain Aboriginal populations who have been found to have higher rates of obesity compared to the overall national average. First Nations adults living on-reserve experience overweight and obesity at rates that are almost 1.6 times that of the average Canadian adult population (Tjepkema 2002; First Nations Centre 2005). Evidence suggests that overweight and obesity prevalence rates among certain Aboriginal children and adolescents are 2 to 5 times higher than the national Canadian average (Shields 2005).

The metabolic changes associated with overweight and obesity increase the risk of individuals developing type 2 diabetes (T2D) (Chan, Rimm et al. 1994; Canning, Courage et al. 2004; Shields 2005; Tjepkema 2005). The prevalence of T2D in certain First Nations adult

populations in Canada is 3-5 times greater than among the general Canadian population (Tjepkema 2002; Ng, Marshall et al. 2006; Dannenbaum, Kuzmina et al. 2008; Chateau-Degat, Pereg et al. 2009; Oster and Toth 2009; Dyck, Osgood et al. 2010; Ng, Young et al. 2010). Studies indicate that Métis people also have higher rates of diabetes than the general Canadian population (Bruce, Kliewer et al. 2003; Statistics Canada 2003; Oster and Toth 2009; Ralph-Campbell, Oster et al. 2009).

Unfortunately, many of the health inequities related to obesity and T2D that exist among First Nations and Métis people can be attributed to a number of factors including the social determinants of health (Smylie 2008; Loppie Reading and Wien 2009). Income, employment and formal education levels are all found to be lower in Aboriginal populations compared to non-Aboriginal Canadians, all of which can influence the involvement of Aboriginal children and youth in healthy eating and physical activity practices, thereby playing a role in overall health of these individuals (Statistics Canada 2003; First Nations Centre 2005; Smylie 2008; The First Nations Information Governance Centre 2011).

It is a critical time to work in collaboration and partnership with Aboriginal communities in order to build programming and community-based interventions that will nurture, support and promote healthy lifestyles among young Aboriginal people. Numerous researchers recommend developing and implementing culturally relevant primary prevention interventions to promote healthy lifestyle choices among Aboriginal children and youth (Macaulay, Paradis et al. 1997; Potvin, Cargo et al. 2003; Story, Stevens et al. 2003; Young 2003; Dannenbaum, Kuzmina et al. 2008; Chateau-Degat, Pereg et al. 2009; Ley, Harris et al. 2009; Wahi, Zorzi et al. 2009; Ng, Young et al. 2010). Evidence supports and acknowledges the school as an appropriate and logical venue in which to promote healthy behaviours (Stewart-Brown 2006; Veugelers and

Schwartz 2010). Comprehensive school health (CSH) ensures that school staff, parents, community stakeholders, and students work together to integrate supportive school- and community-specific health policies, programs, and environments in order to promote health (Veugelers and Schwartz 2010).

To date the creation and assessment of a culture-based CSH intervention has not been investigated in rural Saskatchewan Métis communities. This project aims to collaboratively work with a Métis community to develop, implement and evaluate a school-based health promotion intervention designed for the Grade 3-4 class in the community. The overall purpose of this thesis is to examine the impact of implementing a series of health promoting lessons on the knowledge, attitudes, beliefs and behaviours related to physical activity and nutrition among 8 and 9 year old children living in Île-à-la-Crosse, Saskatchewan. At the same time, we are interested in evaluating the process of using Participatory Action Research methods throughout this intervention research project.

1.2 Review of Literature

The goal of this literature review is to provide evidence for the critical need to build and develop culture-based health promotion interventions among Métis child populations in Canada. Specifically, the impact of pediatric obesity and diabetes on First Nations and Métis children living in Canada is highlighted in order to provide background and rationale for the importance of developing health promoting interventions that are relevant to Métis communities. This review further explores the role that physical activity and nutrition play in health and healthy children and how various social determinants of health may influence physical activity and nutrition choices among Aboriginal populations. As well, the importance of comprehensive school health is discussed. Evidence for the importance of incorporating participatory action research methods and theories into Aboriginal health intervention research is provided. Finally,

current population-health- and culture-based primary prevention strategies and health promotion approaches that have been implemented in collaboration with other First Nations and Métis communities in Canada are reviewed.

1.2.1 Aboriginal Peoples of Canada

In order to provide clarity on the terms Aboriginal, First Nations and Métis that are used throughout this thesis, this first section defines the various Aboriginal groups in Canada. There are three distinct Aboriginal groups recognized by the Canadian Constitution Act of 1982: First Nations, Métis and Inuit. According to the 2006 national Census, there are just over 1 million people who identified themselves as Aboriginal, which makes up 3.8% of the total Canadian population. Of these 1 million individuals, 62% identified as First Nations, 30% identified as Métis, 5% identified as Inuit and 3% identified with more than one Aboriginal group (Statistics Canada 2008). First Nations people are the original peoples to inhabit regions of what is now known as Canada. First Nations communities historically existed throughout many parts of current Canada and the United States however many of these cultures view North America as one unit (Turtle Island). The Métis are descendants of European men and First Nations women in western Canada who maintain a unique language and culture (King, Smith et al. 2009).

1.2.2 Measuring the General Health of Aboriginal Peoples Living in Canada

In Canada, the health status of various populations is characterized primarily by health data sets that are obtained through national and provincial survey data and also by health data collected in local health regions and specific geographic locations. Although there are multiple indicators of Aboriginal health in Canada, there are also many challenges within Aboriginal health measurement systems. Not all First Nations, Inuit and Métis individuals have the opportunity to self-identify since many Canadian health data sets do not systematically collect information about First Nations, Inuit and Métis identity; therefore the health information

collected from these populations may be inaccurate. It is also apparent that national level health measurement systems do not always or consistently identify all three of Canada's unique Aboriginal Peoples (Anderson, Smylie et al. 2006). This has led to inaccurate and poor coverage of the health status of Canada's three Aboriginal groups: First Nations, Inuit and Métis. It is critical to identify whether the data is representative of First Nations, Inuit or Métis since these three groups have unique and diverse health issues that need to be clearly identified before they can be addressed through health promotion programming (First Nations Centre 2005; Anderson, Smylie et al. 2006).

Throughout this thesis much of the data that are referenced are from select national databases that are primarily representative of First Nations populations living on-reserve. In this section I will clarify the information that is collected within each Aboriginal health database I use in this thesis and, importantly, I will clarify which Aboriginal groups are represented in these databases. When information is available for off-reserve First Nations Peoples, non-Status Indians, Métis or Inuit it will be presented and stated as such.

Statistics Canada is the central statistics agency that reports on Canada's population, resources, economy, society and culture. The Canadian Census is a dataset that is referred to throughout this thesis. Although the Census allows Aboriginal individuals to self-identify as status or non-status North American Indian, Métis, Inuit or multiple ethnicities, it's important to note that some Aboriginal reserves choose not to participate or are not completely enumerated. As well, some Aboriginal individuals do not feel comfortable identifying as such to a government worker. This leads to an incomplete and inaccurate account of the Aboriginal population living in Canada. It is the limitation of this decreased coverage and decreased quality

of data collected that can be problematic when attempting to link sociodemographic challenges and their impact on the health of the three different Aboriginal populations.

The Aboriginal Peoples Survey (APS) is a data set that draws directly from the Census Aboriginal Identity population (Statistics Canada 2009). The APS contains information on health status, language, employment, income, schooling, housing and mobility and therefore adds significant Aboriginal-specific and Aboriginal-centered information. The APS was completed in 1991, 2001and 2006 and primarily included non-reserve Aboriginal Peoples with the exception of all reserves in the three territories (Northwest Territories, Yukon and Nunavut). The 2006 APS provides an extensive dataset about Métis, Inuit and off-reserve First Nations adults (> 15 years) and children 6-14 years. The 2006 APS thereby provides a broad picture of the living conditions and lifestyles of the three Aboriginal groups living in Canada.

The Aboriginal Children's Survey 2006 is a post-censal survey designed to provide an overview of the social and living conditions of Aboriginal children living in Canada (Statistics Canada 2008). A post-censal survey is one that uses a census question to identify the target population thereby reducing respondent burden and increasing the efficiency of collecting information on a specific population in Canada that are dispersed geographically (Statistics Canada 2001). The survey provides information on First Nations, Métis, and Inuit children under the age of 6 years living in urban, rural and northern locations throughout Canada. The population coverage of this survey does not include children living on reserve or in institutions. The sample of selected children was based on children's reported answers to the 2006 Census questions.

The Canadian Community Health Survey (CCHS) is another Statistics Canada data set that is performed on a 2-year cycle and which collects information related to health status, health

care utilization and health determinants for populations in Canada (Statistics Canada 2005). This data set does not include any information on individuals living on reserve (Anderson, Smylie et al. 2006). This data set uses the same ethnic identity questions as the Census and includes information on smoking, body mass index, health status and primary health care services utilized. Unfortunately the Aboriginal population sample size is too small to allow for any First Nations, Métis, or Inuit specific information to be extracted and therefore, does not allow researchers to identify specific issues related to these three unique populations.

The Canadian Health Measures Survey (CHMS), launched in 2007, is also a Statistics Canada data set and is an extension to the Health Information Roadmap initiative focusing on "direct measures" health survey data (Statistics Canada 2010). The CHMS collects direct physical measurements such as blood pressure, height, weight, blood and urine sampling and physical fitness testing, along with self-report questionnaires. This data set includes individuals aged 6 to 79 years of age living throughout Canada but does not include persons living on Indian Reserves, Crown lands or certain remote regions. Data collection for the first phase of the CHMS took place between March 2007 and March 2009 and funding support has been established so the CHMS can become an ongoing Canadian health information survey in the future.

The First Nations Regional Longitudinal Health Survey (RHS) is a survey that is centered around the First Nations concept and philosophy of holistic health, is First Nations controlled, reflects First Nations community priorities, and respects that First Nations communities have the right to own, control, access and possess their own health information (First Nations Centre 2005; Anderson, Smylie et al. 2006). Overall, this survey provides data that should benefit First Nations communities and facilitate their understanding of health and well-being of their people (First Nations Information Governance Centre 2010). The First Nations Information Governance

Committee, a committee of the Assembly of First Nations Chiefs Committee on Health, oversees and guides the RHS. The information collected by the RHS includes demographics, language, housing, health status, culture, and community development for registered First Nations people living on reserve (who agreed to participate in the survey). This survey does not include Inuit or Métis specific information or any information on First Nations individuals living off-reserve.

It is important to clarify what sub-populations of Aboriginal Peoples are included in databases because this thesis project focuses specifically on the health of the Métis population. As described above, much of the available data that is reviewed throughout this thesis is primarily related to the First Nations population and it is therefore critical to keep in mind that there are likely differences in health status between First Nations and Métis populations that are not currently being measured in Canada at this time. These differences could be due to distinct historical, cultural, social and/or political contexts that each Aboriginal group has experienced and continues to experience. Also, there are a number of individual research articles and projects that will be discussed throughout this thesis proposal, and the specific Aboriginal sub-populations included in these studies will be identified at the time that the articles are being discussed. The paucity of data that is available on the health of the Métis population clearly points to the need for Aboriginal health researchers to focus on measuring and improving health status within this population.

The general health status of Aboriginal populations living in Canada are observed to be lower than the general Canadian population even when considering the challenges that exist in both the coverage and quality of health status measures, (Smylie 2008). Life expectancies are lower for First Nations and Inuit people in Canada while rates of infectious diseases (such as tuberculosis) are higher for Aboriginal populations compared to other Canadians (Health Canada

2005). The prevalence of major chronic conditions including diabetes and obesity are higher among First Nations and Métis populations when compared to the total Canadian population (Young, Reading et al. 2000; First Nations Information Governance Centre 2010).

1.2.3 Defining Overweight and Obesity

Obesity has been defined as a state of excessive body weight, from a disproportionate accumulation of fat in the body, at such a high magnitude to promote adverse health consequences (Spiegelman and Flier 2001). In order to understand the various terms related to overweight and obesity, Health Canada updated the body weight classification system in 2003 from the 1988 Canadian Guidelines for Health Weights, which is in accord with the classification system released by the World Health Organization (Health Canada 2003). This tool aids in identifying and establishing health risks associated with body weight in the Canadian population for individuals aged 18 years and older. In this classification system health risk is measured by body mass index (BMI) and level of abdominal fat as measured by waist circumference (WC). BMI is calculated as weight in kilograms (kg) divided by height in meters squared (m^2), rounded to one decimal place. Normal weight is considered to be a BMI of 18.5-24.9 kg/m^2, overweight is defined as a BMI of 25.0-29.9 kg/m^2, obesity class I is defined as BMI of 30.0-34.9 kg/m^2, obesity class II is defined as a BMI of 35.0-39.9 kg/m^2, and obesity class III is defined as a BMI of 40.0 kg/m^2 or higher (Health Canada 2003). WC is also used as an indicator of health risk. Men with WC >102 cm (40 inches) and women with WC >88cm (35 inches) are considered to have excess abdominal fat and are at greater risk of secondary health complications (Health Canada 2003).

The ease of measuring and calculating BMI has made this a very common tool to determine overweight and obesity in the clinical and population health environments (Siervogel, Demerath et al. 2003), however, it does not provide an indication of body fatness or the

distribution of body fat in an individual (Health Canada 2003). Body fat that accumulates in the abdomen has been shown to be a strong predictor of adverse health consequences associated with obesity (Kaminsky and Dwyer 2006). In order to identify different levels of health risk among individuals whose BMI is between 18.5 and 34.9 kb/m2, WC should be used in conjunction with BMI measurements. Individuals who accumulate fat in the truncal region have an increased risk of developing such conditions as T2D, hypertenstion, cardiovascular disease and premature death (Anand, Yusuf et al. 2001; Katzmarzyk, Janssen et al. 2003). However, for individuals whose BMI is ≥35.0 kg/m2, the WC measurement does not provide additional health risk information (Health Canada 2003).

In children the Centers for Disease Control and Prevention (CDC) defines overweight as a "BMI at or above the 95th percentile for children of the same age and sex"; this definition is based on the 2000 CDC growth charts for children in the USA (Kuczmarski, Ogden et al. 2002). There are major limitations to using only BMI for determining body composition and adiposity in children (Siervogel, Demerath et al. 2003). The use of BMI in identifying overweight children has been described as poor-to-fair and incorporating alternative techniques of measuring body composition within this population are encouraged (Warner, Cowan et al. 1997). There are reports that using BMI to assess overweight and obesity in children is controversial due to the fact that children are growing (Guo, Wu et al. 2002; Siervogel, Demerath et al. 2003), their body fat stores are constantly changing because of their growth and therefore their BMI will not be consistent or stable during such periods of growth(Guo, Wu et al. 2002; Siervogel, Demerath et al. 2003). As in the adult population, waist-circumference and waist-hip ratios have been found to be more highly correlated with overall percent body fat and therefore might be more appropriate anthropometric techniques to use (Kaminsky and Dwyer 2006). The predictive value

of health risk for waist circumference in children is still unclear however, Jannssen et al. found evidence that a combination of BMI and waist circumference measurements provide an indication of elevated health risk among children and adolescents (Janssen 2005).

1.2.4 Obesity and Diabetes in the General Canadian Population

The prevalence of obesity among the general Canadian adult population has been increasing over the past several decades. In 2007-2009, the overall prevalence of obesity among adults in Canada was 24.1%; more specifically, 24.3% of men and 23.9% of women experienced obesity (Shields, Carroll et al. 2011). Since the 1986-1992 Canadian Heart Health Surveys, the prevalence of obesity in Canadian men and women has increased by 10 and 8 percentage points, respectively (Shields, Carroll et al. 2011). Over the past 20 years of monitoring, increases in obesity were highest among men aged 60-74 years and among women aged 20-39 years. The increased trend towards higher rates of overweight and obesity are serious public health concerns for health care professionals, researchers, policy-makers and the general population in Canada. Overweight and obesity are strongly linked to a number of health consequences, including T2D, stroke, certain types of cancer and sleep apnea, to name a few (World Health Organization 2000). The higher rates of obesity within younger women of child-bearing age increases their risk for developing gestational diabetes, which may further compound the health concerns of obesity and diabetes in their children (Dyck, Klomp et al. 2002; Dyck, Osgood et al. 2010; Osgood, Dyck et al. 2011).

Higher waist circumference measurements are indicative of increased abdominal fat which is a stronger predictor of obesity-related morbidity and mortality risks than BMI (Janssen, Katzmarzyk et al. 2004; Angleman, Harris et al. 2006; Hu, Xie et al. 2007; Janssen, Shields et al. 2011). Janssen et al. found that based on data from the 2007-2009 Canadian Health Measures Survey (CHMS), that present day Canadians have higher WC and skinfold thickness values for a

given BMI than compared to individuals 30 years ago (Janssen, Shields et al. 2011). This change in the obesity phenotype is disconcerting particularly when considering that a 1 cm increase in WC is linked with a 4-5% increased odds of developing hypertension and a 6-7% increased odds of developing at least 3 cardio-metabolic risk factors (Janssen, Katzmarzyk et al. 2004). These data suggest that when taking into account WC measurements the health consequences of obesity may be even greater than originally anticipated (Janssen, Shields et al. 2011).

The prevalence of overweight and obesity in Canadian children has risen over the past 25 years as well. In 1978/79, 12% of 2- to 17-year-olds were overweight while 3% were obese; in 2004, 18% of 2- to 17-year-olds were overweight while 8% were obese (Shields 2005). Specifically, rates of obesity increased from 2% to 10% in boys and 2% to 9% in girls from 1989 to 2004 (Shields 2005). Furthermore, waist circumference values have dramatically increased for a given BMI compared to Canadian youth 30 years ago, indicative of increased risk of developing other chronic health conditions (Janssen, Shields et al. 2011). In adolescents aged 12-19 years, the estimated prevalence of abdominal obesity as measured by waist circumference was 1.8% in 1981, 2.4% in 1988 and 12.8% in 2007-2009. Between 1981 and 2007-2009, the mean WC values for adolescent males and females increased by 4.2 cm and 6.7 cm, respectively (Janssen, Shields et al. 2011). These data indicate a 7-fold increase in the percentage of Canadian adolescents experiencing abdominal obesity (Janssen, Shields et al. 2011) and highlight the importance of developing health promotion interventions to encourage the adoption of healthy lifestyles at a young age in order to prevent the future development of obesity and its secondary complications.

The secondary health complications related to obesity not only lead to a significant impact on an individual's quality of life, but pose many challenges to the healthcare system. A

study conducted by Birmingham et al. reported that the estimated cost of obesity in Canada in 1997 was 2.4% of direct healthcare expenditures ($1.8 billion) (Birmingham, Muller et al. 1999). In 2004, the cost estimate of obesity and its complications was revised to be 2.2% of direct healthcare expenditures ($1.6 billion) while indirect costs associated with obesity were $2.7 billion (Katzmarzyk and Janssen 2004). More recently, in 2006, a revised estimate of the direct costs of overweight and obesity was reported to be 4.1% of the total health expenditures in Canada ($6.0 billion) (Anis, Zhang et al. 2010). Kuhle et al. found that health care costs utilized by obese children were 21% higher than in healthy weight children (Kuhle, Kirk et al. 2011). In this study it was also found that obese children had more physician visits than their normal weight peers and they also had higher lifetime physician costs, leading to the recommendation that there is a strong need for future studies to evaluate the cost-effectiveness of implementing primary obesity prevention programs (Kuhle, Kirk et al. 2011).

Obesity has also been linked to other chronic health conditions including T2D (Millar and Young 2003; Janssen, Katzmarzyk et al. 2004; Janssen 2005). T2D is an endocrine disease resulting from insulin resistance in the body's tissues and may eventually be associated with an insulin-secreting defect in the pancreas. In Canada, approximately 2 million people (6.2% of the population) aged 1 year and older were living with diagnosed diabetes in 2006-2007 (Public Health Agency of Canada 2009). The prevalence of diabetes appears to increase with age among the general Canadian adult population from approximately 2% of individuals in their 30's versus 23% between the ages of 75 and 79 years (Public Health Agency of Canada 2009). These data indicate that the prevalence of diabetes has increased in the general Canadian population by 21% from 2002/03 to 2006/07 (Public Health Agency of Canada 2009). In Saskatchewan, 7.0% of the

population was diagnosed with diabetes in 2010 and this number is expected to increase to 9.9% of the population in 2020 (Canadian Diabetes Association 2009).

Until 20 years ago, diabetes in children was primarily Type 1 Diabetes caused by the autoimmune destruction of pancreatic β-cells, however this situation has changed where more children are being diagnosed with T2D (Amed, Daneman et al. 2010). Recently, as the incidence of T2D increases among children and adolescents, researchers speculate that is in response to rising overweight and obesity rates (Amed, Daneman et al. 2010). Insulin resistance that is characteristic of T2D is strongly associated with visceral adiposity (Libman and Arslanian 2007). According to the National Diabetes Surveillance System (NDSS), 0.3% of children and adolescents were diagnosed with diabetes in 2006/07 and this number is expected to increase by 10% by the year 2012 (Public Health Agency of Canada 2009). Recently, Amed et al. established a national network of physicians who were recruited to participate in a surveillance study to determine the incidence and demographics of children experiencing diabetes. Of the 227 children diagnosed with T2D in this particular study, 25% were Caucasian while 44.1% were Aboriginal, and their mean age at diagnosis was approximately 14 years of age (Amed, Daneman et al. 2010). In the Aboriginal child and youth population 11% of those diagnosed with diabetes were aged 10 years or less. Alarmingly, of the children diagnosed with T2D in this study, 95% experienced obesity (Amed, Daneman et al. 2010). Considering mortality rates, it is disconcerting to note that boys and girls aged 1 to 19 years of age with diagnosed diabetes had about a 10-year reduction in their life expectancy (Public Health Agency of Canada 2009). Furthermore, obesity and diabetes can profoundly affect the overall health and well-being of individuals, particularly if they are living with such chronic conditions throughout several life stages (Canadian Diabetes Association 2009; Kuhle, Kirk et al. 2011).

Health services utilization is increased among individuals living with diabetes such that in 2006/07 adults (aged 20 to 49 years) had almost twice as many visits to their family physician and 3-4 times as many visits to specialists when compared to individuals without diabetes (Public Health Agency of Canada 2009). Children and adolescents with diagnosed diabetes had approximately 5 times as many visits to medical specialists compared with their peers without diabetes (Public Health Agency of Canada 2009). The economic burden of diabetes in Canada was projected to be $12.2 billion in 2010 (in 2005 dollars) and is expected to rise by another $4.7 billion by 2020. These costs account for approximately 3.5% of public healthcare spending in Canada (Canadian Diabetes Association 2009). In Saskatchewan, the cost of diabetes was estimated to be about $419 million in 2010 (in 2009 dollars) with projections for a 27% increase in this number (to $532 million) by 2020 (Canadian Diabetes Association 2009).

1.2.5 Obesity and Diabetes in Aboriginal Peoples Living in Canada

Aboriginal Peoples living in Canada face an inequitable burden of health challenges compared to the rest of the Canadian population (Young, Dean et al. 2000; Young, Reading et al. 2000; Young 2003; Smylie, Kaplan-Myrth et al. 2004). Since the 1950's Aboriginal Peoples living in Canada and the United States started experiencing higher incidences of such chronic conditions as obesity and diabetes (Chase 1937; West 1974; Knowler, Pettitt et al. 1990; Young, Reading et al. 2000). The prevalence of self-reported obesity among self-identified Aboriginal people (excluding First Nations on-reserve) living in Canada was 25.7% according to the 2007-2008 Canadian Community Health Survey (CCHS) (Statistics Canada 2010; Public Health Agency of Canada and Canadian Institute for Health Information 2011). Certain First Nations adults living on-reserve appear to experience even greater prevalence rates of overweight and obesity. In 2008-2010, 34.3% and 34.9% of First Nations adults who participated in the Regional Longitudinal Health Survey (RHS) experienced overweight and obesity respectively (The First

Nations Information Governance Centre 2011). In Sandy Lake, Ontario 50% of men and 65% of women were observed to be obese (Connelly, Hanley et al. 2003), and in a Quebec First Nations community 91% of participants were abdominally obese (Chateau-Degat, Pereg et al. 2009). In 2 remote First Nations Communities in Northwestern Ontario the prevalence of obesity was 65.3% (Imbeault, Haman et al. 2011). Rates of overweight and obesity have consistently been higher than the national Canadian average in a Saskatchewan Woodland Cree First Nations community where 74% and 68% of adults were overweight/obese in 1991 and 2005, respectively (Dyck, Tan et al. 1995; Bruner, Chad et al. 2009). In a recent study, Bruce et al. report that almost 50% of men and 65% of women in a Manitoba First Nation community were obese as defined by BMI (Bruce, Riediger et al. 2010). Thirty-three percent and 49.3% of Métis individuals participating in a diabetes-risk screening project in Alberta were overweight or obese, respectively (Oster and Toth 2009).

Unfortunately, prevalence rates of overweight and obesity are not confined to the adult population. There is limited information available on the magnitude of pediatric obesity in Aboriginal children and adolescents living in Canada however, research indicates that the rates of overweight and obesity in First Nations children and adolescents are greater than that observed among the general Canadian child and adolescent populations (Young, Dean et al. 2000; Belanger-Ducharme and Tremblay 2005; Bruner, Chad et al. 2009; Public Health Agency of Canada and Canadian Institute for Health Information 2011). First Nations children living off-reserve in Canada had an obesity prevalence of 20% in 2004, a value 2.5 times that of the national average (Shields 2005). Twenty-nine percent and 26% of on-reserve First Nations children (ages 9 to 11 years) living in Canada (and who participated in the RHS) were overweight or obese (respectively) compared to the national average where 18% of 2- to 17-year-

olds in 2004 were overweight while 8% were obese (First Nations Centre 2005; Shields 2005). First Nations children aged 3-5 years (and who participated in the RHS) had an obesity rate of 48.7% (First Nations Centre 2005). Similar findings were reported in the RHS 2008-2010 preliminary report (The First Nations Information Governance Centre 2011). According to the 2006 APS, 20% of First Nations children (off-reserve, 6-14 years) and 16.9% of Métis children (6-14 years) were obese (Statistics Canada 2008; Public Health Agency of Canada and Canadian Institute for Health Information 2011).

Other studies of obesity in remote First Nations communities support the increased prevalence of obesity and T2D within these populations. Hanley et al. documented a high level of overweight in children and adolescents in the remote First Nations community of Sandy Lake in Ontario, Canada (Hanley, Harris et al. 2000). The prevalence of pediatric overweight in this reserve community was 27.7% in boys and 33.7% in girls. They also found that potentially modifiable factors were associated with overweight in subjects aged 10-19 years. These researchers suggest that diet composition (high fat, low carbohydrate foods) in conjunction with low physical activity rates are significant risk factors for the development of pediatric obesity (Hanley, Harris et al. 2000).

Ng et al. corroborate these findings with the research they conducted in the Cree Nation of Mistissini, Northern Quebec (Ng, Marshall et al. 2006). They report that the Cree children (grades 4-6, n=112) in this community have an overweight and obesity prevalence rate of 33% and 38%, compared to 9-10% prevalence in the general Canadian child population (Ng, Marshall et al. 2006). Ng et al. also described that 62% of these Cree children experienced central adiposity. Furthermore, this study reports low physical fitness levels among the Cree children living in Mistissini, Quebec, where only 49% of children met pedometer recommendations,

suggesting that the prevalence of overweight/obesity in this population of children is related to decreased physical activity levels (Ng, Marshall et al. 2006).

Similarly, in the community of Kahnawake, Quebec, 29.5% of Mohawk boys and 32.8% of Mohawk girls between the ages of 5 and 12 years were considered overweight (Trifonopoulos 1995). The heightened rates of childhood overweight and the increased rates of T2D that are prevalent in the Kahnawake community have been attributed to low levels of physical activity and low consumption levels of nutrient-rich food (Macaulay, Paradis et al. 1997; Paradis, Levesque et al. 2005).

In the James Bay Cree community of Quebec, 38% of children in grades 4, 5, 8 and 9 were overweight (Bernard, Lavallee et al. 1995). Historically, this group of individuals subsisted on food obtained by hunting, fishing and trapping, but since the 1970's, these activities have dramatically diminished. There has been a trend to decreased physical activity and an increased reliance on market food (food shipped from the south and sold in grocery or confectionary stores). In this James Bay Cree community, it was found that in the 1990's overweight children ate less milk, fruit and vegetable products and participated in less physical activity compared to 60 years ago when Cree children in this community had healthy body weights (2% were obese) (Willows 2005).

In a Woodland Cree community in northern Saskatchewan, 26% of youth aged 7-17 years were overweight or obese (Bruner, Chad et al. 2009). Bruner et al. evaluated whether or not increases in overweight or obesity took place over a 14-year timeframe and although the overweight/obesity levels among these youth are higher than the average Canadian youth data, rates of overweight/obesity remained constant from 1991 (24%) to 2005 (26%). Overall, young and older females had higher rates of overweight/obesity compared to their male counterparts,

which further increases their risk of developing subsequent secondary health complications (Bruner, Chad et al. 2009).

In addition to overweight and obesity, central fat patterning is also a risk factor for developing various diseases including T2D. Research indicates that obesity among some First Nations groups was primarily distributed centrally, as indicated by skinfold measurement and waist-to-hip ratio (WHR) measurements (Young and Sevenhuysen 1989). Katzmarzyk and Malina also concluded that individuals of Aboriginal descent tend to have a more centralized pattern of fat deposition compared to individuals of European ancestry (Katzmarzyk and Malina 1998; Leslie, Weiler et al. 2007). Cree children living in Northern Quebec, Canada were reported to be prone to central adiposity where 62% of children in one Cree community had central adiposity (Ng, Marshall et al. 2006; Downs, Marshall et al. 2008). Anderson et al. also confirmed that Aboriginal children experience greater rates of overweight, obesity and central adiposity when compared to Caucasian peers (Anderson, Baxter-Jones et al. 2010).

In following with the link between overweight/obesity and diabetes among the general Canadian population, there are strong links between these two chronic conditions in the Aboriginal population in Canada as well. The current prevalence of diabetes among some First Nations people is found to be at least 3 times greater than among the general Canadian population (The First Nations Information Governance Centre 2011). The Regional Longitudinal Health Survey (RHS) indicated that 19.7% of First Nations people living on reserve self-reported living with T2D in 2002/03 compared to 4.8% of the general Canadian population (First Nations Centre 2005). More recently, in the 2008-2010 RHS, the proportion of First Nations individuals participating in the RHS increased to 20.7%, an increase of 0.9% over 8 years (The First Nations Information Governance Centre 2011). Data collected through the RHS indicates that not only is

the prevalence of T2D higher in First Nations people versus the general Canadian population, the rate of increase in prevalence by age is also steeper, and more First Nations women experience diabetes compared to men (First Nations Centre 2005; The First Nations Information Governance Centre 2011). These data were consistent with findings in a Saskatchewan study where diabetes disproportionately affected Aboriginal women in their reproductive years (Dyck, Osgood et al. 2010). It has been speculated that the intrauterine environment may play a role in the increased rates of obesity and diabetes among Aboriginal populations, particularly among women experiencing gestational diabetes or diabetes during their reproductive years (Dyck, Klomp et al. 2001). In contrast, diabetes is more common among men than women in the general Canadian population (Public Health Agency of Canada 2009; Statistics Canada 2010).

In a study done with the Fort Albany First Nations community, located in the James Bay area of Ontario, Skinner et al. carried out focus groups, interviews and an environmental scan to obtain the community perspective on healthy eating and physical activity (Skinner, Hanning et al. 2006). In this study, several barriers and supports/opportunities related to healthy eating and physical activity were identified. Some of the barriers to healthy eating included: food insecurity, socioeconomic status, remoteness of Fort Albany, lack of resources for obtaining a variety of high quality food, low literacy rates which impeded health knowledge, and disempowerment of community members to have control over what types of market foods were available to them. Barriers to physical activity included: competing activities (such as TV or video games), decreased number of personnel trained in physical activity, facility limitations, insufficient equipment, and lack of time. There were definite community supports and opportunities that were identified including the school snack and breakfast program, access to the community centre, school gym and school kitchen. Interestingly, the most common theme that was identified

as a barrier to participating in physical activity and healthy eating was the concept of empowerment where the community was given the opportunity to build capacity for healthier living (Skinner, Hanning et al. 2006).

In Saskatchewan, the crude prevalence rate (which does not account for the influence of age) of T2D within First Nations populations living on reserves was found to be 1.4% in 1980 (Gillis 1980; Pioro, Dyck et al. 1996). Pioro et al. did a follow-up study surveying First Nations populations living on reserves in Saskatchewan in 1990 and found that the crude prevalence of T2D had more than doubled to 3.0% (Pioro, Dyck et al. 1996). Interestingly in this same study, when adjusting for age, Pioro et al. observed that 7.2% and 12.1% of First Nations men and women (respectively) living on reserve experienced diabetes, while only 5.6% and 6.6% of non-First Nations men and women (respectively) had diabetes (Pioro, Dyck et al. 1996). A Saskatchewan diabetes profile was published by Saskatchewan Health in February 2003 where, in 2000/2001, the prevalence rates for Registered Indians living in Saskatchewan was 5.1% compared to 4.0% in the general population (Saskatchewan Health 2004). A recent analysis conducted by Dyck et al. indicated that between 1980 and 2005 the incidence and prevalence of diabetes was more than 4 times higher among First Nations women compared to non-First Nations women, and more than 2.5 times greater among First Nations men compared to non-First Nations men (Dyck, Osgood et al. 2010). These data confirm that rates of increases in prevalence of T2D among First Nations populations living in Saskatchewan are evident and likely to continue to increase.

Consistent with findings in the general Canadian population, increasing numbers of First Nations children are also being diagnosed with T2D. T2D has been diagnosed in First Nations children as young as 5-8 years of age (Dean, Mundy et al. 1992; Harris, Gittelsohn et al. 1997).

In Saskatchewan, a recent analysis reveals that the age-adjusted prevalence of diabetes among First Nations children more than tripled between 1980 and 2005 (Dyck, Osgood et al. 2012). In this same study, First Nations girls aged 15 to 19 years experienced the highest prevalence rates of diabetes compared to First Nations boys and Non-First Nations boys and girls (Dyck, Osgood et al. 2012). In a remote First Nations Pacific coast community in Canada, 6.7% of children (aged 6-18 years) had abnormal glucose tolerance (Wahi, Zorzi et al. 2009). Amed et al. report that within a group of 227 children diagnosed with T2D across Canada, 44% were of Aboriginal ethnicity while 25% were Caucasian (Amed, Daneman et al. 2010). Generally, the dramatic rise in childhood T2D has been attributed to the increasing prevalence of obesity in children (Young and Sevenhuysen 1989; Dabelea, Bell et al. 2007; Amed, Daneman et al. 2010; Amed, Dean et al. 2010). As well, children who are born to mothers who experienced gestational diabetes are also at higher risk of developing obesity and T2D (Sugarman, White et al. 1990; Dabelea, Pettitt et al. 1999; Young, Martens et al. 2002; Dyck, Osgood et al. 2010). It has been suggested that gestational diabetes may play a pivotal role in the increasing incidence of T2D among particular Aboriginal groups living in Saskatchewan (Dyck, Tan et al. 1995).

Much less is known about diabetes among the Métis people, however there are a few data sets and research articles that suggest that diabetes rates are also elevated among Métis populations (compared to the general Canadian population). According to self report 5.5% of the adult population have been diagnosed with diabetes (Statistics Canada 2003). Similarly, crude prevalence rates from the Aboriginal Peoples Survey indicate that 6% of Métis people living in Canada have been diagnosed with T2D (Statistics Canada 2009). Among a group of Métis Settlement dwellers in northern Alberta, the self-reported age-adjusted prevalence of T2D was found to be 6.9% in 2006 (Ralph-Campbell, Oster et al. 2009). These data also show that

diabetes prevalence was higher among females than males (7.8% compared to 6.1%, respectively) (Ralph-Campbell, Oster et al. 2009). Ralph-Campbell et al. also found that there were high rates of undiagnosed T2D, pre-diabetes and metabolic syndrome among this Métis population (Ralph-Campbell, Oster et al. 2009). Oster et al. report that although First Nations individuals may have more risk factors for T2D, the rates and risk of T2D among Métis people appear to be greater than that observed in the general Canadian population (Oster and Toth 2009). In Ontario, the age- and sex- standardized prevalence of diabetes among Métis populations registered with the Métis Nation of Ontario was 11.2%, a value almost 25% higher than that of the general Ontario population (Shah, Cauch-Dudek, Pigeau, 2011). Similarly, in Manitoba, the age- and sex-adjusted prevalence of diabetes among Métis populations was 11.8% compared to the 8.8% prevalence noted in the general Manitoba population (Martens, Bartlett 2010). Research indicates that due to the paucity of data related to the health of Métis populations, the number of actual cases of T2D among Métis populations is likely underrepresented (Bruce, Kliewer et al. 2003). As pointed out by several researchers (Oster and Toth 2009; Ralph-Campbell, Oster et al. 2009), there are many undiagnosed cases of T2D among this population.

The region-specific data noted above support that the prevalence of diabetes among the Métis is higher than that observed among non-Aboriginal populations. It appears that although the prevalence of diabetes among Métis populations is not as high as what has been observed among First Nations populations, these individuals experience diabetes at disproportionate rates when compared to non-Aboriginal data. The challenges that are discussed with respect to the prevention of obesity and T2D within the First Nations population may be similar to those that the Métis population is faced with, however, health status differences will exist due to the unique

social, historical and political contexts in which these two groups live (and must be accounted for). So although much of the data available on diabetes among Aboriginal people primarily concerns First Nations, there is also evidence for concern among the Métis people. This further supports that research within Métis communities and with Métis people is of paramount importance in order to promote health optimally in these communities.

1.2.6 Factors Influencing the Development of Obesity and Diabetes

Health is a perpetually changing and dynamic state that is influenced not only by our biologic and genetic predispositions but also by our interaction with our social, cultural, spiritual and physical environments in which we live (McMurray and Clendon 2011). Overweight and obesity result from an imbalance between energy intake and energy expenditure at an individual level however, the environments we live in dramatically influence individual choices and behaviours related to healthy lifestyles (physical activities and nutrition, for example). There is much more to the overweight and obesity equation than the physiology of energy input and output which includes the influence of our biology, behaviour and environments interacting with one another (Rutter 2011). The environments in which we live including the influence of peers, families, communities and socioeconomic status have been described as the social determinants of health, all of which have been found to strongly influence health of populations (Young 2003; Raphael 2009; McMurray and Clendon 2011). As well, changes in the global food system has placed a priority on the delivery of more highly processed foods that contain more sugar, fats, salt and flavour enhancers (Gortmaker, Swinburn et al. 2011) and the environments in which we live make these low-nutrient, energy dense foods more readily available and desirable (Gortmaker, Swinburn et al. 2011). This section of the dissertation examines the factors that have been described in the literature to influence the development of overweight, obesity and T2D.

Genetics and Biology

The etiology of obesity is unclear but many propose that it is a complex interaction between genes and the environment (Barness, Opitz et al. 2007). Obesity has been suggested to be very heritable but it also arises from interactions of multiple genes, environmental factors and individual behaviours (Yang, Kelly et al. 2007). Family members may share genes, but they also share environments, lifestyles, and dietary habits, all of which are independent determinants of obesity (Bray, Bouchard et al. 2004). Historically, there has been much debate about the role of specific genes (i.e. 'thrifty genotype hypothesis' proposed by Neel in 1962 (Neel 1962)) in the development of obesity and T2D among Indigenous populations throughout the world. However, genetic data suggest that no single gene in any population can fully cause T2D but rather such conditions develop when diverse networks of genes interact with themselves and with the environments in which people live (Paradies, Montoya et al. 2007; Dyck, Osgood et al. 2010; Abraham 2011).

Environmental Factors and Other Social Determinants

An obesogenic environment has been defined as a set of conditions external to the individual that, in combination with genetics, increase the likelihood of the development of obesity (Brantley, Myers et al. 2005). Genetics may lay the foundation for the susceptibility to obesity and T2D but it is the interaction of these genes with environmental factors that determine whether an individual will develop obesity and/or T2D. Considering that obesity and T2D have been documented in the Aboriginal populations primarily after the 1950's (Chase 1937; West 1974), it is not possible to fully explain the dramatic change in prevalence of these conditions in this population by genetics alone. Changes occurring within our environment, specifically related to the nutrition transition (Kuhnlein, Receveur et al. 2004), the abundance of energy-dense food

and lack of physical activity, play a critical role in the development of obesity and T2D within our society (Gortmaker, Swinburn et al. 2011; Swinburn, Sacks et al. 2011).

Physical Activity

Increasing rates of obesity reflect a state of positive energy balance where energy input is exceeding energy expenditure. The environment we live in promotes the consumption of energy-dense high fat food at the same time discourages physical activity. The literature indicates that trends in increasing obesity rates are taking place at the same time that inactivity levels continue to escalate (Active Healthy Kids Canada 2008; Active Healthy Kids Canada 2009). Children growing up today spend more time participating in sedentary activities (such as watching t.v. or playing video games) and less time doing physical activities. In today's society, more families rely on the use of their vehicle instead of using active modes of transportation, further impacting the growing concern of sedentary behaviour among our children and youth (Tremblay, Leblanc et al. 2011). Sedentary behaviour is independently associated with decreased health (Katzmarzyk, Janssen et al. 2003; Janssen and Leblanc 2010). As well, research indicates that increased physical fitness and participation in physical activity is associated with health benefits (Janssen 2007; Janssen and Leblanc 2010; Tremblay, Shields et al. 2010).

The minimum Canadian recommendation on physical activity for children aged 5 to 17 years is to engage in at least 60 minutes of moderate-to-vigorous physical activity (MVPA) per day. At the same time, sedentary activity recommendations for this age group are such that screen time should be limited to no more than 2 hours per day and sedentary (motorized) transport, sitting time and time spent indoors should be minimized (Canadian Society for Exercise Physiology 2011; Tremblay, Leblanc et al. 2011). Recent data from the 2007-2009 Canadian Health Measures Survey (CHMS) indicate that only 7% of Canadian children and

youth accumulate at least 60 minutes of MVPA per day and that Canadian boys and girls spend 62% of their waking hours engaged in sedentary time (Colley, Garriguet et al. 2011). It appears that sedentary time increases with age (Colley, Garriguet et al. 2011).

Energy expenditure via physical activity is a modifiable environmental determinant that can alter the overall energy balance of an individual. Longitudinal and historical data indicate that habitual physical activity levels continue to decrease over time, particularly within the childhood and adolescent populations (Jebb and Krebs 2004; Franks, Ravussin et al. 2005; Tremblay, Barnes et al. 2005). Janz et al. observed that males who were inactive and who watched television for long durations per day had approximately 2.2 kg more body fat than those males who watched less television; this trend was also observed in females of the same age, but the differences in body fat were less (Janz, Levy et al. 2002). Physical activity has been found to be protective against the development of obesity while evidence indicates that physical inactivity is independently associated with the development of obesity (Katzmarzyk, Janssen et al. 2003; Hill 2006; Tremblay, Shields et al. 2010).

The environment in which we live, work and play, along with cultural norms in our communities, can influence physical activity levels. Research conducted with the Pima Indian population has revealed interesting findings related to the influence of the environment on the development of obesity. In 1994, Ravussin et al. assessed the potential impact of the environment on the development of obesity and T2D within a population of individuals of Pima ancestry (Ravussin, Valencia et al. 1994). They examined the difference in lifestyle, specifically traditional versus non-traditional eating and physical activity practices, between 2 groups of Pima Indians living in two different locations. Their preliminary findings concluded that obesity

was less prevalent in the Mexican Pima Indians living a traditional lifestyle when compared to the Arizona Pima Indians living a more "Westernized" lifestyle.

Tremblay et al. conducted a comparative study between Old Order Mennonites living in southwestern Ontario with the general Canadian population to establish whether any differences existed in physical fitness and daily activity patterns between 2 culturally diverse youth populations (Tremblay, Barnes et al. 2005). Old Order Mennonite populations strongly resist the social and technological changes that are taking place among the general Canadian population, thereby preserving daily behaviours that may better resemble those behaviours of the past (Tremblay, Barnes et al. 2005). The Old Order Mennonite children were stronger, leaner and more active than rural and urban children in the general Canadian population, suggesting that the contemporary environment in which we live plays a significant part in the declining physical activity levels of Canadian youth (Tremblay, Barnes et al. 2005; Esliger, Tremblay et al. 2010).

Similar to trends in the general Canadian population, physical inactivity is becoming increasingly prominent in Aboriginal populations living in Canada. Certain Aboriginal populations have undergone and experienced a rapid transition from an active to sedentary lifestyle thereby impacting their overall energy expenditure. The Aboriginal Peoples' Survey showed that only half of Aboriginal adults participate in leisure-time physical activity (Statistics Canada 2003). The Regional Longitudinal Health Survey observed that only 21.3% of First Nations adults perform at least 30 minutes of moderate to vigorous activity on four or more days of the week (First Nations Centre 2005). The RHS also indicates that less than half of First Nations youth accumulate a minimum of 30 minutes of moderate to vigorous activity most days of the week. It is clear that the trend towards physical inactivity may play a significant role in the development of obesity (and T2D) within the Aboriginal Peoples living in Canada.

Physical inactivity has been directly linked to the development of obesity among Aboriginal peoples living in Canada (Katzmarzyk 2008). In both youth and adult populations, the odds for being obese was associated with higher levels of physical inactivity and evidence suggests that physical activity is an important correlate of obesity among Aboriginal peoples (who participated in the CCHS 2.2 survey) (Katzmarzyk 2008). Findlay et al. report that the odds of being active (versus being inactive) were significantly lower for individuals living in lower-income households and also for those who had large numbers of dependants in their household and who were aged 35 years or older (Findlay 2011).

A study conducted by Downs et al. indicated that only 59% of participating children (in Grades 4-6), from two schools in Cree communities in northern Quebec, met pedometer step recommendations. This study demonstrated that children experiencing central adiposity were less active than those children who did not have central adiposity (Downs, Marshall et al. 2008). Overall, 83% of children had very poor physical fitness: 96% of children with central adiposity versus 69% of children without central adiposity (Downs, Marshall et al. 2008).

In a Cree population living in Attawapiskat, Ontario, Sutherland reports that declining levels of physical activity has been observed in the Cree youth (12-15 years of age) living in this community. Sutherland implemented an online web-survey that allowed her to determine that 61% of the youth in this community were only "sometimes active (2 times or less)" per week. In this study, Sutherland indicates that 85% of the youth would have participated in more physical activity or sports if they were run by organizations within the community (Sutherland, Skinner et al. 2007).

Interestingly, however, data from the 2005 CCHS indicated that 37% of First Nations people (off-reserve) and 39% of Métis people reported engaging in physical activity in their

leisure time compared to 30% of non-Aboriginal people (Findlay 2011). Correspondingly, physical activity participation among Aboriginal youth (who participated in the CCHS 2.2) was reported to be higher than participating non-Aboriginal youth (Ng, Young et al. 2010), although further evidence suggests that levels of physical activity decline as age increases (First Nations Centre 2005; Findlay 2011). These data were corroborated by a study conducted in a Woodland Cree community in northern Saskatchewan, where individuals aged 15-24 years had the highest levels of self-reported leisure-time physical activity compared to that reported among individuals aged 40-54 years (Bruner 2008). Although Ng et al. reported that Aboriginal youth (who participated in the CCHS 2.2) were more physically active than their non-Aboriginal peers, it was also observed that these Aboriginal youth also consumed less vegetables and dairy products and spent more time viewing TV compared to non-Aboriginal youth (Ng, Young et al. 2010). These data suggest that a combination of factors including physical activity levels, diet and sedentary levels all impact the development of obesity in Aboriginal populations; as well, the CCHS data was based on self-reported physical activity levels that tend to be over-estimated by the majority of individuals and this should be considered when comparing physical activity data.

Nutrition

The promotion of healthy eating is becoming a major focus of health promotion interventions as it can lead to significant improvements in the health of populations (Raine 2005). Eating patterns and behaviours are influenced at multiple levels and by various social determinants, all of which can interact with one another, further compounding the complexity of understanding healthy eating (Raine 2005). Some researchers have reported that local food environments, such as proximity to fresh produce markets, grocery stores or fast-food restaurants, can play a role in the odds of developing obesity (Veugelers, Sithole et al. 2008;

Spence, Cutumisu et al. 2009). Others argue that as changes have been made in the global food system there has been a simultaneous increase in rates of obesity throughout the world (Swinburn, Sacks et al. 2011). Such food system changes include the production of more affordable and processed foods that are marketed more efficiently and are often packaged in portion sizes that exceed dietary recommendations (Brantley, Myers et al. 2005; Swinburn, Sacks et al. 2011).

Food system changes affecting Aboriginal peoples living in Canada have been described as the 'nutrition transition' which reflects the rapid change from consumption of cultural traditional foods to that of more 'Westernized' market foods (higher saturated fats, sugars and refined foods) (Popkin 2004; Popkin and Gordon-Larsen 2004; Damman, Eide et al. 2008; Downs, Arnold et al. 2009). As Aboriginal populations experience this 'nutrition transition', less reliance on locally procured food such as through hunting, trapping, fishing, and gathering occurs (Kuhnlein, Receveur et al. 2004; Willows 2005; Downs, Arnold et al. 2009). Aboriginal diets consisting of local natural resources that were high in protein and low in fat and carbohydrates have been gradually replaced by 'market' foods that consist of much lower nutritional value (Willows 2005; Damman, Eide et al. 2008). It is believed that this, in turn, is one reason why obesity rates are disproportionately higher in Aboriginal populations in Canada (Kuhnlein, Receveur et al. 2004; Downs, Arnold et al. 2009).

Unfortunately, as local and traditional food consumption decreases, the dietary habits, customs and Aboriginal ways of knowing that are often passed down from generation to generation via involvement in various ethnic and cultural events and ceremonies also decreases. The Aboriginal Children's Survey 2006 observed that only 16% of young Métis children lived in a community rated as "excellent" or "very good" regarding cultural activities; at the same time,

51% of Métis children lived in communities rated as "fair" or "poor" regarding cultural activities (Statistics Canada 2008), which may further impact healthy eating and overall health among Métis populations.

Aboriginal peoples living in Canada experience food insecurity disproportionately than the general Canadian population (Power 2008; Willows, Veugelers et al. 2009). Food insecurity, defined as "the inability to acquire or consume an adequate diet quality or sufficient quantity of food in socially acceptable ways, or the uncertainty that one will be able to do so" (McIntyre 2003), affects a significant number of Aboriginal households throughout Canada (Willows, Veugelers et al. 2009). It is estimated that 29% of Aboriginal people aged 18 years or older were living in food-insecure homes in 2004 (Willows, Veugelers et al. 2011). Low levels of education, employment, income along with higher levels of poverty, lone-parent families, crowded housing situations and greater reliance on social assistance and welfare all contribute to food insecurity in Aboriginal homes (McIntyre 2003; Statistics Canada 2009; Willows, Veugelers et al. 2009; Egeland, Williamson-Bathory et al. 2011). Research indicates that individuals who consume the least amount of fruit and vegetables are individuals of low socio-economic status (Kirkpatrick 2008) and even young preschool aged children living in food-insecure homes can experience altered dietary habits (Egeland, Williamson-Bathory et al. 2011). Ironically, some individuals suffering from obesity are poor and often hungry because of the poor quality of food they can afford to purchase and consume (McIntyre 2003). Research indicates that foods lower in cost tend to contain less nutrients, be more energy-dense and higher in fat, sugar and starch than higher cost, nutrient-dense healthy diets (Broughton, Janssen et al. 2006).

Food insecurity issues are further compounded for those living in northern and remote locations where food availability and food costs become even more of an issue. These

individuals rely on supermarket managers to decide what food is brought in for sale in these communities; as well, many individuals are forced to commute long distances to purchase fresh, affordable fruits and vegetables (Kumanyika 2001). A recent study showed that preschool children living in food insecure homes in Nunavut consumed 37% less milk but higher amounts of high-sugar drinks than children in food secure homes, indicating that energy-dense sugar beverages may be cheaper for families to purchase than milk (Egeland, Williamson-Bathory et al. 2011).

Receveur et al. found, within 16 Dené and Métis communities in the Canadian Arctic, that the younger generations consume less traditional foods such as berries, birds, fish and local land animals; in contrast, these youth consume food much higher in fat, carbohydrate and sugar (Receveur, Boulay et al. 1997). Others have made similar observations within Aboriginal communities related to an overall increase in foods that were high in saturated fat, cholesterol and sugar and were low in dietary fiber (Wolever 1997; Wolever, Hamad et al. 1997; Hanley, Harris et al. 2000). It is suggested that nutritional campaigns and interventions promoting increased consumption of traditional foods may improve healthy food choices (Egeland, Williamson-Bathory et al. 2011).

Interestingly, the Namgis First Nation of Alert Bay have recently been involved in a study where they reverted back to consuming a diet very similar to the traditional diet of their elders. Although the data has not yet been published, preliminary results indicate that after consuming a more traditional diet high in protein and fat and low in carbohydrates and sugar, these individuals have observed reductions in body weight, cholesterol levels and some have improved glucose tolerance (Canadian Broadcasting Corporation 2008).

James Bay, Quebec Cree youth participated in a study to obtain more information on dietary habits among the youth living in this area. The study found that the majority (96.8%) of the youth involved in this project consumed high fat foods while 65% had a lower consumption of fruits and vegetables. 92.8% of the participating youth consumed high-sugar beverages while 95% had low consumption of milk and milk products (Khalil, Johnson-Down et al. 2010). In a separate study also with 2 different Cree communities, similar findings were found among 201 children in grades 4-6. In this group of children, 18% reported eating restaurant meals three or more times per week thereby consuming 479kcal more energy than children who did not consume restaurant meals (Downs, Arnold et al. 2009). Sixty-eight percent of participating children reported often having fruits and vegetables at home yet 98.5% of children consumed less than 5 fruits and vegetables daily (Downs, Arnold et al. 2009). In a Woodland Cree community in northern Saskatchewan, the mean number of servings from the vegetables and fruit group and the milk products group were well below the minimum guidelines among individuals aged 7-17 years (Bruner 2008). Furthermore, the number of foods containing fat, oil or sugar, high fat/salt snack foods and beverages comprised large portions of daily food intake, particularly among participants aged 15-24 years (Bruner 2008).

Diet quality clearly is a challenge for First Nations youth living in northern and remote parts of Canada and this is likely due to underlying social determinants of health and the cost and quality of fresh food available in remote northern locations. This information further highlights the need for culture based interventions to be developed to focus on healthy diets and integrating Aboriginal ways of knowing into the design of such interventions to ensure that health is promoted in a relevant and sustainable way for these populations.

Other Social Determinants of Health

The conditions in which people are born, grow up, live, work, play and age are considered social determinants of health (Raphael 2009). There are a number of social aspects of peoples' lives that can influence their health including income, occupation, family wealth and assets, education, health literacy, employment, the degree of autonomy in one's job and use of time, as well as housing (Halfon, Larson et al. 2010). The effects of European colonization among Aboriginal peoples living in Canada are also considered to be a determinant of health due to their role and impact on all of the above-mentioned social determinants (Mowbray 2007; Smylie 2008). European colonization led to the dislocation of Aboriginal peoples from their traditional lands, suppressing their cultural and traditional ways of obtaining food, suppressing language and ceremonies, and perpetuating interpersonal and institutional racism (Smylie 2008). All of these experiences and the trauma that Aboriginal populations experienced because of this has led to poverty which further perpetuates the previously discussed determinants of health.

Individuals of lower socioeconomic status have been found to have higher prevalence of obesity (Haas, Lee et al. 2003; Stunkard 2007; Katzmarzyk 2008; Findlay 2011). Various studies have revealed that children in homes of lower education levels and lower economic status have higher rates of food insecurity and obesity (Janssen, Boyce et al. 2006; Stunkard 2007). In measuring physical activity, Mo et al. observed that 40.7% of subjects in their study were physically active and within the high income group (Mo, Turner et al. 2005). Data from the Aboriginal Children's Survey 2006 indicates that almost one third (32%) of Métis children under the age of 6 years live in families considered to have low income (Statistics Canada)}. Aboriginal people living in Canada experience lower employment rates and higher unemployment rates than non-Aboriginals (Statistics Canada 2003; Smylie 2008). A study

conducted in the Saskatoon Health Region compared the health status of residents living in low income neighborhoods to the rest of city of Saskatoon and found substantial health disparities (Lemstra 2008). This study found that 80% of children (aged 10-15 years) living in low-income neighborhoods were more likely to be physically inactive. Saskatoon residents living in a low-income neighborhoods were 196% more likely to have diabetes and 50% more likely to report low self-reported health (Lemstra 2008). Interestingly, the health status of Aboriginal populations living in these neighborhoods was improved substantially when income status was statistically adjusted and accounted for (Lemstra 2008).

These data support the suggestion that Aboriginal peoples may experience higher rates of obesity due to the impact of such social determinants of health as income and employment. It is important to acknowledge the role that the social determinants play on overall health of populations however, many of these factors are outside the scope of this project and are not specifically addressed presently.

1.2.7 The Role of Schools in Promoting Health

Schools have been identified as important settings for health education for a number of years. The World Health Organization (WHO) initiated the development of healthy 'settings' in the 1980's where such locations as schools were identified as ideal locations to integrate a holistic approach to health promotion (Mukoma and Flisher 2004). In Canada, such an approach to integrating health promotion into schools is known as "comprehensive school health" (CSH) or "health promoting schools" (HPS) (Veugelers and Fitzgerald 2005; Veugelers and Schwartz 2010). Every attempt will be made to use the CSH term throughout this dissertation unless an author specifically utilizes the HPS term, in which case this will be stated as such.

CSH programs have become embraced internationally as an effective way of promoting health of children, adolescents, the school and the community as a whole (Mukoma and Flisher

2004). In Canada, the Joint Consortium for School Health (JCSH) was established in 2005 and is a partnership between federal, provincial and territorial governments from all parts of Canada. These governmental groups work together with education sectors to promote the health of children and youth in the school setting (Joint Consortium for School Health 2011). The JCSH uses the term CSH and defines it as follows: "Comprehensive school health is an internationally recognized framework for supporting improvements in students' educational outcomes while addressing school health in a planned, integrated and holistic way" (Joint Consortium for School Health 2011). The JCSH identifies four main pillars for CSH: 1) teaching and learning; 2) healthy school policy; 3) social and physical environments; 4) partnerships and services (Joint Consortium for School Health 2011). It is believed that when all four pillars are integrated into school settings that students are supported in achieving their full potential academically as well as in becoming healthy, productive members of society (Joint Consortium for School Health 2011).

The CSH approach differs from the whole school approach and the ecological model approach in that all 4 of the above-identified pillars need to be addressed. The whole school approach does not merely focus on physical activity and health eating but can focus on any identified health condition such as mental health initiatives and youth resiliency, which makes this approach different from that of the CSH approach. Furthermore, the ecological model integrates the school as one entity in addressing health, along with other sociopolitical and community level influences which differs from the CSH approach with the school as the primary focus. It is important to understand the differences in these terms as they are all used within the literature yet they are distinctly different.

Schools that provide high-quality health and physical education and that also support physical and social environments that nurture active and healthy living have been shown to have positive effects on the adoption of healthy lifestyle habits among children and youth (Sallis, McKenzie et al. 1999; Chomitz, Slining et al. 2009; Veugelers and Schwartz 2010). In Nova Scotia, the Annapolis Valley Health Promoting Schools Project (AVHPSP) integrated a community development approach to building partnerships between schools and other community organizations with the goal of making it easier for students to make healthy physical activity and eating choices (Veugelers and Fitzgerald 2005). Intervention schools integrated healthy eating programs based on the Centres for Disease Control and Prevention (CDC) recommendations for schools promoting physical activity and healthy eating (Centers for Disease Control and Prevention 1996; Centers for Disease Control and Prevention 1997). These recommendations included enhanced policies, curriculum, instructions to students, integration of school nutrition education and food services, staff training, family and community involvement as well as program evaluation. Results from this study indicate that students from intervention schools had significantly lower rates of overweight and obesity, had healthier diets and reported increased levels of physical activity than students from non-intervention schools (Veugelers and Fitzgerald 2005).

In 2006, schools in Prince Edward Island adopted school nutrition policies that addressed the quality of food available in the school environment, student access to food, food used in school fundraising initiatives, food safety and nutrition education (Mullally, Taylor et al. 2010). Temporal changes in food consumption of fifth and sixth grade students indicated that students were more likely to meet Canadian nutrition recommendations for fruit and vegetable intake and milk and alternatives intake post-policy implementation. At the same time, students were also

two times more likely to report consuming less than 3 daily servings of low nutrient dense foods after the implementation of the school nutrition policy. This indicates that even when schools focus on one of the pillars identified by the JCSH that positive health changes can be observed among students attending these schools.

Action Schools! BC (AS! BC) is another whole-school approach to promoting physical activity among children in grades 4 and 5 in select schools in Vancouver and Richmond, B.C (Reed, Warburton et al. 2008). The AS! BC model focuses on six 'Action Zones' including the school environment, scheduled physical education, extra-curricular, school spirit, family and community, and classroom action. In 2003, 8 elementary schools implemented the AS! BC model. After 1 year of programming, results indicate that 20% of children who attended intervention schools had greater increases in physical fitness and a 5.7% smaller increase in blood pressure compared to students who attended a 'usual practice' school. No changes were observed with respect to BMI or measured blood variables (Reed, Warburton et al. 2008).

All three of these examples have integrated one or more pillars that make up a CSH program as outlined by the JCSH, and all resulted in positive changes in physical health outcomes and health knowledge and behaviours. Researchers highlight the importance of including participatory methods to ensure parents, teachers, community organizations, and school administrators are involved in the planning stage thereby integrating practices and processes that are acceptable to them (Naylor, Macdonald et al. 2006; Leatherdale, Manske et al. 2010). Multifaceted approaches to promoting health at the school levels can be effective in influencing student health outcomes and healthy choices and broader implementation of such programs is necessary, particularly in the face of escalating rates of chronic conditions and related quality of life issues and health care costs.

A few school- and community-based health promotion studies have been conducted in First Nations communities in Canada and in American Indian communities in the United States and have integrated more culturally relevant programming. Researchers believe that designing such culture-based interventions will not only provide children with life skills and tools to be able to make informed decisions regarding their health presently and in the future, and ensure that Aboriginal ways of knowing are shared with the students, but will further allow interventions to be designed in consideration of the specific health disparity challenges that Aboriginal populations face. The following few paragraphs highlight the various intervention research studies that have been conducted to date.

The Sandy Lake Health and Diabetes Project was a healthy eating and physical activity school-based intervention that was implemented in the Sandy Lake Oji-Cree community in northwestern Ontario (Saksvig, Gittelsohn et al. 2005). The project was designed within the context of an ecological model combined with elements from the social cognitive theory and integrated community-specific health beliefs, attitudes and perceptions (Saksvig, Gittelsohn et al. 2005). The intervention was built around three main components: community-based activities involving radio programming, walking, home visits; school health curriculum development (for grades 3-5) focusing on healthy eating, physical activity and diabetes education; environmental initiatives including food labeling at the local grocery store and in-store education. An evaluation of the school program revealed improved nutritional, physical activity and diabetes knowledge and improved dietary fibre intake (Saksvig, Gittelsohn et al. 2005). Unfortunately, even though these positive changes were found, this study did not reveal any reductions in obesity in the participating children.

The Mohawk community of Kahnawake, Quebec implemented a community-based program that focused on the primary prevention of diabetes among school-aged children known as the Kahnawake School Diabetes Prevention Program (KSDPP) (Macaulay, Paradis et al. 1997; Potvin, Cargo et al. 2003). This study utilized a participatory action research approach to implement the intervention that consisted of a culturally relevant school nutrition and healthy lifestyle education program (for grades 2-4), community-wide events (such as an annual community walk/run challenge), and environmental changes (including the construction of a recreation path to promote walking and running). Results collected over four years (from 1994 to 1998) showed an increase in the proportion of children participating in more than 30 minutes of physical activity per day, increase in children's awareness of nutrition, fitness and diabetes, an overall decrease in the amount of time spent watching TV, but no measured change in BMI or diet (Adams, Receveur et al. 2005). Unfortunately, the measured improvements in physical activity, fitness and screen viewing were not sustained over the long-term (Paradis, Levesque et al. 2005).

Pathways is another study that was designed to test a culturally appropriate obesity prevention program in American Indian children living in the United States (Davis, Going et al. 1999). This 3-year randomized school-based intervention focused on the primary prevention of pediatric obesity among 1700 children, grades 3-5, in 41 schools and from 7 tribes in Arizona, New Mexico and South Dakota. This intervention consisted of the following components: (1) curriculum, (2) physical education, (3) families, and (4) school food services, all of which were structured to increase the knowledge, beliefs, values, attitudes and skills surrounding physical activity and healthy eating. Results indicate that a reduction in total and saturated fat intake were

observed (Himes, Ring et al. 2003) although no significant differences were measured in physical activity levels between intervention and control schools (Going, Thompson et al. 2003).

All of the culture-based health promoting interventions described above have integrated programming elements into schools and classrooms as a primary means of including large numbers of students in such initiatives. As well, influencing children to make healthy lifestyle choices early on is more likely to lead to positive health outcomes as they have their lifetime to apply this knowledge to their lives. To date, all of the culture-based interventions implemented in Canada have focused on First Nations populations and there are no documented health promoting school-based interventions in Métis communities in Saskatchewan, which highlights the importance of this particular project.

Recently the National Collaborating Centre for Aboriginal Health (NCCAH) has started to create a framework for Indigenous school health (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). This framework is being created to ensure that comprehensive school-based health promotion initiatives and programs are grounded in Indigenous cultural strengths, knowledge, traditions and values that are unique to their own communities (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). The purpose of this framework is to build on interventions that have already been conducted with Indigenous communities and to ensure that all initiatives support Indigenous children's health at the same time as reflecting the unique Indigenous ways of knowing, being and learning (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). The proposed framework for Indigenous school health integrates many of the pillars of CSH by integrating community strengths into programming and by extending families and relationship structures, including connections to the surrounding physical and spiritual environment, into

school-based health promotion initiatives (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010).

Currently the framework for Indigenous school health, which continues to be developed and modified, is represented by a circle or sphere that indicates the wholeness/wellness dichotomy (Figure 1). Within the sphere are foundational principles, cultural concepts of learning, and the four aspects of human nature (physical, emotional, social and spiritual) (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). The four aspects of human nature intersect to represent the individual, the family, the community and the Nation or People (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). Finally, the strengths of Indigenous communities (beliefs, values, teachings and gifts) encompass and surround the whole sphere thereby supporting all of the interconnections within (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). This framework represents the multi-layered and interacting elements that can impact health, which are similarly portrayed by ecological models or frameworks used within a Westernized research perspective.

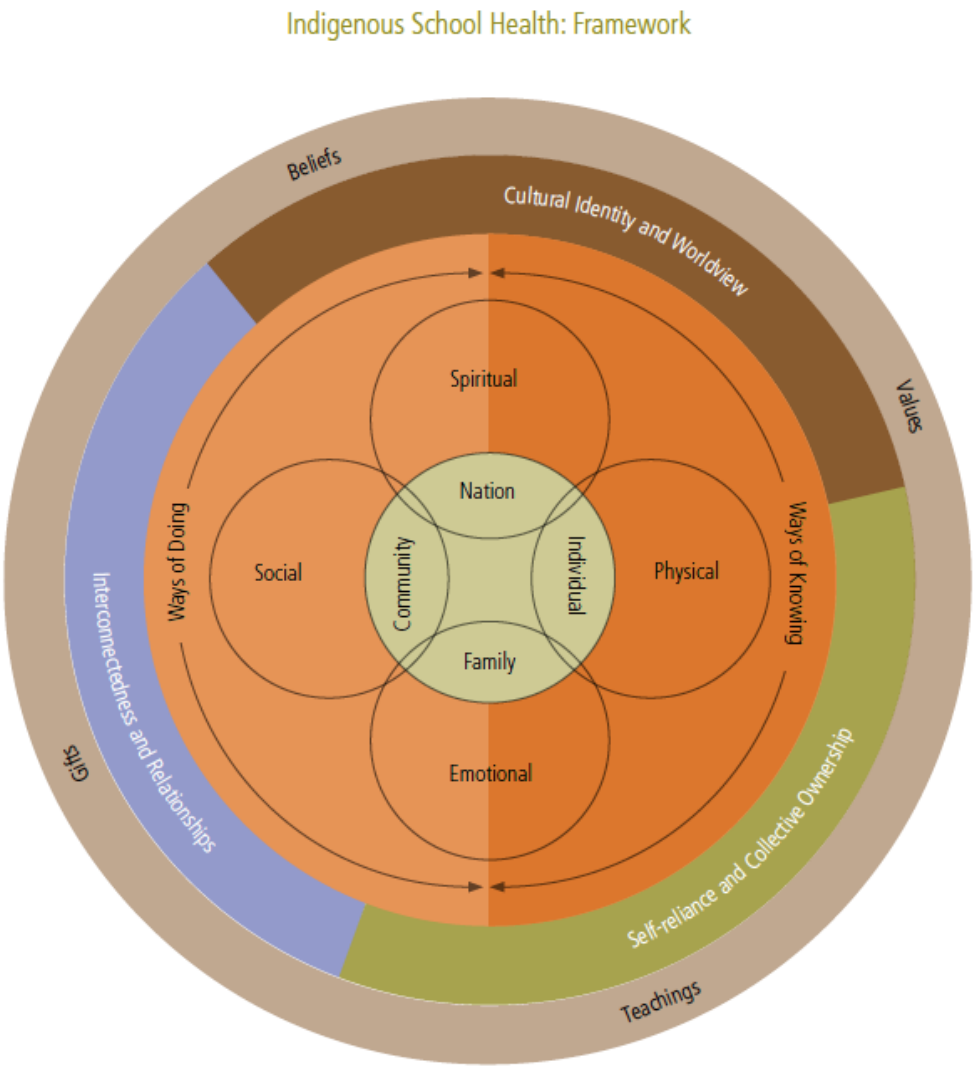

Figure 1. Indigenous School Health Framework

1.2.8 An Ecological Model Approach to Understanding Health in Schools

Ecological models have been applied to health promotion studies and research since the 1980's. Ecological approaches have been favored over more dominant linear research models and methods as they recognize the importance of considering the role that social, environmental and biological factors play in health (Susser and Susser 1996; McMichael 1999; Krieger 2001; Richard, Gauvin et al. 2011). More emphasis is being placed on developing programs and

interventions that address the multiple settings and social contexts that may influence individual behaviour rather than merely focusing on individual behaviours and their cognitive determinants (McKinlay and Marceau 1999; Richard, Gauvin et al. 2011). Merely focusing on individual education and motivation will not always lead to successful and positive behavior change particularly if the environment and policies in that environment make it difficult to choose the healthy behavior (Glanz, Rimer et al. 2008). Ecological models provide a framework for understanding the multi-layered and interacting determinants of health behaviors. It integrates the individual, interpersonal, community, organizational, and societal factors, and their influences on each other, into the planning and implementing of health promotion interventions due to their direct and indirect influences on lifestyle, behaviour choice and health (Glanz, Rimer et al. 2008). All of these factors are integrated into CSH models and therefore linking these two models fits well in developing school-based health promotion interventions.

Another critical piece in utilizing an ecological model to inform the design of research projects with Aboriginal communities is how this approach complements or respects Indigenous knowledge and worldviews. Indigenous knowledge has been suggested to include the principles of "totality" or "holism" (Battiste 2000)(pg. 42) (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). The Royal Commission on Aboriginal Peoples has previously defined Indigenous knowledge "as a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and their environment" (Indian and Northern Affairs Canada 1996). Battiste and Henderson discuss the concept of Traditional Ecological Knowledge which focuses on the "web of relationships between humans, animals, plants, natural forces, spirits and land forms in a particular locality…" (Battiste 2000), pg. 44. The framework for

Indigenous school health that is being developed also highlights the importance of relationships and connectedness of individuals to one another and the world around them (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). All of these suggest a multidimensional, multilevel, interactional and interdependent relationship of humans with their surroundings – similar to what the ecological model encompasses. In order to effectively incorporate elements of an ecological model into a health promotion research project, community members must be actively engaged in the research process. Participatory action research (PAR) provides such a framework and opportunity for researchers to collaborate with and actively engage community participants to ensure that health promotion intervention designs are relevant to their community and cultural needs.

1.2.9 Participatory Action Research Approach

Participatory action research (PAR) focuses on an ecological model of health. PAR has been defined as "… a collaborative approach to research that equitably involves all partners in the research process and recognizes the unique strengths that each brings." (Minkler and Wallerstein 2003). PAR actively engages participants in the research process and can lead to practical outcomes that can positively influence the lives of the participants themselves (Stringer and Genat 2004). PAR is centered around bringing knowledge and action together for the benefit and improvement of a community's health, thereby eliminating health disparities (Minkler and Wallerstein 2003). Community members have input in the generation of the research questions, in determining the manner in which the research is carried out, in the interpretation of the data, in the conclusions drawn and in the dissemination of the research findings. In so doing, community perspectives, wishes and desires are integrated into the research process and community-specific strengths and social networks are built upon. Co-learning and capacity building between researchers and community members is promoted with PAR where researchers learn from the

local knowledge and expertise of community members and community members learn from the knowledge and expertise of the academic researchers. This will allow the sharing and transfer of knowledge, skills and capacity between all groups involved (Macaulay, Commanda et al. 1999; Minkler and Wallerstein 2003). This interactive process of co-learning is a central feature of PAR as it moves away from the unidirectional model of outside researchers providing education 'to' community members (Macaulay, Commanda et al. 1999).

Protocols and ethical guidelines have been established specifically for research being conducted with Aboriginal communities where there is continued involvement of community members at all levels of the research being conducted (Schnarch 2004; Canadian Institutes of Health Research 2007; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). PAR is acknowledged as a more respectful way of conducting research within Aboriginal communities because it ensures that Aboriginal experiences and expertise are woven into the research process thereby building ownership and control over programming and potential health outcomes in their community. PAR recognizes the community as a unit and attempts to build on and strengthen pre-existing social networks and relationships (Minkler and Wallerstein 2003). This, in turn, further supports the emergence of local relevance and Aboriginal perspectives.

1.3 Rationale for this Research Project

The literature review has highlighted the critical need for designing, implementing and evaluating comprehensive school health interventions in culturally relevant ways, in collaboration with Aboriginal communities in order to nurture the adoption of healthy lifestyles among Aboriginal children. There is a paucity of information available related to the effectiveness of Métis culture-based CSH interventions on physical activity and healthy eating knowledge, attitudes and behaviours among Métis children. The rationale for this research project, therefore, is to narrow this research gap and further explore the role that a culture- and school-based health promoting intervention can have on healthy physical activity and nutrition knowledge, attitudes, beliefs and behaviours of Métis children.

1.3.1 Research Questions

The primary and secondary research questions for this project are:

1. Does implementing a CSH intervention impact physical activity and nutrition knowledge, attitudes, beliefs and behaviours among northern Métis children?
2. What are the processes and experiences of researchers engaging in PAR methods in collaboration with a Métis community?

CHAPTER 2

THESIS STRUCTURE AND RESEARCH PROJECT APPROACH

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2.1 Thesis Structure

This thesis is organized into 4 distinct but related papers that highlight the various stages of this Ph.D. project. The participatory action research (PAR) cycles that make up the whole Ph.D. project, which are described in detail in this methodology section, have been compiled into common threads that inform each of the 4 papers. In other words, the results generated from one PAR action cycle may inform one or more of the unique papers that make up this dissertation. Although each paper is an independent chapter in this thesis, each one builds on and informs the work of each consecutive paper.

For ease of understanding and to ensure clarity to readers, this general 'research project approach' chapter has been divided into 5 sections as follows: (1) My place in Community-based Aboriginal health research, (2) Ethical considerations in conducting research in collaboration with Aboriginal communities, (3) Participatory Action Research (PAR) Approach supports the principles of Ownership, Control, Access and Possession (OCAP), (4) Integrating PAR into this project and (5) Aboriginal Epistemology and Indigenous methodologies. Following this, the dissertation is written in 4 distinct and independent, inter-related manuscripts including the introduction, methods, results, discussion and conclusion sections. Key topic areas related to the general introduction, literature review, methodology and research approach are repeated in each manuscript. A complete list of references cited throughout this dissertation is included at the end of this thesis document. The final chapter, Chapter 7, presents a general discussion and the conclusions of all 4 papers and of the overall impact of this Ph.D. dissertation, including the limitations of this study and future research directions.

2.2 Research Project Approach

2.2.1 My Place in Community Based Aboriginal Health Research

Scholars and investigators involved in research involving other individuals and communities must be aware of their position in the research relationship and ensure they are comfortable within their own sense of 'place' to nurture a supportive environment in which to promote the emergence of new and local knowledge. Specifically, when working within an Aboriginal health context where community participants experience their own realities and have unique non-Westernized epistemologies, it is imperative to be respectful and mindful of this in order to decrease the risk of the scholar's viewpoint influencing observations and results of the project. In order to be more mindful of my position and place in the research relationships that I have formed during my Ph.D. training I have had to reflect on who I am and how my cultural background and life experiences influence my current viewpoint, values, perspectives, research interests and career goals.

I was born in Saskatchewan, Canada in 1973 and was the first of my family to be born a Canadian citizen. My father was born in India and grew up in Mauritius, a small island in the Indian Ocean, while my mother was born in Wales, United Kingdom. My brother was also born in Wales and my family immigrated to Canada three years before my birth. I was raised primarily in rural Saskatchewan in communities that consisted mainly of Caucasian German-Catholic people. These facts have been very important in shaping my experiences as a young girl growing up in rural Saskatchewan and which continue to shape my perspectives on the role that culture and language play in building relationships and community.

Growing up in a rural Saskatchewan community was a positive experience for me and I had many opportunities to participate in sporting activities and free play with neighborhood children. I became very involved in youth leadership activities in the school and was part of the

high school soccer and basketball teams. Our community had an outdoor pool which allowed me to be involved in competitive swimming. This community also had a school of dance that provided the opportunity to participate in this form of activity as well. Overall I had very positive experiences with organized and non-organized sport and activities which also set the stage for understanding the importance of movement and physical activity in health.

I was always very curious about the human body and how it functioned and this is perhaps why I pursued my first degree in physiology. After receiving a B.Sc. in physiology I entered the School of Physical Therapy, completed my B.Sc.PT and worked as a clinician for 4 years. During my time as a clinician it became more and more evident that the number of people experiencing diabetes was increasing. I, in turn, became more curious about the physiologic mechanisms involved in the development of type T2D. I obtained my Masters of Science in physiology from the University of British Columbia with a research focus on the treatment of obesity and diabetes in ob/ob mice with a leptin cell therapy. The training I received and knowledge gained during this time was invaluable and laid the foundation for my basic understanding of body weight regulation and metabolism. As I worked to complete my M.Sc. I found myself reading information regarding community-based diabetes prevention programs that were being developed in various locations in Canada and throughout the world. The articles I found myself reading began to move away from the basic science area of obesity and T2D and into more population health and health equity literature. I found it unsettling to read about the health disparities that were observed in Indigenous populations in Canada and throughout the world. My interest in Aboriginal health, health disparities and the role of the social determinants of health came to the forefront and led me to pursue my current Ph.D. research.

I feel that my early experiences with the diverse cultures I was exposed to in my parents' families played a part in my keen interest in Aboriginal health. As I learned more about the history of Aboriginal peoples in Canada and the marginalization of the Aboriginal cultures, the more I felt a strong pull to be a part of working towards changing the way research is conducted with marginalized populations. Social justice and health equity resonated so strongly and it was clear to me that this was an area of work that I was drawn to. Both of my supervisors played a pivotal role in paving the road for me to pursue this field of study and in commencing a research relationship with a northern Saskatchewan Métis community, Île-à-la-Crosse.

On my initial visit to the community of Île-à-la-Crosse I met 2 of the Elders in the community who I had spoken with over the phone about commencing a project focusing on health promotion with the long-term goal of preventing T2D in the youth of their community. One of the Elders told me that she was surprised to learn that I did not have blond hair and blue eyes and that I reminded her of one of her nieces. At that first meeting I remember the feeling I initially had of uncertainty and the sense of being an 'outsider' but once I heard this statement from the Elder we both laughed and the atmosphere was cleared and an open and transparent discussion about moving forward with this research project ensued. The relationship that I developed with this particular Elder has become a very rich one and I have learned a tremendous amount about the Métis culture and the importance of spirituality in their community. She has been the individual who has been constant, consistent and present throughout the duration of this project and has always been available for counsel when needed.

The other Elder who was involved in the initial phases of this research project was a man with a strong vision for the future holistic health of his community and his people. He provided advice at the important beginning portions of the research project when the research agreement

was written and agreed upon. Unfortunately, before the main component of the school-based health promoting intervention was implemented, this well respected individual and community member passed away. I often think about the words we shared at the beginning of the project and I hope that the outcomes of this project were what he had envisioned. In some ways this program could be one of his legacies to the children and youth of the community.

The first two years of my Ph.D. program were spent getting to know several community members, establishing community representation on the research team and building a trusting and respectful relationship with various community members. There were individuals I interacted with in the community that I felt were uncomfortable with my engaging in research in their community and school but for the most part everyone was very welcoming and interested in the programming that we were collaboratively designing and implementing. The various dynamics and political undercurrents that were part of the community and community member relationships would sometimes become intertwined in the project thereby having an influence on the project timeline or objectives. This was interesting for me, as an outsider to the community, because often I would not be aware of why things were proceeding as they were but I learned to accept that community dynamics played a role and influenced various aspects of the project, even though I was never privy to what the dynamic shifts were due to. These experiences have allowed me to further develop my skills in diplomacy, respect for privacy and also the importance of relinquishing a sense of 'control' and becoming more flexible with project plans and timelines. I have learned that I have become much more at ease and comfortable with uncertainty and spontaneous changes affecting planned timelines and project deliverables. So in reflecting on my positionality as a researcher in this field of work I strongly believe that my Ph.D. training has had a positive influence on my ability to conduct community-based

participatory action research in flexible ways that support the integration of community needs and desires.

The comfort levels and ease of community members with my presence in the community changed over the duration of the project. I observed and felt the comfort levels increasing among various community members with each subsequent visit I made to the community. This unspoken change was important to me because I felt that it was an indication that more and more community members were open to the work that I was engaging in with them and that they saw value in the project that was being conducted with the children. At the end of the project when I returned to the community to share the results of the project with various stakeholder groups in Île-à-la-Crosse, one individual who had observed my presentation said something to me that I will not forget. She stated that she was able to sense that this was more than just a research project for me, that through my words and my manner in sharing the results that it was clear that I was genuinely interested in truly promoting the health of the children; that I cared about the impact of this project on the children's health more than the actual results of the project. The fact that she observed the presentation and took the time to speak with me about this was one of the most rewarding aspects of my Ph.D. journey. So although I was still considered a guest in the community, a researcher and an outsider being invited in, I was viewed as an ally, as someone who cares not only about the outcomes of the research, but also the future health of their children. To me, this is what community-university partnerships should develop into, into lasting collaborative and respectful relationships.

As a non-Aboriginal person doing work within the realm of Aboriginal health research I have done a lot of reflection on what my place is in this area of work. It is important for me to realize that the lens I wear and the experiences I have had in my life that inform my perspectives

and viewpoints are unique to me and are very different from those held by the community members I have collaborated with. Continually being aware that these differences exist has laid the foundation for developing respectful relationships with community members and has encouraged learning and teaching to happen in both directions. I have been open and engaged when learning about the perspectives of the community and have integrated much of this learning into this research project. I have also been very cognizant that the community has invited me in to their community and I view this as a privilege that should be honored with reciprocal respect. I believe there is a place for non-Aboriginal researchers to engage in Aboriginal health research when community members invite them into their community and as long as non-Aboriginal researchers act in ways to promote the emergence of new and local Indigenous knowledge. I have integrated input from community members, children and youth throughout all elements of this research project and I feel that I have worked hard to ensure that everything I have control over has led to the nurturing of the emergence of new Métis knowledge related to health promotion in the community of Île-à-la-Crosse.

2.2.2 Ethical considerations in conducting research in collaboration with Aboriginal communities

Historically, research involving Indigenous Peoples has commonly been conducted in ways that have not always respected, included or empowered the research participants themselves (Smith 1999; Ermine, Sinclair et al. 2005; Wilson 2008). In fact, there are instances where the research being conducted was not even asked for by the Indigenous communities and has not always benefited these same communities. Over the past several years there has been a shift in the way in which research is being conducted such that Aboriginal communities are brought on as equal partners in the research process and the research being conducted is more

visible and beneficial to the communities (Wilson 2008). Ethical guidelines recommend a continued involvement of community members in research practices and protocols, throughout every stage of the research process (Schnarch 2004; Canadian Institutes of Health Research 2007; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). The intent of these ethics guidelines is to ensure that Aboriginal values, ideology and traditions are integrated into all stages of research in order to impact not just physical health but also spiritual, cultural, community and environmental wellbeing (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). Supporting and respecting Aboriginal ways of knowing through ethical research will foster growth, balance, self-determination, relationships and reciprocity, all of which will positively impact overall health outcomes (Canadian Institutes of Health Research 2007; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). Not only will doing research in this way ensure that the unique cultural knowledge and knowledge systems that are inherent within Aboriginal populations are brought to the forefront of the research process, but also those of us who do not possess Aboriginal ways of knowing will have much to learn from and integrate into our own personal growth. At the same time applying these important ethical guidelines will ensure that we are engaged in research processes that will not do harm but rather benefit Aboriginal people.

Elements of the guidelines are based on the theme of respect and the development of respectful relationships based on collaborations and engagement between Aboriginal communities with the academic research world (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). It is

recommended that community engagement in Aboriginal health research initiatives be a requirement of the research process. Furthermore, the extent to which communities are engaged in the research process should be agreed upon jointly between the researcher and partner community (Canadian Institutes of Health Research 2007; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). Community leaders are also recommended to be part of the research process in order for communities to also have input into the **O**wnership of, **C**ontrol of, **A**ccess to and **P**ossession of (OCAP) research processes and outcomes that directly affect participants in the research community. OCAP is further discussed in the next section of this methodology chapter. Often the development of a research agreement or memorandum of understanding enhances this component of engaging community members in ethical and responsible research and has been recommended prior to recruiting participants for the research project (Canadian Institutes of Health Research 2007; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). Providing communities with the opportunity to engage in a collaborative and participatory approach during the community engagement phase of the project is a further ethics recommendation. Such research processes and methods provide a means of developing mutually respectful and productive relations (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). Considering many, if not all, of these ethical elements in this research project has led to the outcomes being mutually beneficial for both the academic research team members and for the community partner. Community needs and priorities were incorporated and local research assistants were hired and trained in research skills, thereby supporting another ethical consideration labeled as community capacity building. The academic research team

members also benefited from the research process through learning Métis ways of knowing and in the completion of this Ph.D. project and dissertation. This topic of reciprocity is further addressed in Chapter 4 of this dissertation.

2.2.3 Participatory Action Research (PAR) Approach supports Community Involvement and Ownership

PAR methodology applied to community-based research is a culturally relevant and empowering means of incorporating Aboriginal Peoples worldviews and expertise. It is a methodology that allows enough flexibility to incorporate the principles of OCAP into all phases of the research process. PAR challenges mainstream Western methodologies and critiques the impact of colonization and marginalization that is still occurring today (Brant Castellano 1993; Macaulay, Commanda et al. 1999; Dickson 2000; Ermine, Sinclair et al. 2005) at the same time that it supports and values local participation and the capturing of local ways of knowing. PAR nurtures an environment where Aboriginal populations actively play a role in the research process. This framework stresses policies that promote improved access, ownership, and identification of needs throughout the planning, designing, analysis, interpretation and dissemination phases of the research process. In applying PAR methods, academics can more readily participate in research that is more meaningful to, inclusive of, and culturally appropriate for Aboriginal communities.

Ownership, control, access and possession, also known as the OCAP principles, have been described as the application of self-determination to research among First Nations groups (Schnarch 2004). OCAP has been one of the cornerstones and building blocks for the ethical guidelines that have been developed by CIHR and that have informed the Tri-Council Policy Statement for Ethics on Ethical Conduct for Research Involving Humans 2010 (Canadian

Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010), discussed in section (2), above. OCAP was created in response to political and colonial approaches to research and information management that has not always benefited Aboriginal peoples. In a broad sense, OCAP is concerned with the full spectrum of information, from the creation of knowledge and information to the management and dissemination of it (Schnarch 2004). OCAP originated in 1998 and although it originates from a First Nations context, many of the insights are also applicable to other groups including Métis populations.

Ownership refers to the connection that a community has to its own cultural knowledge, data and information. A community owns any information about them and their members collectively and has the right to make decisions about how this information is used, shared or stored (Schnarch 2004). The principle of control asserts that Aboriginal communities should have the opportunity to control all aspects of research and information management processes which will impact them and their community members. All Aboriginal communities are required to have easy access to all information about their community and its members and have the right to manage and make decisions about this information (Schnarch 2004). Finally, possession is the principle that suggests that Aboriginal communities should have the option to literally possess or have stewardship over all of the data or information about their community and its members. Possession differs from ownership in the sense that it is not merely the relationship between communities and their data but rather a mechanism by which ownership can be implemented. In order to address all of these principles of OCAP, these issues were discussed in detail with the community research team members and a Memorandum of Understanding was established in collaboration with the community group (outlined further in Chapter 3 of this dissertation). The secure storage of data was shared between the community and the university during the life of

the research project and it was agreed upon by the academic and community research groups that long-term storage of the data would remain at the University of Saskatchewan, with the agreement that if the community requests this information and is interested in storing this information, then that can be arranged. It was made explicit that the community owns all of the data and that only individuals from the community and the university will have access to the data. Finally, the principle of control was integrated throughout all phases of the research project as PAR methods supported the input of community feedback throughout every stage. Community members actively involved with the project had opportunities to be able to share their knowledge, expertise and advice as the project moved from one action cycle to the next.

2.2.4 Integrating PAR into this project

PAR has previously been defined as "… a collaborative approach to research that equitably involves all partners in the research process and recognizes the unique strengths that each brings." (Minkler and Wallerstein 2003). As well, PAR is centred around bringing knowledge and action together for the benefit and improvement of a community's health, thereby eliminating health disparities (Minkler and Wallerstein 2003). In this way of approaching research, there is an attempt to negotiate a balance between the researcher and the community. PAR moves away from the traditional paradigm of arriving in a community, collecting the required information with minimal contact among community members. In PAR, the individuals who are the 'subjects' of the research give more than just their informed consent; they actually share their knowledge and expertise in order to generate relevant questions they are also interested in. Community engagement is the basis for PAR where the participation of community members and organizations in the research process is critical to the success of the project. This form of research, that emphasizes community engagement and participation, has

been increasingly accepted in research projects involving Aboriginal communities (Smylie, Kaplan-Myrth et al. 2004).

PAR encourages the following three key attributes: shared ownership, community-based input, and community action (Kemmis and McTaggart 2000), all elements respectful of the principles of OCAP. In this project, "research team" refers to both the academic team members and the community team members who came together to form one research group. There are times when 'academic research team members' and 'community research team members' are specifically referred to in order to ensure clarity and respect of the different areas of expertise and skills that were being drawn from. One of the main goals of PAR is to encourage researchers and participants to agree on a common goal and make change thoughtfully after critical reflection of current behaviours, knowledge, skills and values of community members. Although PAR has not been previously outlined in a prescribed sequence of steps, the process of PAR will generally involved a spiral of reflective cycles of: planning, acting, observing and reflecting (Figure 2) (Stringer and Genat 2004). This cycle leads to the next cycle of planning, acting, observing and reflecting, and so-on, until the research team has developed and implemented programming that best meets the needs of the community. Critical, thoughtful action is a major attribute of PAR where information is collected and new knowledge is developed and applied through action (Kemmis and McTaggart 2000; Stringer and Genat 2004). The action portion of this research methodology seeks local understandings that will be specifically relevant to the participant community. Throughout the cycles of reflection and action, it is hypothesized that it will be possible for the community of Île-à-la-Crosse to identify the specific social, cultural and environmental factors that are unique to their community and that have an impact on the health of the community members; thereby working towards effective solutions that may have a

positive impact on the practices, behaviours, knowledge, attitudes and beliefs of physical activity and nutrition within the Métis youth population.

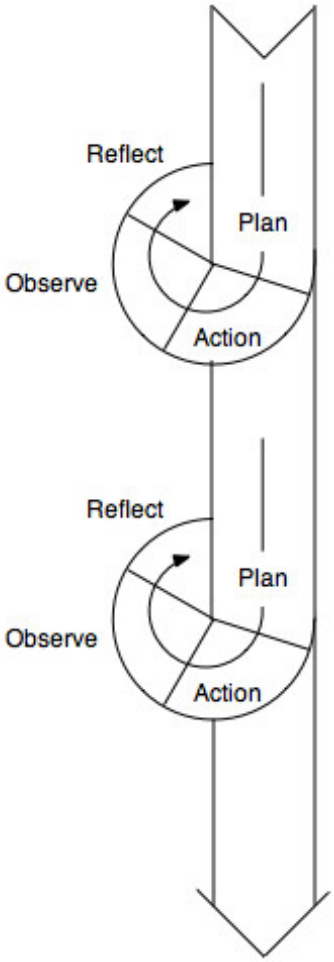

Figure 2. Action Spiral (adapted from Kemmis and McTaggart (Kemmis 1982))

In this research project, the initial meetings that allowed the academic and community research team members to establish a 'common goal' of promoting physical activity and healthy eating behaviours among Métis children commenced the series of action cycles that make up this project. Each action cycle consisted of a specific and unique research question followed by the appropriate data collection methods and observations, results analysis and interpretation,

subsequently followed by a revised plan that led to the next action cycle. A total of 8 action cycles were completed in order to address the general research objectives of this project.

An overview of each action cycle is briefly outlined below in order to bring clarity and understanding of the flow of the action cycles that make up this research project (see Figure 3). More specific details of the action cycles and their outcomes are discussed in each of the 4 research papers that make up this dissertation, however the purpose of this section is to outline the organization of the various action cycles to establish a clearer picture of how each action cycle has built on one another. As described in the 'Thesis Structure' section, above, the action cycles have been compiled into common threads that inform each of the 4 papers.

Action cycle A, "community engagement", ensured the start of the development of a respectful research relationship with community members of Île-à-la-Crosse (Figure 3). This phase of the project nurtured rapport building, the identification of a research team (consisting of community and academic team members), clarification of research team roles and the development of a Memorandum of Understanding. The research team consisted of core team members including myself and an elder from the community; as well, there were a group of peripheral team members which included my Ph.D. supervisors, the mayor of the community and several other community stakeholders. The processes involved applying ethics from the community perspective and from the university perspective to lay the foundation for culturally relevant and respectful research processes. Action cycle B, "environmental scan", allowed both the academic and community research team members to observe the current physical activity and nutrition practices and programs that existed in the community (Figure 3). Community-specific factors that influenced physical activity and nutrition knowledge, attitudes and beliefs were identified in order to further inform the development of a community-specific school-based

health promotion intervention. Aspects of action cycles A and B are further outlined and discussed in Chapter 3.

Action cycle C, "Intervention Planning and Design", built on the factors identified in action cycle B and integrated them into the collaborative design of a comprehensive school health intervention addressing the physical activity and nutrition knowledge, attitudes, beliefs and behaviours of Grade 3-4 students (Figure 3). The integration of the information obtained in action cycle B was integral to ensuring that community-specific needs and desires were integrated into various components of the health promoting intervention. Action cycle D, the "pilot of curriculum" phase, was initially designed to pilot the various measurement tools and components of the health promoting lessons with a small group of children attending the elementary school in Île-à-la-Crosse (Figure 3). Piloting of the health promoting lessons did not occur, however, due to various conflicts with time lines and schedules that arose amongst community members, all of which were independent of the research program. More specific details regarding the intervention planning and design aspects of action cycle C are discussed in Chapter 4.

Action cycle E, "summer intervention", was created in response to discussions with community members that took place in the environmental scan phase of the project (action cycle B; see Figure 3). Community input led to the request to have health promotion programming provided to young children in the community during the summer months. The development of a 'traveling playground' along with plans to support a community garden initiative was undertaken. Elements of the summer intervention are outlined in Chapter 6.

Action cycle F, the "school intervention", was implemented after integrating findings from action cycles C and D (intervention planning and designing; and pilot testing of

measurement tools; see Figure 3). Ultimately baseline measurements were established followed by the implementation of the health promotion lessons within the Grade 3-4 classroom. Follow-up measurements were taken at the end of the implementation phase. Further details and outcomes are described in Chapter 5.

Finally, action cycles G (results analysis, interpretation and analysis) and H (final community report) were conducted to analyze, interpret, share and highlight the outcomes of the project (Figure 3). In keeping with ethical considerations, action cycle H ensured that all results from the project were shared with key community stakeholder groups. Elements of the results analysis, interpretation and analysis are discussed in Chapter 5 and 6. Action cycle H outcomes are discussed in the final chapter on knowledge translation, Chapter 7.

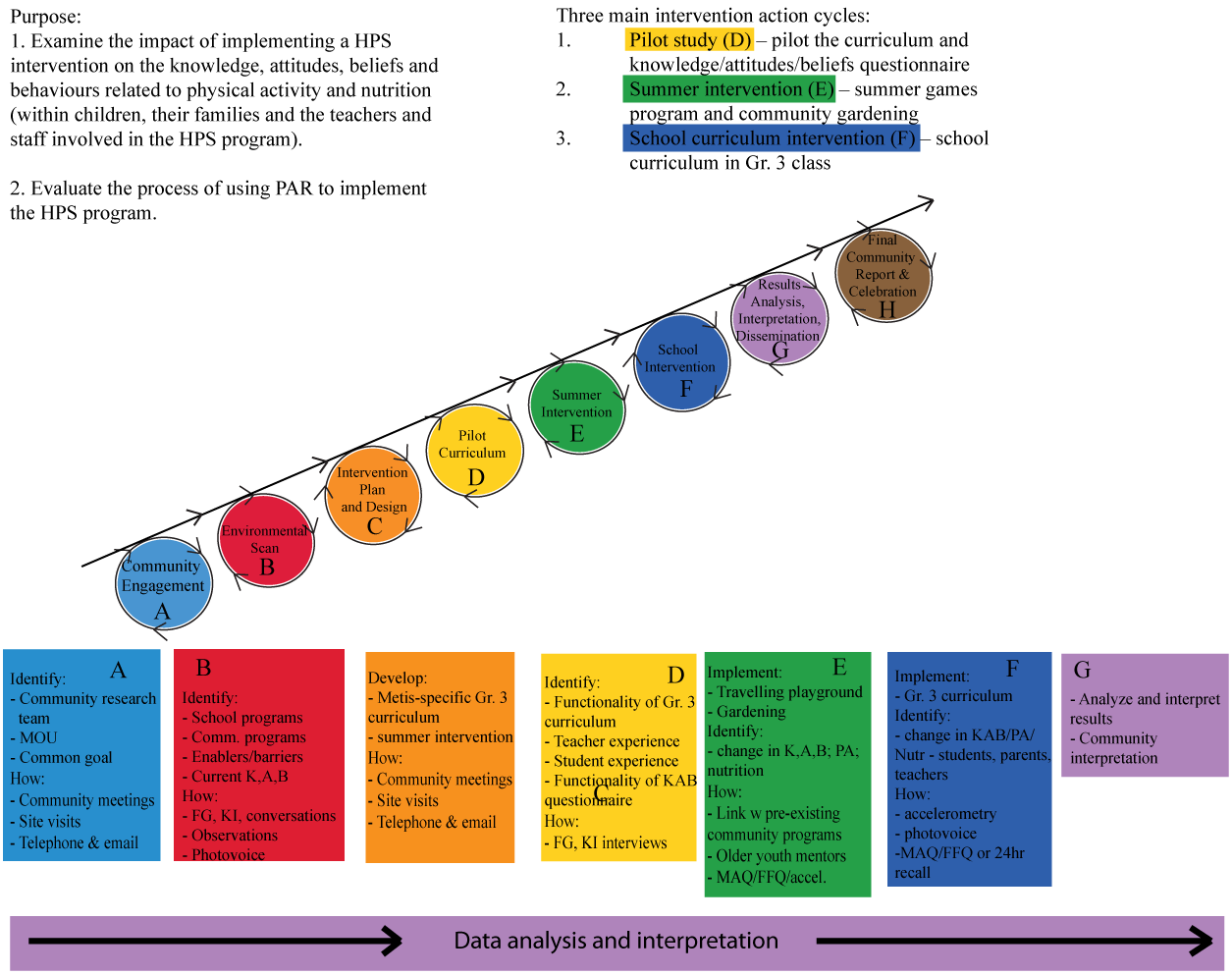

Figure 3.Overview of Participatory Action Cycles

2.2.5 Aboriginal epistemology & Indigenous methodologies

Epistemology has been defined as the theory and understanding of knowledge (Dictionary.com 2011; Oxford Dictionaries 2011); within research, Kovach describes Indigenous epistemology as a "system of knowledge that references within it the social relations of knowledge production" (Kovach 2010). In an Indigenous context, the Indigenous epistemology and worldview has been greatly influenced by the historical tone of colonization, power-relationships and the hierarchical structure of a patriarchal settler society (Wilson 2008). At the

same time, however, inner strength and the quest for knowledge through an inward, introspective manner and the examination of the "self-in-relation" aspect that has been described as being inherent in Indigenous knowledges is also part of an Indigenous epistemology (Kovach 2010).

Indigenous scholars such as Shawn Wilson discuss that research methodology needs to incorporate Indigenous "cosmology, worldview, epistemology and ethical beliefs" (Wilson 2008). Input from Indigenous peoples and communities must be a requirement throughout all stages of research (Wilson 2008; Kovach 2010; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). Due to the social action component of PAR it has been widely used by Indigenous researchers as it acts as a complementary framework supporting and accepting the unique nature of Indigenous ways of knowing (Wilson 2008). Given that I, personally, am not Aboriginal and do not inherently have Indigenous knowledge, it is critical, therefore to ensure that community perspectives are integrated into any research project that I am involved in. This will, in turn, open the avenue to seeking knowledge to inform research processes that encompasses and nurtures Indigenous ways of knowing and doing into the research process.

Throughout the life of the project and my Ph.D. journey, it became clearer to me that I needed to either modify the methods I was using or include alternative data collection methods to obtain information in order to further capture Métis ways of knowing. I had to reflect strongly on identifying ways that would encourage my own epistemology, ways of knowing, and my own biases to be side-lined in order to support the emergence of local Métis knowledge. One way that I attempted to do this was by incorporating a photovoice component to this project, a data collection method that gives research participants the means to capture their own perspectives and be actively engaged in the research process. This method is further discussed in Chapter 5 of

this dissertation. The main point about this is that using a PAR framework allowed our research teams to be open to adapting data collection methods that were more inclusive, engaging and empowering to the research participants. At the same time, PAR also allowed for open dialogue to occur between myself and the community research team members which increased my learning and understanding of Métis values, ideology, and unique knowledge all of which inform their worldview and epistemology. Engaging in dialogue like this and acquiring this form of knowledge has dramatically influenced my viewpoints and my personal identity and has encouraged me to observe the research process in a more holistic and relational way. This shifting that has taken place in my own epistemology and worldview that has culminated in the integration of a Western perspective and research paradigm with elements of Métis perspectives is perhaps a living example of the importance of how two worldviews can come together in a collaborative way to inform research and positively influence health outcomes. In my opinion, this is an example of the 'ethical space' that Willie Ermine describes where Western and Indigenous worldviews come together and the 'best of both worlds' are shared with one another. This has been described by a Mi'kmaq Elder (Albert Marshall) as a "two-eyed" way of seeing which can bring diverse knowledge systems and research practices together, to build strength from one another (Cape Breton University 2004)

CHAPTER 3

COMMUNITY ENGAGEMENT: BUILDING RAPPORT AND UNDERSTANDING OF PHYSICAL ACTIVITY AND NUTRITION PRACTICES IN A RURAL MÉTIS COMMUNITY

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3.1 Introduction

Health promotion initiatives are becoming a focus of Aboriginal communities and Aboriginal health researchers as the rates of chronic conditions such as obesity and diabetes remain disproportionately higher among Aboriginal populations compared with the general Canadian population (Macaulay, Commanda et al. 1999; Potvin, Cargo et al. 2003; Young 2003). These disparities in rates of obesity and diabetes are occurring at a time when levels of physical activity are declining, sedentary levels are increasing and healthy nutrition practices are challenged (Willows 2005; Downs, Arnold et al. 2009; Tremblay, Shields et al. 2010; Colley, Garriguet et al. 2011; Egeland, Williamson-Bathory et al. 2011; Tremblay, Leblanc et al. 2011). Researchers believe that addressing factors that influence healthy lifestyle choices and behaviours related to physical activity and healthy eating, in collaboration with Aboriginal communities, can lead to more positive health outcomes. It is imperative that Aboriginal community-based health promoting interventions be designed in ways that integrate the unique aspects of Aboriginal culture, experiences, knowledge and practices as a means to address the unique health challenges these populations face. Actively engaging community members in the research process can accomplish this. Applying principles of participatory action research (PAR), including community engagement practices, can allow for integration of these unique Aboriginal contexts in ways that may lead to increased sustainability of health promoting programs. The purpose of this paper is to describe how principles of PAR and community engagement were used to collaborate with a northern Saskatchewan Métis community in order to

determine a common research question and commence dialogue around creating a physical activity and nutrition health promotion intervention.

The Métis are one of three unique Aboriginal groups living in Canada. Availability of health data sets and health promotion initiatives that are specific to Métis populations in Canada are limited and further collaborative research is required in order to address these gaps. Recent regional data was obtained from a diabetes-risk screening project involving Métis communities in Alberta (Oster and Toth 2009). It was observed that 33.2% and 49.3% of Métis individuals participating in this study were overweight or obese respectively (Oster and Toth 2009). Furthermore, approximately 32% of these Métis individuals were found to experience pre-diabetes (Oster and Toth 2009). The Aboriginal Peoples Survey indicated that 5.5% of the Métis self-reported having been diagnosed with diabetes (Bruce, Kliewer et al. 2003; Statistics Canada 2003).

Researchers and health care professionals have extensively speculated as to why some First Nations and Métis people experience obesity at disproportionately higher rates than the general population. Health inequities that exist among Aboriginal peoples, including higher rates of obesity, have been attributed, in part, to various social determinants of health (Smylie 2008; King, Smith et al. 2009; Loppie Reading and Wien 2009). Although this particular project does not address the various social determinants of health which are present at many different levels (historical, political, community infrastructure, resources, health behaviours, physical environments) (Loppie Reading and Wien 2009), they do set the stage for understanding why health inequities currently exist. We need to acknowledge that these various determinants are at play in order to engage respectfully and with relevance with Aboriginal communities. Awareness of the role of such social determinants of health further provides strong rationale for why it is

imperative that PAR and community engagement methods be applied to ensure the input of Aboriginal people, from their perspectives and experiences, and in order to create sustainable health promotion programming that is relevant to the community.

'Community' refers to the individuals who live, work and play in a specific environment or area (Jones and Wells 2007). Community-based research takes place within the specific environment or area that community members reside in and therefore these individuals can play an important role in sharing unique community-specific knowledge (Wells and Jones 2009). PAR methods advocate for community engagement to ensure that mutual engagement and progress is made in benefiting the community at the same time that knowledge and science are advanced (Wells and Jones 2009). Community engagement has been defined as "the process of working collaboratively with and through groups of people… to address issues affecting the well-being of those people" (Centres for Disease Control and Prevention 1997). Individuals living in Aboriginal communities experience unique challenges to participating in regular physical activity and healthy eating practices and their input and perspectives must be integrated into the research process in order to apply community-specific solutions to these challenges. Promotion of physical activity and healthy eating can take place at numerous levels within the community, thus framing the design of health promoting intervention programming within the socio-ecological model may also be useful. Applying many of these methods and principles to community-based health promotion research may further increase the chances of building stronger community capacity and sustainable programming within these communities. Momentum is building for health researchers to develop health promotion interventions that focus on wellness and that build Aboriginal community capacity and ownership of programming (Macaulay, Commanda et al. 1999; Potvin, Cargo et al. 2003; Saksvig, Gittelsohn et al. 2005;

Willows 2005; Naylor, Scott et al. 2010). It is believed that this, in turn, will empower Aboriginal communities to have more control over the decisions being made about physical activity and nutrition research programs in their communities, thereby playing a significant role in the future health outcomes of their people.

Applying PAR methods when collaborating with Aboriginal communities ensures a mutually respectful approach that develops and nurtures relationships built on trust and respect. Principles, protocols and ethical guidelines have been established specifically for research being conducted with Aboriginal communities where there is continued involvement of community members at all levels of the research being conducted (Schnarch 2004; Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). PAR supports the integration of community cultural values and norms as well, it nurtures a culture of balance, respect, empowerment, flexibility and reciprocity, all of which are more likely to lead to the development of successful and sustainable research interventions (Macaulay, Paradis et al. 1997; Davis, Going et al. 1999; Potvin, Cargo et al. 2003; Naylor, Scott et al. 2010).

The purpose of this study was to build rapport and a respectful research relationship with the northern Saskatchewan Métis community of Île-à-la-Crosse in order to collaboratively identify various physical activity and nutrition elements to be integrated into a comprehensive school health-based intervention. This paper highlights the activities and processes that were undertaken to identify current facilitators, barriers and community priorities for Métis children engaging in physical activity and healthy eating practices. In turn, the data collected here will be used to inform the design of a health promotion school-based intervention. This project applied Aboriginal-specific ethical principles as outlined in the Tri-Council Policy Statement 2010

(Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010) and the socio-ecological model was used as the primary framework.

3.2 The Socio-Ecological Framework

A socio-ecological model was utilized as the primary framework to inform this research project. The term 'ecology' is a biological term that refers to the relationships and interactions between organisms and their environment (Glanz, Rimer et al. 2008). Socio-ecological models help researchers understand how people interact with their environments and take into account the influence that socioeconomic factors and other social and cultural influences have on individual behaviours and health outcomes (Marmot 2005; Commission on the Social Determinants of Health 2008; Richard, Gauvin et al. 2011). Such models recognize that different communities and cultural groups will have unique and diverse environmental influences on health behaviours (Susser and Susser 1996; Krieger 2001; Richard, Gauvin et al. 2011). Utilizing a socio-ecological model may have limitations in capturing the complexities associated with individual interactions with environments (Nelson, Abbott et al. 2010), however such models ensure a more holistic approach to gathering information particularly since this study focused on gathering information on the facilitators, barriers and priorities that community members perceived to influence children's participation in physical activity and healthy eating.

Applying a more 'holistic' socio-ecological approach to research and data collection also complements and respects Indigenous ways of knowing, teaching and learning (Battiste 2000; Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). Indigenous approaches to health are grounded in the core beliefs that there are relationships between individuals, communities and the environment (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010), all of which are acknowledged within a socio-ecological

model. Furthermore, the socio-ecological model lays the foundation for focusing community engagement efforts at multiple levels in order to collaborate with individuals, social networks and support systems, schools, and the community-at-large (Centres for Disease Control and Prevention 1997; Dozier 2010). Analyzing the data within the context of the socio-ecological perspective will therefore attempt to integrate the influences of local, Métis experiences, culture and value into the project results, and further negotiate a balance between community and academic interests.

3.3 Methods

3.3.1 Partnering with a Métis Community: Ethical Principles, Protocols and Processes

Community engagement is one of the main principles outlined in the ethical principles of the Tri-Council Policy Statement 2 (TCPS 2) on "Ethical Conduct for Research Involving Humans: Research Involving the First Nations, Métis and Inuit Peoples of Canada" (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). Applying this principle to action can often take tremendous amounts of time to build trust, rapport and collaborative understanding. However, in this research project I was fortunate to have one of my supervisors lay the foundation for the commencement of building a trusting relationship. The research relationship was borne from a pre-existing research relationship that JS had with the community. JS had previously been brought into the community through a relationship that had been established by another researcher, MC, who is well-respected by Île-à-la-Crosse community. JS is a Métis person who subsequently had both clinical and community-based participatory research experiences in the community of Île-à-la-Crosse. A respectful research relationship had already been built and passed forward because of the history that had been established by JS and MC. Building on pre-existing relationships ensured the creation of a 'safe' environment for me, a newcomer and outsider to the community, to be able to

ask these elders and other community stakeholders specific questions about the protocols and procedures specific to the community of Île-à-la-Crosse.

Respect for governing authorities in the community, another ethical principle outlined in the TCPS-2 (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010), was practiced in this project. Initially, a phone discussion occurred with two elders in the community who were very involved in promoting health and well-being and who were highly respected in the community. At this time, verbal agreement was made to move forward with a school-based health promoting intervention to address health concerns in the community, including obesity and diabetes. Subsequent to this a community research team was established which consisted of the two elders involved with the initiation of the project, the mayor, and the principal of the local high school. The research team, which included community members and myself, met to discuss in more detail the topic of a school-based health promoting intervention and to clarify mutual expectations. The presence of elders on the community research team was critical to this project as they were able to share the relevant Métis customs and codes of research practice along with their experiential knowledge that ensured the success of this project. As well, input from the community members of the research team ensured the research topic was relevant to their community, another ethical principle and requirement when working collaboratively with Métis communities (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). The need to address and work towards preventing the health challenge of diabetes was the community's initial and primary focus and further agreement to address overweight and obesity in the children living in the community by promoting healthy eating and physical activity was established.

Community engagement also involved formalizing the research partnership between the University of Saskatchewan and Île-à-la-Crosse in a memorandum of understanding (MOU) (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010)(Appendix I). This occurred after the first few initial rapport-building visits to the community. A draft MOU was developed from other pre-existing research agreements that had been respectfully and successfully used within the community by JS and MC. This, in turn, further enhanced the integration of community-specific customs and codes of practice into this project (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). A final MOU was developed jointly between my supervisors, the community research team and me. It outlined the collaborative nature of the project and identified the extent of community engagement through clarification of research roles and responsibilities. The development of this document, in conjunction with the community research team, enhanced relationship-building and established research roles and responsibilities, and details on data ownership primarily by creating a safe ethical space for discussing these sensitive issues. Sitting down as a group and discussing community concerns about such issues as data ownership helped to inform the MOU, but more than that, it allowed the community to share their perspectives with me, and allowed me to really listen to why these issues were important for community members. More specifically, the MOU highlighted the purpose and importance of maintaining respect to the culture, language, knowledge, values and laws of the Île-à-la-Crosse community. The memorandum was designed as a tool to support the community-university partnership and the success of the project by outlining various roles and responsibilities of the community and academic research team members. The MOU made it explicit that the community was to remain as full partners in all

aspects of the research process to ensure that local concerns and recommendations were understood and addressed at each stage of the research project. The MOU identified the objectives and goals of the research project and acknowledged the ethical principles by which the agreement was guided. Finally, the memorandum further documented that there would be shared ownership of the data between the University of Saskatchewan and the community of Île-à-la-Crosse to ensure that the data would not be used for any purpose other than this specific project without consent from the community research team members.

It is recommended that research capacity should be strengthened when partnering with Métis communities (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010). This was accomplished in our project by hiring a community research coordinator to provide a local liaison and consultant to the academic research team, to ensure that community desires and opinions were highlighted and to assist with project organization. This included participant recruitment, data collection, administrative duties, organization of community meetings, and ensuring appropriate language of the consent forms and interview questions. This individual was chosen and recommended by the community research team members.

3.3.2 Consent

Approval for the community's participation in this project was initially established from the local governance (the town council) and the community research team prior to obtaining individual participant consent. The community research coordinator facilitated the process of obtaining individual participant consent and all details of consent were approved in collaboration with the community research team members, ensuring appropriate language and content. In order for children to participate in the project, parental consent was mandatory, along with assent of

the participating children (Appendix XVI). Consent was also obtained from the University of Saskatchewan Research Ethics Board in Behavioral Science Research.

3.3.3 The Community

The community of Île-à-la-Crosse is the second oldest community in Saskatchewan. It is located 520 km northwest of Saskatoon and is situated on the west side of the Île-à-la-Crosse Lake, on the southern peninsula. The closest larger centres are Meadow Lake (151 km) and Prince Albert (285 km) and many of the residents of Île-à-la-Crosse travel to these centres for grocery shopping, medical appointments, and to do business.

The community was first established in 1776 as an outpost for fur traders, and as French Canadian, English and Scottish traders established themselves in this region, they developed intimate and long-lasting relationships with local First Nations women, thereby creating the Métis population and community in the region (MacDougall 2006). The non-Aboriginal and Aboriginal lineages of the Métis people created a unique Métis socio-cultural identity in the community of Île-à-la-Crosse (MacDougall 2006). Currently the majority of the residents in Île-à-la-Crosse are Métis and these individuals have a deep-rooted history and connection to their land (MacDougall 2006). Historically, Métis individuals living in Île-à-la-Crosse participated in active living where they hunted, fished and gathered berries from the surrounding land and also planted vast vegetable gardens to supplement their food requirements (Favel, Campbell et al. 2011).

In 2006, the population of Île-à-la-Crosse was 1, 341 people, an increase of 5.8% from 2001 (Statistics Canada 2008). Of this total, 1,240 individuals identified themselves as Aboriginal, and of this 1, 240 people, 1, 095 identified themselves as Métis (Statistics Canada 2008). Île-à-la-Crosse is considered to be a 'young' community since 43% of this population are 19 years or younger and 50% are 25 years or younger. The majority of homes were built prior to

1986 (63%) and in 2001, 52% of the private dwellings were rented by residents in the community. The median income of persons over the age of 15 years, in 2005, was $21, 010 and the median household income was $42, 073. The unemployment rate was reported to be 12% and approximately 36% of individuals between the ages of 25 and 34 had attained a high school diploma (Statistics Canada 2008). The main industries in the community included agriculture and other resource-based industries such as logging, fishing and mining, and a large proportion of the population worked in the health, social and education services areas (Statistics Canada 2008).

3.3.4 Community Building Process

Initial community engagement took place through several face-to-face meetings with the community research team members, where an overview of the goals and expectations of a school-based health promotion program was established. The community research team members invited me to present this overview and proposal at a town council meeting which allowed me to connect with other community members involved in the governance of the community. Our research team agreed that it would be helpful to hire a research assistant from the community in order to establish joint leadership between the community research team members and the academic team members (Jones and Wells 2007). As well, one of the elders on the research team made it clear that she could be contacted at any time to address any larger or more in-depth cultural issues. This was very important as it was helpful to have multiple community co-leaders working with me to advise this project (Jones and Wells 2007). At this time, the two community co-leaders met with the elementary school principal who invited teachers to attend an information session, led by me, outlining the goals of this research project. I presented the topic areas and outline of the goals of the research project to the group of teachers who attended and a Grade 3-4 teacher expressed an interest in participating in the project.

Following these initial visits to the community, I was able to establish consistent and regular communication sessions with the interested Grade 3-4 teacher, school principal, and research assistant; these took place primarily by phone and via email messaging, with the occasional face-to-face meeting. These sessions allowed the research team to share their ideas, perspectives and activities to maintain an environment of transparency throughout the research project and plan research activities within the community and school.

3.3.5 Participants

Participant recruitment initially involved discussions with the community research team and the elementary school administration to identify who in the community might be interested in sharing their perspectives on community factors influencing physical activity and healthy eating among children. It was agreed that it would be appropriate to recruit a group of adults to share their perspectives, as well as a group of children to share their opinions. Involvement of children was a priority since the information gathered in this study could influence the future health promoting intervention that would directly impact other children their age.

Adult participants were recruited via convenient sampling of key community stakeholders that were known to be very involved with the children living in the community (such as parents, teachers, health care professionals, elders). The community research coordinator recommended potential participants and verbal and written invitations were sent out to specific individuals inviting them to participate. In order to engage the community-at-large, the community research coordinator recommended advertising the research project on the local television scroll, the radio and through letters sent home with some of the elementary school children. Opportunistic sampling also occurred during the field work to allow for flexibility of inviting unexpected or unanticipated community members to participate in the project (Creswell 2007).

Participating children were recruited from the Grade 3-4 split class. Their homeroom teacher spoke to each student and sent a note home to their parents/guardians explaining that our research team was interested in asking them a few questions about their experiences in their leisure time and with the foods they like to eat. This classroom of children was chosen to participate in focus group discussions primarily because of the interest of the teacher in this project, but also because the elementary school administrators wanted to start this project out small and in only one classroom. Letters of invite were sent home with all students in this class for their parents/caregivers to read and discuss with their child. Children who provided parental consent and their own assent to participate were involved in this phase of the project.

3.3.6 Focus Groups

Qualitative data was collected via two focus groups: one adult focus group (n = 8) and one child focus group (n = 7). Focus groups allow community members to share their thoughts, feelings, experiences and assumptions on the environmental enabling and constraining factors in their own words and according to their personal perspectives (Glanz, Rimer et al. 2008). Generally focus groups are conducted in naturalistic settings in which community members are comfortable and where researchers can gain insights within a safe, socially interactive space (Krueger and Casey 2000). They allow the emergence of unique community-specific ideas, perceptions and complexities that can be discussed further within the group (Allender, Cavill et al. 2009; Grant, MacKay et al. 2010).

I facilitated the adult focus group, with the support from the community research assistant, which lasted approximately 60 minutes. There were eight individuals who participated in the focus group three of whom were non-Aboriginal and five of whom were Métis; four were teachers, two were health care professionals, 1 was a parent and 1 was an elder. The focus group interview was preceded by an introduction that clearly explained the purpose of the project and

consent was obtained (Krueger and Casey 2000). Sixteen main structured questions were developed prior to the focus group discussion and were designed to establish an understanding of the awareness of and perceptions to the successes and barriers to engaging younger children in healthy physical activity and nutrition practices (see Appendix II). As the discussion unfolded it became evident that some questions did not need to be posed as they were already addressed through comments and discussion; other questions were not posed at the time of discussion due to time constraints. Additional and unexpected discussion related to potential community solutions to identified barriers to physical activity and healthy eating among children was generated along with community perspectives on what types of activities they felt should be a priority in a health promotion school-based intervention. The focus group discussion was recorded and transcribed for analysis.

I also facilitated the focus group with children which lasted 30 minutes and consisted of 7 students from the Grade 3-4 split class. This discussion took place during school hours and eight structured questions were designed prior to the focus group (Appendix III). The questions focused on establishing an understanding of what the children's perspectives were on their physical activities and food choices. Not all of the questions were discussed due to time constraints during the school day. The focus group discussion was recorded and transcribed for analysis.

3.3.7 Environmental Scan

Information about the physical environment of the community was collected through direct observations of the social setting, school and community environments (Patton 2001). These community observations were important because it has been suggested that the environments we live in contribute to the choices we make about physical activity and healthy eating, and contribute to the ease or difficulty with which we make these choices (Skinner,

Hanning et al. 2006; Spence, Cutumisu et al. 2009; Swinburn, Sacks et al. 2011). The physical and social environments of a community are determinants of physical activity and healthy eating that must be considered in the larger picture of capturing potential barriers and supports to healthy living. In keeping with the participatory nature of this project, the community research coordinator facilitated a guided tour of the community for me to observe the community layout and identify the various facilities, buildings, neighborhoods and businesses that might influence physical activity and food choices. I recorded all observations as field notes and with photographs. This descriptive and reflective information supplemented the data obtained during focus group discussions and was used to enhance the objectivity of the data being collected, thereby increasing the validity, reliability and rigor of the data (Guba 1981; Lincoln 1985; Creswell 2003).

3.3.8 Qualitative Data Analysis

A content analysis of the transcribed focus group discussions was informed by the socio-ecological model and allowed the identification of relevant themes through iterative readings of the transcriptions (Krueger and Casey 2000). The data was categorized into themes that fit within the socio-ecological model such as at the individual level, family level or school level, for example. Initially, transcripts were read and reviewed while abstracting meaningful data using the computer software, Atlas-ti. Information was broken down into smaller data portions referred to as ‘quotations’ which were further grouped into concepts or ‘codes’. Codes consisted of several inter-related ideas that were contained in the transcripts and were related to physical activity and nutrition practices in the community. These quotations and codes summarized community member perceptions related to successes, supports and barriers to engaging younger children living in the community to make healthy physical activity and nutrition choices. Internal validity was addressed by ensuring that all participants received the transcribed information and

had the opportunity to confirm the accuracy of the transcripts. Every attempt was made to ensure that all participating students, along with their parents and/or caregivers, had the opportunity to review these transcripts. The participating teacher was also involved in reviewing all transcripts to ensure that they reflected the viewpoints of the participating students appropriately.

It is important to point out and clarify that I completed the majority of the analysis with minimal input from the community research team (due to their limited availability). The lens through which the data was analyzed and deconstructed was through an socio-ecological perspective (described above). As a non-Métis individual analyzing this data, it was critical for me to ensure that the most useful and relevant information for the Métis community members was extracted in order to support their perspectives. Given that my professional training is from a Western perspective and my cultural background is different from those individuals living in Île-à-la-Crosse, however, this must be taken under consideration when reviewing the analysis of the data. Every attempt was made to include the community research coordinator but her input was limited due to her restricted availability.

Data obtained from the environmental scan were used to triangulate the data and provide a complementary data source to validate and cross-check the viewpoints and findings of the focus group discussions (Patton 1997). Field notes and photographs were analyzed, coded and categorized in a similar method as the focus group discussions. Results from the focus group discussions and the environmental scan were compared and contrasted to create a summary of themes and findings. Triangulation of the data in this manner allows for enhanced validity and rigor of the data and provides increased trustworthiness of the information collected (Patton 1997).

3.4 Results

The data analysis revealed six main themes related to community perspectives regarding the various enabling and constraining factors for children to engage in physical activity and healthy eating in their community. These themes included (1) current physical activity enablers, (2) food security, (3) access, (4) cost, (5) safety, and (6) knowledge and awareness.

3.4.1 Current Physical Activity Enablers

The current physical activity practices in the community that were identified also highlighted the successes and supports that currently exist in the community (see Table 1 for a summary of physical activity programming in the community). Walking was identified as the main activity community members engaged in. One focus group participant stated: "I usually walk. My sister and I usually walk – in the winter time and the summer time". Another noted, "Yeah and there are a lot of people who do walk. It's amazing. There's a lot of people that walk". One of the participating children stated, "Yesterday I went walking with my Mom and S. came with us and…". Another child spoke about how easy he felt it was to be active: "You can walk and go play with your friends and bike ride…". Both statements made by these children indicate the important role that families and friends play in supporting leisure-time physical activities. Supports for walking that existed in the community included walking groups and an indoor walking track. A community walking group was started during the life of this project and consisted of approximately 60 to 70 participants (primarily adults), and was designed around the television reality show, "The Biggest Loser" competition. The high school was a newly built facility that housed a large gymnasium, a walking track and an exercise room with weights. These facilities were available to all high school students, staff and other community members. There was an outdoor track located on the high school grounds that was paved and where many community members walk or run in the summer months. Community members often walked

along the main road into the community. The Elementary School playground included a newly built 'jungle gym' with slides and swings as well as a basketball court with 2 basketball hoops and a paved basketball court.

The Friendship Centre was integral to overseeing many of the social programs organized in the community. The Friendship Centre organized programming to support young families requesting help in many areas of health and wellness. The Centre also provided "Cultural connections for Aboriginal youth" programming that integrated recreation, leadership, cultural, social and wellness-related opportunities for Aboriginal youth (aged 14-24 years) living in the community. The Recreation Department for the community focused on providing various extra-curricular physical activity and sport opportunities throughout the year for the children and youth living in the community. Organized sport activities such as male and female hockey, soccer, baseball, volleyball and swimming lessons were offered. It was noted, however, that the majority of these opportunities are for children aged 10 years and older.

Other community supports for engaging in physical activity that were observed included a curling rink and a community centre that has a large open space that is used for community gatherings and youth programming. The Île-à-la-Crosse community is situated on the edge of the Île-à-la-Crosse lake and this serves as an excellent location where children and youth often swim and canoe during the summer time and skate, ski and ice-fish in the wintertime. A local family has created cross-country ski trails on their land and other community members can rent skis and use the trails during the winter months.

Children reported riding their bikes, walking, jumping on the trampoline, swimming in the lake (in the summer), playing independently at the school park and playground, or playing in competitive sports leagues as their primary physical activity interests. School sports teams and

community recreational sports teams existed as opportunities for children to play sport and be active, however, it was noted that not all children engaged in these opportunities.

Other cultural activities that occurred in the community, but where more information was not easily obtained, included sweat lodge ceremonies for specific male and female groups. For example, women were invited to women's-only sweat ceremonies where health and wellness topics were incorporated into the learning and discussions. These ceremonies occurred throughout the year and often accompanied other community-organized events such as youth conferences and Michif Festival events.

3.4.2 Food Security

Food security was identified as a concern due to the high cost of foods, the high ratio of pre-packaged and processed foods compared to the lower ratio of fresh produce, and the issue of the quality of the fresh foods brought in by the local grocery store. Food can be purchased at the community grocery store or the local confectionary store and there is a restaurant that serves food from 8 am to 9pm. The price of food in the local community grocery store was notably higher for certain items compared to prices in more urban locations such as Saskatoon (see Table 2). An adult participant noted, "I find it's expensive here – and it's probably hard, I think, for some of the parents to feed their children, like, uh, fruit for instance".

Only one participant, a student from the focus group with children, identified that he regularly went fishing with his family in the summer: "In the summer me and my Dad go fishing in a boat…". This speaks to the topic of food security but could also reflect the role the natural surrounding environment can play in physical activity behaviours of families engaging in more traditional food-procuring activities.

Community supports for healthy eating included cooking programs available to families with a lower socio-economic situation and the availability of the Good Food Box to any

community member interested in acquiring one. (Table 1). A community kitchen program was started in November 2010 with support from the Friendship Centre. The two community schools (elementary and high school) were highlighted as locations that supported healthy eating practices because of their school nutrition policy that allowed only low fat and low sugar snacks and drinks in the vending machines. There was a healthy snack program in place at the Elementary School where mid-morning snacks along with milk were provided to all of the students. Snacks included granola bars, carrots and dip, fruit snacks with either 2% white milk or 1% chocolate milk.

3.4.3 Access

Ease with which to access services, programs, facilities or businesses related to physical activity and healthy eating opportunities was a repeated theme in the focus group discussions. A number of children did not have the same level of access to playgrounds, equipment, or sports teams as other children thereby affecting their choice to be physically active. Discussions identified that children who lived in neighborhoods that were not in close proximity to the schools had limited access to physical activity opportunities. Community members described that although their community was small, it was spread out which prevented easy access to school playgrounds, depending on where in the community children lived. One participant noted: "…a lot of kids don't have a place to play…". Other participants described that although there may be opportunities for children to be active in the community, not all of the children choose to access these opportunities and they felt that this culture needed to change. Another participant noted, "It's those kids who are sitting at home and playing the games and watching tv – those are the kids who we are missing out on".

Transportation issues also affected access to physical activity and healthy food options. For example, families that did not have access to transportation would have had difficulty

accessing community cross-country ski trails. This is very interesting given that these children and families live proximal to the bush and historically would have not needed any formal trails or paved paths to exercise and be physically active. Transportation was also reported as a factor for some families in accessing high quality, affordable food. Affordable healthy food options were reported to be limited at their local grocery store. One focus group participant stated: "…sometimes I go to the store and it [fruit] has been sitting there forever because it's so expensive and nobody is going to buy it…". Participants described that they often drive several hours to a larger community to access healthier and more affordable fresh food options. This, of course, was not a possibility for all families because of lack of transportation, another barrier described by the group.

3.4.4 Cost

Cost of living, cost of fresh food and cost of organized activities were described as potential barriers to eating healthy and being physically active. One participant made this statement: "…the other things is ~ the cost of living here is really, really expensive. It really is. I went to buy one onion and it almost cost me 5 dollars! Five dollars!". A solution that was discussed to address the higher costs of lower quality fresh food was to work on and promote the concept of a community garden. A participant noted, "So we want to start a garden – it will be cheaper. I'm always travelling around going shopping – and I think a community garden is also an excellent idea". Participants discussed the important role gardens once played in their community in the past but currently few gardens are seen in the community. Involving children in the gardening process would enhance their education and knowledge and at the same time work towards improving their food security. Organized sporting opportunities were reported to be too expensive for some families and therefore some children were not able to engage or participate in sport in the community.

3.4.5 Safety

Safety was another theme important to community members. Many community members walked for their activity along the road and highway system. This posed several challenges to the safety of individuals particularly when vehicles did not slow down or in the winter, when walkers were forced into the snowy ditch to move out of the way of vehicles. These were some of the participant comments on safety while walking: "…*sometimes you have to literally, like, get off the road. Walk in deep snow*."; and "…*it's not the safest*". Other safety factors noted were the stray dogs that live in the community and can pose a threat to the safety of individuals walking. As stated by one participant, "*And the dogs… The dogs are a problem*". Wildlife also posed unique challenges to community members attempting to walk on trails in the bush: "*But then in the summer you have to be careful of bears there… bears are after all the berries. I've seen many bears on that trail – so it's not the safest… We thought of that, though, it's such a nice trail…* ".

3.4.6 Knowledge and Awareness

Finally, physical activity and nutrition knowledge and awareness among children and families were themes identified as playing a role in children participating in healthy lifestyles. Knowledge and awareness encompassed the general topics of improving children's, and their families', understanding of why it is important to be active and eat healthy, but also their awareness of what types of programs and activities are available to them in their community. One participant described "…in our community, if we sat down and tallied all the activities happening within schools, within rec., there's a lot for kids to do". Participants felt that building knowledge and awareness among children who were less active and not eating optimally should be a focus of any health promoting intervention. Participating children reported being aware of the many diverse options for them to be active and identified that they felt it was very easy to be

active. The children reported being aware that there were some other children living in the community (friends, peers, relatives not participating in the focus group discussion) who had more difficulty getting out and being active. Interestingly, the group of students who participated in the focus group were very optimistic and could not clearly articulate what types of things would make it easier for other children (who were less active and living in the community) to be more active. However, participating children reported being aware of many opportunities to be active in the community. The students' perceptions were such that they felt it was easier to be active in the summer than the winter because "…it's not as cold". Also, most students related being outside with being active and being inside as being inactive.

Building awareness around the fact that children do not just need to play a competitive sport to be physically active was a message that participants felt was important .One participant reflected that "… there's a lot of competitive opportunities and not so much just [free] play…". Other participants agreed and suggested that play environments for children needed to nurture a culture of inclusion: "…there's lots of those kids that have learned and they've been told enough [by other students/peers] that they can't play, they know it's safer to play video games, so we have to change that culture". Discussion around increasing healthy lifestyle and nutrition awareness among parents was also brought up: "So it's awareness – making pamphlets and making parents aware [of what types of food or recipes are healthy]…".

3.4.7 Participant Solutions to Identified Barriers

Adults participating in the focus group discussion also identified a number of potential solutions to barriers impacting physical activity and healthy eating behaviours. Several individuals noted the importance of acknowledging the role of the physical environment in enabling increased leisure-time physical activity and suggested building more recreational trails and more playgrounds in the community. It was clear, however, that these types of solutions

were longer-term solutions so other short-term solutions were identified. Involving older youth to act as mentors for younger children and run out-of-school non-competetive physical activity programs was one such short-term solution.

"*And have a mentor… to draw them out and build that trust.*"

"*That might not be a bad idea what you're saying – having a mentor teaching different games… that the kids might not really know about. Because we don't have a lot of facilities right now – by the summer we're not going to be able to build playgrounds and safe places that they could go. But if we did have an older youth, maybe, going to certain areas and just starting up games… and get them moving.*"

Other individuals thought that involving children in growing a community garden was a solution to being physically active but also to address the availability and access to fresh produce. "*Yeah, and even doing gardening – you know, I've heard that back 50 years ago, everyone had their gardens…*"

Inviting other health care professionals, such as dieticians or nutritionists, to the school and work directly with families and build nutrition knowledge and awareness was another suggestion. "*It's the same thing, you know… sitting with a nutritionist face-to-face…if they can't even come to us as educators, such as physicians and that, how do you think they'd feel talking to a machine, the technology. That's one of the things that they just say – I don't want to go to TeleHealth – I don't want to talk to a machine… And that's the awareness that has to start.*" Involving the students in sending out information to families to help build nutrition awareness and knowledge was also mentioned: "*So it's awareness – making pamphlets and making parents aware – because when the Friendship Centre has their Good Food Box, they put in a recipe…*

and maybe that's something or one of the things the students could do is look at portion size and what is a healthy snack… and take pamphlets home and put them in the community…".

Table 1.Community programs integrating physical activity and healthy eating that exist in the community of Île-à-la-Crosse in 2010/2011 (NR = not reported)

Program Name	Focus	Participants	Activities/Topics	Time of Year
Community Kitchen	Nutrition	Community-wide	Cooking, nutrition label reading, grocery shopping, food preparation	Fall and winter
Community competitive sports leagues (Recreation Department activities)	Physical activity	Children and youth 10 years and older	Organized sport such as male and female hockey teams, soccer, baseball, swimming lessons	Year round
Cultural Connection for Aboriginal Youth	Physical activity, healthy living	Youth ages 14-24	Recreation, health & wellness, physical activity	Fall and winter
Good Food Box	Nutrition	Community-wide	Healthy eating, fresh produce	Year round
Kids First North	Nutrition and physical activity	Infants and children	Health and wellness for children	NR
Parent Mentor Program	Nutrition	Adults and families	Health and wellness for families	NR
Prenatal Program	Nutrition	Women	Health and wellness during pregnancy	NR
Walking Program	Physical activity	Community-wide	Walking, physical activity, social connections	NR
Weight Loss Program ("The Biggest Loser")	Physical activity & nutrition	Community-wide	Physical activity and nutrition required for weight loss	NR

Table 2. Comparison of various food items in Île-à-la-Crosse, SK versus Saskatoon, SK (January – March 2011)

Food Item	Price in Ile-a-la-Crosse	Price in Saskatoon (Safeway)
4 liters 2% milk	$5.99	$4.49
Bananas (per pound)	$1.38	$0.87
Small naval oranges (per bag)	$7.45	$3.99
Macintosh apples (per pound)	$2.53	$1.99
Fresh (white) onions (per pound)	$2.26	$1.48
Fresh potatoes (10 pound bag)	$9.39	$7.99
Canned creamed corn	$1.99	$1.99
Canned mushrooms	$1.79	$1.97
Canned green beans (French cut)	$1.45	$2.19
Canned whole tomatoes	$2.69	$2.29
Bran Flakes (475 g)	$5.25	$4.19
Quick cooking oats (1kg)	$5.89	$4.68
Bread (white)	$2.45	$1.49
Spaghetti (Catelli 900g)	$2.89	$2.99
Ground beef regular (per kilogram)	$10.89	$6.65
Carrots	$2.79 per kg	$1.49 per bunch
Cabbage (per pound)	$1.27	$0.99
Eggs	$3.15/dozen	$2.19/dozen
Peanut Butter (natural, Kraft)	$7.49	$4.99
Butter	$4.59	$4.78
Cheddar cheese	$8.39	$6.99

3.5 Discussion

The goal of this study was to apply PAR methods in order to collaborate with the Métis community of Île-à-la-Crosse to identify community member perceptions on facilitators and

barriers that influence children's participation in physical activity and healthy eating. In this study, valuable insights into the unique factors that influence children's and families' engagement in physical activity and healthy eating while living in a northern Métis community were identified. Local Métis perspectives were sought in order to inform the development of a health promoting physical activity and nutrition intervention in collaboration with the community. Our findings suggest that the enablers and barriers to participating in physical activity and healthy eating are similar to those identified in other northern First Nations communities (Skinner, Hanning et al. 2006; Bruner 2008; Downs, Arnold et al. 2009). The 'usual' factors noted in other studies were also evident in our study: safety, cost, access and availability, physical environment, and knowledge and awareness were key influential factors affecting physical activity and nutrition choices (Skinner, Hanning et al. 2006; Bruner 2008; Downs, Arnold et al. 2009).

Schools have been previously identified as important locations to promote healthy eating and physical activity behaviours (Veugelers and Schwartz 2010; Joint Consortium for School Health 2011). The schools in Île-à-la-Crosse clearly provided enabling environments that promoted healthy eating and access to physical activity options. The schools also provided both indoor and outdoor opportunities for children to play and be active and the children's perspectives appeared to confirm that they were fully aware of these opportunities for leisure-time physical activity. These findings support the integral role that schools can play in influencing health and wellness of children and confirm that the elementary school in this northern Métis community is well situated to integrate a comprehensive school health intervention.

Several of the comments made in the focus group discussion also highlighted the important role that families and social networks in the community can play in supporting physical activity and health eating choices. Similar to previous documentation (First Nations Centre 2005; Findlay 2011), walking opportunities in the community were identified as a strength since this appears to be a common form of physical activity reported by community members. Suggestions of training an older youth mentor to encourage and influence younger children to engage in more leisure-time physical activity further emphasized the important role that other community members may play in influencing individual healthy lifestyle behaviours. All of these discussion points, taken together, fit well within the social ecological framework thereby supporting the integration of this framework into future health promotion planning in the community(Marmot 2005; Commission on the Social Determinants of Health 2008; Richard, Gauvin et al. 2011).

Food security was a theme that was discussed among participants and one in which other researchers have identified as issues in other northern First Nations communities (Kuhnlein, Receveur et al. 2004; Willows 2005; Downs, Arnold et al. 2009; Egeland, Williamson-Bathory et al. 2011). Community garden development was posed as a possible solution to increasing the availability of high quality more affordable food for families. Similar to other northern communities experiencing a 'nutrition transition', fewer and fewer children have been exposed to the concepts and skills needed for gardening (or other more traditional ways of procuring food) (Kuhnlein, Receveur et al. 2004; Power 2008; Downs, Arnold et al. 2009; Egeland, Williamson-Bathory et al. 2011). The proposed solution of community gardening addresses many aspects of healthy living from being physically active in planting and maintaining the

garden, to procuring healthy, fresh, affordable, locally-grown food, while building an even stronger sense of community among the community gardeners.

Topics raised in the adult focus group discussions revealed different perceptions and outlooks compared with the focus group with the children. For example, many of the adults interviewed felt very strongly that there were several things that needed to change to encourage more children to be physically active, particularly among those children who were already experiencing body weight increases. The children who were interviewed, however, revealed that it seemed easy for them to be physically active and although they indicated knowing peers who were not as physically active as themselves, it was difficult for them to identify why these peers were not engaging in more physical activities. Interestingly, all of the children who had consent and assent to participate in the focus group discussion visually appeared to be in good health and to have a healthy body weight, although no objective measurements were made. Our research team did not have the appropriate amount of time to identify and work with this specific and unique group of children, which has been identified as a limitation of this study. This suggests that future focus group discussions should be organized for those children who are already experiencing overweight, obesity and/or diabetes to obtain their perspectives.

This study clarifies the unique challenges that the Métis community of Île-à-la-Crosse faces in promoting healthy lifestyles among community members and their children. The challenges range from costs of food and food security issues, general knowledge and awareness about the importance of adopting healthy lifestyles at a young age, to access to safe playground structures and physical activity equipment. This information has been collected at a time when researchers are recommending the development of culture-based health promoting interventions in partnership with Aboriginal communities. Developing an intervention focusing on the

community-specific factors that influence physical activity and healthy eating in Île-à-la-Crosse, while building on the identified strengths and enablers in the community, has the potential to positively affect the physical activity and dietary practices of children. This study contributes to the limited data available regarding the factors that influence healthy behaviours in northern Métis communities. Information obtained from this study can be used to develop an effective culture-based physical activity and nutrition health intervention to promote and support healthy lifestyles among Métis children living in Île-à-la-Crosse.

CHAPTER 4

DEVELOPING MÉTIS-SPECIFIC HEALTH PROMOTING SCHOOL LESSONS AND INTERVENTION MEASUREMENT TOOLS USING PARTICIPATORY ACTION RESEARCH METHODS

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4.1 Introduction

Creating environments that promote health and support healthy lifestyle choices among children is critical at a time when it is becoming easier for individuals to gain weight than to lose it (Rutter 2011). The prevalence of obesity and diabetes in children is increasing and it is paramount that researchers focus on developing and designing physical activity and nutrition interventions to address these concerns (Macaulay, Paradis et al. 1997; Story, Stevens et al. 2003; Young 2003). Aboriginal children appear to experience obesity and diabetes disproportionately to the general Canadian child population (Young, Dean et al. 2000; Belanger-Ducharme and Tremblay 2005; Bruner, Chad et al. 2009; Public Health Agency of Canada and Canadian Institute for Health Information 2011). Health promoting interventions must be developed in partnership with local Aboriginal community members and leaders to ensure culturally safe and relevant values, themes and activities are integrated into programming (Macaulay, Paradis et al. 1997; Potvin, Cargo et al. 2003). In this way, the needs of Aboriginal children will more likely be met thereby increasing their chances of optimal health.

Numerous authors indicate the need for the school, family and community to work together to enhance the health of children and to prevent the development of obesity and its secondary complications (Macaulay, Paradis et al. 1997; Story, Evans et al. 1999). Schools have the potential to act as healthy settings that promote both physical activity and healthy eating for numerous children, their families and the greater community (Story, Kaphingst et al. 2008; Pan Canadian Joint Consortium for School Health 2010; Veugelers and Schwartz 2010). Comprehensive school health (CSH) has been defined as a school that supports "…

improvements in students' education outcomes while addressing school health in a planned, integrated and holistic way" (Veugelers and Schwartz 2010; Joint Consortium for School Health 2011).

Over the past several years, a few successful CSH approaches have been integrated throughout Canada that have had a strong influence in schools and on children's health (Naylor, Macdonald et al. 2008; Population Health Intervention Reserach Unit, University of Alberta et al. 2010). Many of these interventions have attempted to be holistic, incorporating local school and community values into the programming. However, although many of these programs have been relevant to general Canadian populations, these programs were not created within the context of Métis culture and therefore may not be an ideal fit within the context of Métis communities (Loppie Reading and Wien 2009; Naylor, Scott et al. 2010). In saying this, however, many of the elements and pillars that are prioritized in the CSH framework parallel aspects of a socio-ecological and an Indigenous school health framework, all of which would allow CSH programs to be adapted in culturally relevant ways (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010).

The Joint Consortium for School Health (JCSH) identifies the following four pillars that are essential to CSH: 1) teaching and learning; 2) social and physical environments; 3) healthy school policy; 4) partnerships and services (Joint Consortium for School Health 2011). Ultimately, these pillars suggest involvement and collaboration with families, community members, community businesses and integration of the overall living, learning and playing environment that children interact with daily into programming. Furthermore, the CSH approach shifts the focus from a deficit, ill-health perspective, to one of health and wellness, another important aspect that resonates with Aboriginal culture and values (Loppie Reading and Wien

2009; Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010). The framework for Indigenous school health further stipulates the integration of unique Indigenous ways of knowing, being and learning into school-based health promotion programming implemented in Aboriginal communities and settings (Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010).

There are increasing numbers of health promoting programs and interventions being designed and implemented throughout several parts of Canada; however there is a paucity of studies such as these in Métis child populations in Canada. The Sandy Lake School Diabetes Prevention Program (Saksvig, Gittelsohn et al. 2005) and the Kahnawake School Diabetes Prevention Program (Macaulay, Paradis et al. 1997) are two examples of First Nations-specific health promotion programs designed to address the growing concerns of obesity and diabetes in these communities. Findings from these studies suggested that the community ownership and capacity building aspects of the program design ensured cultural relevance and enhanced the sustainability of the projects (Macaulay, Paradis et al. 1997; Potvin, Cargo et al. 2003; Saksvig, Gittelsohn et al. 2005). These studies concluded that designing culturally relevant health promoting school-based interventions in collaboration with communities could be an effective way of modifying the risk factors related to developing obesity and diabetes. These studies also identified the importance of building capacity and sustainability in communities in order for them to continue to promote health in their child and youth populations, in culturally relevant ways (Macaulay, Paradis et al. 1997; Potvin, Cargo et al. 2003; Saksvig, Gittelsohn et al. 2005). The Action Schools! BC program is a whole-school framework designed to influence physical inactivity and unhealthy dietary behaviours among children during the school day (Naylor, Macdonald et al. 2006). It was initially designed for use within the general Canadian child

population but it was also evaluated in a First Nations context in several remote communities in British Columbia (Naylor, Scott et al. 2010). Recommendations from this study highlighted the importance of engaging community in planning and implementation, and of culturally adapting programming to integrate Aboriginal traditions and perspectives (Naylor, Scott et al. 2010).

In Saskatchewan, there have been no school- or community-specific physical activity and nutrition interventions designed in collaboration with Métis communities. The purpose of this paper is to highlight the process that was undertaken to: (1) create and design Métis-specific physical activity and healthy eating CSH programming focusing on Grade 3-4 students and their families; and to (2) develop culturally relevant data collection and measurement tools to evaluate the impact of implementing this intervention among children living in this northern Métis community.

4.2 Methods

4.2.1 Application of the Socio-Ecological Framework

CSH strives to engage community members in order to connect the school to the greater community and to integrate community- and culture-specific aspects into the learning process. The socio-ecological model is one that is used often as a conceptual framework with many CSH initiatives as it acknowledges the important influence environments can have on individual health behaviours (such as physical activity and healthy eating). At the same time, applying a 'holistic' socio-ecological approach to designing a school- and community-based health promotion program complements and respects Indigenous culture, knowledge sharing and ways of learning and doing (Battiste 2000; Tagalik and National Collaborating Centre for Aboriginal Health (NCCAH) 2010).

4.2.2 Setting

The community of Île-à-la-Crosse, Saskatchewan, is located 520km northwest of Saskatoon, on a peninsula surrounded by Lake Île-à-la-Crosse. Approximately 1, 341 people reside in Île-à-la-Crosse where 1, 095 individuals identified themselves as Métis (Statistics Canada 2008). Fifty percent of the population is less than 25 years of age and 64% of the population speaks English only while 36% of the population also speaks Michif Cree (Statistics Canada 2008). The community is accessible by road all year and has a small airport that supports the landing of small aircraft. There are two schools in the community, an elementary school (grades 1 to 6) and a high school (grades 7 to 12).

4.2.3 Consent

Individual participant consent was obtained once the local town council and research team approved participation in the project. The community research coordinator facilitated all consent agreement while the community representatives of the research team approved language and content of consent forms (Appendix XVI). Consent was also obtained from the University of Saskatchewan Research Ethics Board in Behavioral Science Research (Appendix XIV).

4.2.4 Participants

Sixteen students were enrolled in the Grade 3-4 class during this school year, all of whom were invited to participate in this health promotion intervention. All 16 of these students obtained consent to participate. This classroom of children was chosen to participate for a number of reasons. First, from a physiological perspective, children who are in Grade 3 and 4 are not yet entering the adolescent growth phase that is characterized by increased adipocyte number and size (Rolland-Cachera, Deheeger et al. 1984; Dietz 1994; Rolland-Cachera, Bellisle et al. 2000). Second, positively influencing the development of healthy lifestyle behaviours among children of this age group may translate into a decreased risk of developing chronic conditions

(such as obesity and T2D) in their adult life (Dobbins, De Corby et al. 2009). Creating lifestyle patterns of regular physical activity and healthy eating at a young age has been suggested as one way to carry over these healthy lifestyle patterns into adulthood (Dobbins, De Corby et al. 2009). Third, from the community perspective, the teacher teaching this classroom was very interested and keen to participate and felt that it was important for her students to learn these lifelong skills. Letters explaining the purpose of this project along with student responsibilities were sent home with the students. This was done with collaborative support from the school administration, the Grade 3/4 homeroom teacher and the community research assistant. All students obtained consent from their respective parents and/or caregivers and gave their assent for participation in this project. Parents and caregivers of these students also gave consent to be interviewed about their experiences with the program. This group of students was chosen by the community research team because of the interest expressed by the homeroom teacher to participate in the design of this health promoting intervention.

4.2.5 Participatory Action Research Methods

In this project, the academic research team members consulted and collaborated with the community research team members through face-to-face meetings, phone meetings and email, in order to integrate unique Métis expertise into the project measurement documents and intervention content. There were two primary community research team consultants who worked on the development of the school-based curriculum in conjunction with the academic research team members. One of these individuals was also the participating teacher who implemented the lessons in her classroom. The other individual was the community research coordinator who was hired to act as a local liaison and consultant with the academic research team. The research coordinator was fluent in Michif and played a significant role in integrating pertinent and relevant information related to the Michif language and culture. These individuals were also

highly involved in providing pertinent feedback to the measurement tools and questionnaires that were chosen to measure changes in physical activity and nutrition choices and practices associated with implementing the health promoting school curriculum. Community and academic research team members reflected on the information collected from the focus group discussions and information gathered in the previous phase of the project (Chapter 3). This, along with critical reflection of the environmental scan, allowed the research team to design activities and lessons that focused on learning in the classroom, but also involved peers, the whole-school, and families.

4.2.6 Physical Activity and Healthy Eating Intervention Lessons Requiring Métis Cultural Adaptations

I compiled all of the pertinent school-based, Indigenous-specific health promoting interventions implemented in Canada and the USA from the literature and presented them to community research team members. It was made clear that none of these interventions had been conducted in a Métis community or context previously and all of the Canadian literature explored the role of school-based programs in First Nations communities.

The intervention topics and lessons for this study were obtained primarily from the Sandy Lake School Diabetes Program as this was identified by the community research team as a program that was straightforward to modify into a Métis-specific program. Health messaging and curricular components were also integrated from the Pathways study (Davis, Going et al. 1999; Pathways 2010) and also from the "At My Best" curriculum, a free "comprehensive curriculum-supported toolkit for children in grades kindergarten to grade three to promote and develop children's overall wellness" (Physical and Health Education 2011; Physical and Health Education Canada 2011). The Sandy Lake program consisted of 9 different chapters and a total

of 17 different lessons, all of which were formatted into an electronic version for ease of modification.

4.2.7 Measurement Tools Requiring Métis Cultural Adaptations

The measurement tools that were presented to and accepted by the community research team members as reliable and valid tools to capture physical activity and nutrition knowledge, attitudes, beliefs and behaviours of the Grade 3/4 students included: (1) the Physical Activity Questionnaire for Children (PAQ-C); (2) a Food Frequency Questionnaire for Grade 3-5 students; (3) an Aboriginal-specific Knowledge, Attitudes, Beliefs questionnaires; and (4) a protocol for utilizing Photovoice with children. Both the academic and community research teams examined these measurement tools to identify whether the formatting, wording of instructions or questions, or other changes would be necessary to ensure cultural relevance. Any wording that needed to be modified to ensure it was appropriate for use in Île-à-la-Crosse enhanced the face validity and any replacement of items enhanced the content validity of the measurement tools.

(1) The PAQ-C was designed as a self-administered 7-day recall questionnaire that measured general moderate to vigorous physical activity levels in children (ages 8 to 14 years) during the school year (Kowalski, Crocker et al. 2004). This tool utilized memory cues (such as lunch or recess) to assist in student recall and could be administered easily to children in school without extra guidance or help (Kowalski, Crocker et al. 2004). This tool has been validated in the general Canadian child population and has been used successfully in other research projects (Kowalski, Crocker et al. 2004; Ahamed, Macdonald et al. 2007).

(2) The food frequency questionnaire (FFQ) used in this study is a validated self-administered questionnaire that assesses the frequency of food intake of elementary-age students (Mullally, Taylor et al. 2010) (Appendix IX). Participants choose from a list of 27 food items to

identify the frequency of their intake for each food item. This survey was initially created with the intent to identify categories of foods and food choices that may be of concern within child populations, including concerns around consumption of milk products, fruit and vegetables, or low nutrient-dense foods (such as chips or other "junk" food) (Evers 2010; Mullally, Taylor et al. 2010). This tool does not measure total energy intake or assess total diet but it does allow the evaluation of changes in general dietary choices. The reliability and validity of the Eating Behaviours Survey has been previously examined among school-aged children aged 9-12 years living in Prince Edward Island and Ontario (Evers, Taylor et al. 2001).

(3) The knowledge, attitudes and beliefs (KAB) questionnaire was developed from the Sandy Lake School Diabetes Prevention Program (Saksvig, Gittelsohn et al. 2005) and the Pathways program (Stevens, Cornell et al. 1999), both of which were designed to measure change in self-reported physical activity and nutrition knowledge, attitudes and beliefs in groups of Aboriginal children in Grades 3 and 4.

(4) Photovoice was another measurement tool chosen in preparation to measure changes in food choices and leisure time activities during implementation of the health-promoting lessons. Photovoice is a qualitative research method that uses photography to visually capture and document various aspects of an individual's life, such as leisure time activities and nutrition practices. Photovoice uses photographs taken by participants as a means to directly involve and engage them to discuss options for change that will impact their health (Wang and Burris 1997; Wang, Morrel-Samuels et al. 2004; Castleden and Garvin 2008). Photovoice encourages children to raise their own questions related to healthy behaviours, in the context of their unique environments. Photographs obtained in this way have been successful in prompting individual

reflection, which, in this case, may empower children to be active, and informed participants in the research process.

In previous photovoice projects, researchers distributed disposable cameras to participants, instructed them in the use of the cameras and in the expectations of their assignment, and would leave the cameras with the participants for a number of days to weeks. Participants returned the cameras, with their photograph assignment completed, photographs were developed and participants were either interviewed or participated in focus group discussions, based on their chosen photographs(Vaughn, Rojas-Guyler et al. 2008; Fitzgerald, Bunde-Birouste et al. 2009; Poudrier and Mac-Lean 2009). In this project, we developed a variation on this protocol, as outlined in the results section of this paper (specifically under the heading: "Photovoice: Identifying an appropriate protocol for use with children living in a remote community".

4.3 Results and Discussion [*]

The results of this portion of the study culminated in 2 primary outcomes, including: (A) a complete set of lessons that would be implemented with students in the Grade 3-4 class; and (B) a set of customized culture-based questionnaires/measurement tools with which to evaluate the impact of these lessons when implemented.

4.3.1 The Creation of the Health Promoting School Lessons

All Oji-Cree words in the original Sandy Lake School Diabetes Program documents were translated to Michif to ensure appropriate transfer of Métis ways of knowing and doing. Several supplemental and supporting documents from the Pathways and 'At My Best' curricula were

[*] The format for integrating the Results and Discussion into one section is based on the literature review of such pedagogical articles as Davis, S. M., S. B. Going, et al. (1999). "Pathways: a culturally appropriate obesity-prevention program for American Indian schoolchildren." The American Journal of Clinical Nutrition **69**(4 Suppl): 796..

integrated into the lessons after consulting with community research team members. Following this, the participating homeroom teacher reviewed all of the lessons for content to ensure that they met with various curricular objectives and her own cultural expertise. This was accomplished primarily through phone meetings, email messaging and face-to-face meetings.

The creation of this CSH intervention took place before the Indigenous school health framework was developed or available. Therefore, much of the design of this project was based on the four pillars outlined by the Joint Consortium for School Health. Although not all four pillars were addressed and integrated into our study (due to time limitations), the content of the lessons and the overall school-based program will be discussed in the context of the first two pillars outlined by the JCSH: 1) teaching and learning; 2) social and physical environments (Joint Consortium for School Health 2011).

4.3.2 Pillar 1. Teaching and Learning

The various units and lessons that comprise this CSH program were centred around the following main themes: understanding what healthy is, comparing lifestyles from 'yesterday' to 'today', understanding what diabetes is, promoting physical activity and active leisure time, promoting healthy eating, and teaching about healthy lifestyle choices that prevent the development of diabetes (Appendix IV). Healthy nutrition and physical activity information and messaging are interwoven throughout each theme. An overview of all of the units and corresponding lessons and activities are outlined in Table 3.

Initially, in order to increase the involvement of the Grade 3/4 students and promote student and school 'ownership' of the lessons and program, participating students were asked to create a logo that represented "life, healthy living, everyday physical activity, healthy food choices and children who live by these examples". All participating students created a logo and

the class voted on the logo that best captured these elements; this class-identified logo was chosen as the main logo for the overall program (Figure 4).

Table 3. Overview of the intervention units and lessons

Unit 1. Visiting the Mayoyahwins	
Lesson 1	Introduction to the program
	Program logo creation
Lesson 2	Meet the Mayoyahwins Storybook – Chapter 1
Unit 2. What is Healthy?	
Lesson 3	Mayoyahwin Storybook – Chapter 2
	What it means to be healthy.
Lesson 4	What being healthy means to me
	Goal setting exercise 1 (physical activity OR nutrition)
Unit 3. Yesterday and Today	
Lesson 5	Mayoyahwin Storbook – Chapter 3
	Traditional foods are good to eat
Lesson 6	An Elder's story
Unit 4. What is Diabetes?	
Lesson 7	Mayoyahwin Storybook – Chapter 4
	What is diabetes?
Lesson 8	Sacred Circle: Type 2 diabetes prevention for Aboriginal children (video)
	Goal setting exercise 2 (nutrition – try a new vegetable)
Unit 5. Tahto-kiskaw Mitsowin (Everyday Foods)	
Lesson 9	Mayoyahwin Storybook – Chapter 5
	Tahto-kiskaw (Everyday) Foods
Lesson 10	Missy's Food Diary
	Goal setting exercise 3 (nutrition – try a new fruit)
Unit 6. Being Active	
Lesson 11	Mayoyahwin Storybook – Chapter 6
	Physical activity 'yesterday' and 'today'
	Goal setting exercise 4 (physical activity)
Lesson 12	My favourite physical activity; body cues
Unit 7. Tahto-kiska (Snack Attack)	
Lesson 13	Mayoyahwin Storybook – Chapter 7
	What did I eat yesterday?
	How to read a Nutrition Facts Food Label
Lesson 14	Snack preparation and taste test
Unit 8. Askaw Mitsowin (Sometimes Foods)	
Lesson 15	Mayoyahwin Storybook – Chapter 8
	Askaw (sometimes) foods

	Goal setting exercise 5 (nutrition – eat everyday snack each day during the week)
Lesson 16	Nellie's Tahto-kiskaw Choices (word play activity)
Lesson 17	Jeopardy game/quiz – summarizing key messages from intervention

Figure 4. Logo created by participating student

Nutrition

Nutrition concepts were integrated into the units and lessons and emphasized the differences between "Tahto-kiskaw Mitsowin" ("Everyday Foods") and "Askaw Mitsowin" ("Sometimes Foods"). Posters containing various market food items and local Métis food items were developed and put up in the classroom (Figure 5). The objectives of the nutrition component of the curriculum were meant for students to learn, identify and describe different

"Everyday" foods and the importance of eating these healthy options. Students were encouraged to identify foods that were low in fat, low in sugar, and high in fibre and were taught how to keep a food diary and read food labels. Lessons also addressed the differences between fresh, frozen and canned foods.

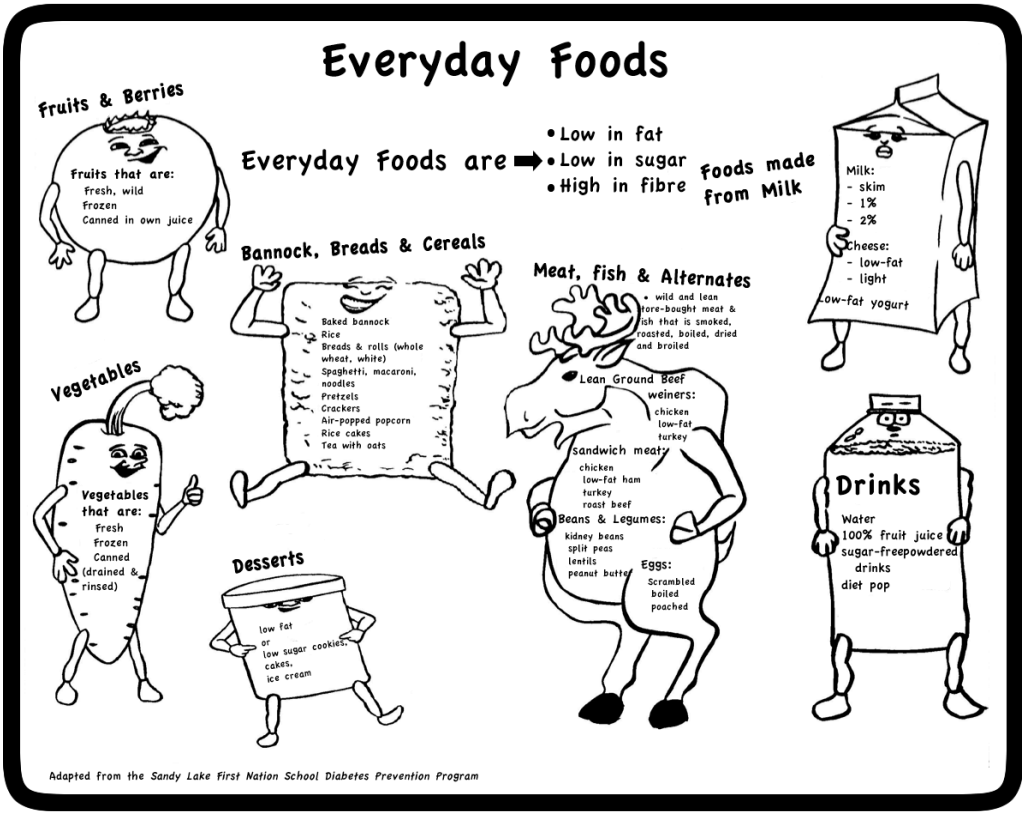


Figure 5. Poster of Poster of *Tahto-kiskaw Mitsowin* Everyday foods.

Intergenerational and Métis-specific Cultural Learning

Other important Métis-specific components included interaction with elders, and learning related to local Métis food and activities. Inter-generational learning was emphasized so students would have an enhanced understanding of what foods and activities were once primary elements of elders' lives. The teacher ensured that students learned the protocol for speaking to an Elder

(if they were not already aware of these respectful practices), including the offering of tobacco and the appropriate way to thank an Elder for their time in sharing their experiences.

The homeroom teacher held a class session on making pemmican and teaching the students the role pemmican played in the history of the Métis people. Students were also taught traditional Métis jigging (rapid moving dance technique unique to Métis people) by their peers and other individuals who were experienced in this form of dance. Both of these examples not only promoted healthy eating and physical activity, but they did so in ways that resonated with the Métis culture. The classroom activities were linked to other pre-existing school celebrations such as celebrating the Michif language and culture through poster displays, assembly and parental involvement, which further supports the sustainability of some of the program units and lessons. This also fits with the fourth pillar outlined by the JCSH, "partnerships and services" (Joint Consortium for School Health 2011).

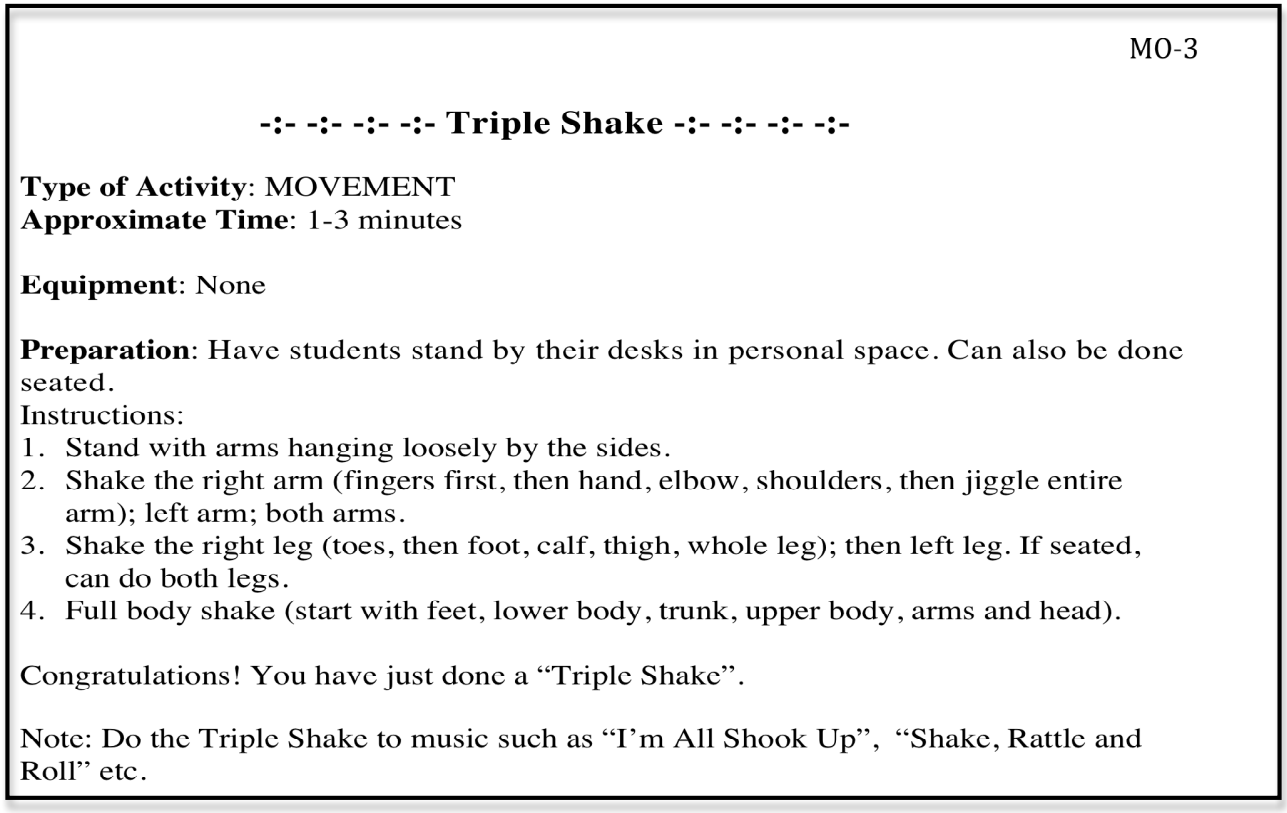
On one occasion, a community Elder was invited into the classroom to speak about the importance of the medicine wheel in their lives and why it is important to maintain a healthy mind and body (Figure 6). Elder M explained that the Medicine Wheel is a tool to help students stay healthy and prevent diabetes by maintaining a healthy balance in all four spheres of the Medicine Wheel. Elder M encouraged students to be aware of these four elements: Mental, Physical, Emotional and Spiritual spheres. During this particular portion of the lessons, I had proposed that the teacher may also choose to show a video, "Sacred Circle: Type 2 Diabetes Prevention for Aboriginal Children", prepared by the Alberta Native Friendship Centres Association and the Aboriginal Diabetes Wellness Program (Alberta Native Friendship Centres Association and Alberta Diabetes Wellness Program 2010). HT reported that the video was well received by the students and complemented the talk that was given by Elder M.

Figure 6. Medicine Wheel example (Journey 2006)

Physical Activity

The importance of physical activity was emphasized in the design of this health-promoting program through messaging and through action. Students were taught about the difference in physical activity levels comparing today to 50 years ago and how that could impact health. 'Body cues', or normal physiological changes that occur during exercise were reviewed. An important element designed to promote physical activity in the classroom everyday was the inclusion of "Exercise Breaks". An "Exercise Breaks" kit was designed based on those from the Pathways program, and included color-coded cards with simple explanations of the activities (Pathways 2010). The activities included various movements, stretches, animal walks, partner

activities, strengthening exercises, and creative walks. An example of an exercise break card is included in Figure 7. Exercise Breaks were designed to last between 1-10 minutes and were to be completed 1-2 times per school day. The teacher commented that she never had the opportunity to forget to implement the exercise breaks as the students thoroughly enjoyed these activities and would often ask or remind her to do an exercise break during their class.



MO-3

-:- -:- -:- -:- Triple Shake -:- -:- -:- -:-

Type of Activity: MOVEMENT
Approximate Time: 1-3 minutes

Equipment: None

Preparation: Have students stand by their desks in personal space. Can also be done seated.
Instructions:
1. Stand with arms hanging loosely by the sides.
2. Shake the right arm (fingers first, then hand, elbow, shoulders, then jiggle entire arm); left arm; both arms.
3. Shake the right leg (toes, then foot, calf, thigh, whole leg); then left leg. If seated, can do both legs.
4. Full body shake (start with feet, lower body, trunk, upper body, arms and head).

Congratulations! You have just done a "Triple Shake".

Note: Do the Triple Shake to music such as "I'm All Shook Up", "Shake, Rattle and Roll" etc.

Figure 7. Example of an exercise break card

Diabetes

Throughout the in-class lessons, the homeroom teacher (HT) was able to share her own experiences of being a caregiver for a family member who experienced diabetes with the students. This was a unique feature of the health promoting intervention as it incorporated more storytelling into the program and brought the importance of promoting health to the forefront of

these lessons. HT described that the students received the story of her experiences with diabetes very well and found that this built awareness and generated many of the participants to share their own personal stories related to diabetes.

Goal Setting

Teaching students about goal-setting related to physical activity and healthy foods was another important element that was included throughout the program. This was accomplished by designing a series of 'Goal Cards' for the students to fill out. As students worked through the units and lessons in class, they would occasionally have a goal card to fill out which would encourage them to identify a nutrition or physical activity goal to achieve over a short time frame. These were all self-directed and completed. An example of the Goal Cards can be viewed in Appendix XIII. Five goal cards were integrated throughout the nine units and corresponded to physical activity and healthy eating.

The "Meet the Mayoyahwins" Storybook

The element of storytelling and learning from stories was built into this curriculum and was based on the Oji-Cree Daaybway story created for the Sandy Lake School Diabetes Program (Saksvig, Gittelsohn et al. 2005). The original drawings were not modified but the various cultural themes and language were adapted to the Métis culture and the Michif language. All Michif translations were compiled by the community research assistant and reviewed with one of the community Elders. This story was written for Grade 3/4 comprehension and followed the lives of Missy and Buddy Mayoyahwin and how they learned to make healthy choices in order to prevent themselves from developing diabetes [Mayohaywin = Healthy] (Please see Appendix V for the Mayoyahwin story).

The story was well received by participating students and they were easily able to recount the experiences of Missy and Buddy at the end of the project. Students were able to relate to the main characters, Missy and Buddy, and were interested in their adventures exploring physical activity and healthy eating themes. Overall, the homeroom teacher felt that the story might be more interesting or effective if it was made into a play or drama production with a final outcome involving a performance for the entire elementary school. As an educator, the teacher felt that merely reading the story to the children did not do the story justice as far as stimulating them educationally and academically. The performance did not take place, however, it was left up to the teacher if she would attempt to do this in the future. The idea of creating a play or drama production of the story would fit very well with actively engaging community in the design and implementation of this project. The children would be more actively involved as well, which could further positively influence the knowledge acquired by the children.

4.3.3 Pillar 2. Social and Physical Environment

Family Component

Integrating health promotion messages from the classroom to the homes and families of the participating students was another focus of this project. (Macaulay, Paradis et al. 1997; Story, Evans et al. 1999; Saksvig, Gittelsohn et al. 2005; Dietz 2011; Gortmaker, Swinburn et al. 2011; Swinburn, Sacks et al. 2011)In discussions with the community research team members, it was suggested that families be provided with information and messages that participating students were receiving. It has been well documented that families and family members have a powerful influence over the type of food and physical activities children choose to do (Crockett, Mullis et al. 1988; Hearn, Bigelow et al. 1992; Teufel, Perry et al. 1999).

Families have been widely recognized as an important element in creating health promoting environments for children (Macaulay, Paradis et al. 1997; Story, Evans et al. 1999; Saksvig, Gittelsohn et al. 2005; Dietz 2011; Gortmaker, Swinburn et al. 2011; Swinburn, Sacks et al. 2011). As well, it is important to develop health promoting family components from cultural perspectives to ensure more relevance and practicality to the families. The family component for this project resonated well with community research team members as it emphasized the importance of family, extended family and kinships, elements that are highly regarded in Métis culture and identity (MacDougall 2006). Considering the specific Métis context, families lived in extended family groups that enhanced their social, economic and healthy well-being (Anderson 2011). Wahkootowin was a term that embodied a unique world view to express that strong relationships between and among family members lay the foundation for all activities, and in this case, for ensuring future health (MacDougall 2006). This worldview is still held among many Île-à-la-Crosse community members.

Community research team members felt that this portion of the project should be introduced in a gentle, gradual way in order to encourage parental involvement but not over-burden parents or caregivers with time-consuming activities. The concept of a family "activity pack", originally created by the Pathways research team in the United States, was integrated into the program as a way to include families in the project.

The purpose of the family "activity packs" was to familiarize parents/caregivers with the overall objectives of the health promoting program and to assist them in creating home environments that reinforced nutrition and physical activity messages students were receiving at school. The family "activity packs" consisted of a series of take-home materials created to nurture a supportive and informed home environment (Pathways 2010). The take-home materials

consisted of information related to healthy living, ways to prevent T2D, healthy recipes and snack ideas, suggestions for physical activities to do with the entire family, and various other worksheets. Each activity pack also contained a copy of the Mayoyahwin story for families to read together. Return cards were included in the family "activity packs" which the student and an adult family member were asked to sign, to provide an indication of whether or not the activities were accomplished. Please see Appendix VI for an example of what was included in one of the "activity packs".

School and Peer Component of the School-based Intervention

School and peer components were built in to the overall design of the Grade 3/4 health promoting intervention through two main activities that included the whole student body of the elementary school. The first activity was integrated into a pre-existing school Education Week event. It was designed as a whole-school guessing game where students had to guess the correct amount of sugar in various commonly consumed beverages. The activity was meant to raise awareness of the excessive amounts of sugar in some popular drinks that students enjoy, thereby encouraging students to choose healthier alternatives. (Appendix VII highlights the details of this guessing game).

The second activity, a pedometer challenge, was proposed by the homeroom teacher as a way to encourage students, along with their families and other community members, to participate in walking in a fun way. A group of 12-16 community members (including children) wore pedometers and walked around the community and the track for 1-hour, once per week, for a period of about 1 month. Cumulative distance was recorded and plotted on a map of Saskatchewan to showcase how far these individuals had walked. Pedometers had been previously purchased for the elementary school as an honorarium for their participation in this

project. This challenge demonstrated that community capacity building was successfully being integrated into the program and highlighted how PAR nurtures community ownership and stimulates participating community members to integrate their own ideas into the program.

HT also identified that not all of the students were drinking enough water while at school and discovered that a barrier to this was the fact that not everyone owned a water bottle to bring to school. Water bottles containing elementary school logo were purchased and the teacher reported that this enhanced the amount of water consumed by her students tremendously (Figure 8).

Figure 8. Class with water bottles

4.3.4 Customizing Questionnaires to Reflect Cultural Relevance

Designing a curriculum that was culturally relevant to the Métis community, Île-à-la-Crosse, also necessitated the research team to modify the various proposed measurement tools to be more culture-based. All questionnaires and protocols were reviewed for content validity to

ensure Métis-specific elements were incorporated. These measurement tools were to be used to evaluate any changes in physical activity and nutrition knowledge, attitudes, beliefs, and behaviours before and after the implementation of the culture-based physical activity and nutrition CSH program.

4.3.5 Physical Activity Questionnaire for Children (PAQ-C)

Wording in the PAQ-C was reviewed with community research team members to ensure that it would be appropriate for use in this community, thereby enhancing the face validity of the PAQ-C tool. The community research team felt that the language used in the questionnaire would not impede or prevent relevant information from being obtained from the participating students and no changes were made.

4.3.6 Food Frequency Questionnaire

This tool allowed for modifications to be made to the list to account for cultural variation in food choices. Both face and content validity were enhanced through input from the community research team members. For example, the community research team felt that adding items such as moose meat, rabbit and bannock to the list of foods to choose from was appropriate and important. Alternatively, some food items were taken off the list, such as English muffins, chickpeas and lentils; while other food item names were changed (example: porridge was used instead of oatmeal). Other than the above-identified recommended changes, the community research team members deemed all other wording and editing culturally appropriate and the food frequency questionnaire was approved for use.

4.3.7 Knowledge, Attitudes and Beliefs Questionnaire

Modifications were made to this questionnaire to ensure questions were culturally and geographically relevant to this population and also so questions would coincide with concepts being taught to students from the lessons created. For example, all questions regarding

demographics were modified to ask about children's background and language with 'Métis', 'Michif', 'Cree' and 'French' all being options for children to choose from. The final version of the knowledge, attitudes and beliefs questionnaire that was created during this phase of the project is included (Appendix X).

Trial of this questionnaire with students in Grade 3-4 revealed age-appropriate reading levels due to the ease with which students could complete the questionnaire. Few students required extra help and guidance the students completed all questions, with none left blank. The majority of students who filled out the questionnaire did not ask for clarification about the content, wording or topics of the questions and reported that all of the questions "made sense" to them and were not confusing. Some students and community research team members reported that the questionnaire was too long and this was taken into account in the final version of the questionnaire. The final questionnaire was shortened and questions related to self-esteem and dieting were removed, along with another set of questions asking what types of health-related goals, community events and activities they participated in at home, at school, with their friends over the past year.

4.3.8 Photovoice: Identifying an appropriate protocol for use with children living in a remote community

Modifications to the process of performing photovoice were necessary because of the rural and remote location of the community and because of the young age of the participants. Initially, the research team attempted to use disposable cameras with the Grade 3-4 participants. There were a number of concerns and difficulties identified throughout the steps involved in the photovoice project that required problem-solving prior to the implementation phase of the project. The length of time from students taking the photographs to having the photographs to look at and talk or write about was approximately 3 weeks due to the time for mailing,

processing and traveling back to the remote community. This time delay inhibited the ability of students to recall specific details about the photographs that they took. Few students were able to write down 5 items related to their photograph which made the focus group discussion challenging for them. As well, stimulating young students to discuss their ideas about their photograph in a group setting made several participants feel uncomfortable and therefore these students chose not to participate in the discussion.

It became apparent that digital cameras were required for use with these young students to ensure that the photographs they took could be viewed immediately. As well, the research team also purchased a digital photograph printer to ensure that photographs could be printed as soon as the photographs were downloaded from the cameras. Students were given digital cameras to use, were oriented to their use, and were told to take their cameras home for one night. When students returned the next day, they were interviewed individually about 2 photographs they took and were given a print out of one of their photographs for their own keeping. This strategy enhanced their ability to recall the reasons for taking the photographs and further enhanced the quality of the data collected. The research team members were then able to build a PowerPoint poster with all of the chosen photographs from the participating students and showcase their photographs on a slide for the entire class to view. Following this, a more successful focus group discussion ensued.

4.4 Conclusions

Local Métis input, combined with the knowledge and experience of the academic research team members, resulted in the development of a set of culturally appropriate health promoting lessons focusing on physical activity and healthy eating. Furthermore, a set of comprehensive, high quality and culturally relevant data collection instruments was also

developed during this phase of the project. Designing health promoting physical activity and nutrition lessons for elementary school-aged children, in direct consultation with community stakeholders who will also benefit from the program is critical for promoting and nurturing community ownership in a project like this. Often it is difficult for teachers, parents, and other community members to find the time in a busy schedule to create such a program to promote healthy lifestyle choices with the goal of preventing diabetes. Identifying a common health concern to address is critical in order to link with other community initiatives and priorities. Integrating Métis-specific culture, topics, language and examples throughout the program continued to build trust and rapport with the community, and further created a supportive path necessary for the implementation phase of the project. It was clear that the practice of engaging repeatedly with the community research team not only yielded a culturally appropriate curriculum and a set of measurement instruments, but was also an effective means of maintaining and building further trust and rapport.

Integrating stories into the curriculum were integral to effectively engaging the teacher and the students in participating in the project. The Mayoyahwin storybook provided students with fictional role models that were culturally recognizable and accepted. The participating students were able to easily recall the names and experiences of the characters and reported that they enjoyed reading about these characters. Of the parents/caregivers who read the stories to their children, the majority of them indicated that it encouraged discussion about health and healthy living with their children and this was a positive experience for them.

Families reported that the family activity packs were very successful in linking health-promoting messages with families while stimulating conversations about health and diabetes amongst family members. Generating family discussion about what is healthy and what items are

less healthy to eat is an important step for families looking to provide healthy environments at home. The messages in the family activity packs even lead to the cessation of pop drinking in the home of at least one family. Parents were quite pleased to have the ability to see what types of messages were being taught in the classroom and to be given a role to support their children as they learn about healthy lifestyle choices.

Several lessons were learned during the development of the health promoting curriculum and modification of the measurement tools. Academic research teams must be aware of the time constraints of the participating teacher and their students and therefore should consider the length of questionnaires and lessons to fit with the desires of the teacher. Ensuring that teachers have a role in providing input, particularly related to the length of measurement tools and the lesson plans, can impact teacher participation in such a project. Flexibility is a critical element to bring into a collaboration such as in the designing of this program, particularly as the project moves forward and community members realize that they would prefer to have things done in a different way. In order to ensure that the community stakeholders felt actively engaged in the development of the program, it was necessary to build in their recommendations as they arose. Incorporating participatory action research methods into the design of this collaborative project ensured that this flexibility was feasible and highlighted that PAR design was paramount to the success of this project.

CHAPTER 5

EVALUATING THE IMPACT OF A MÉTIS CULTURE-BASED COMPREHENSIVE SCHOOL HEALTH INTERVENTION ON PHYSICAL ACTIVITY AND NUTRITION KNOWLEDGE, ATTITUDES, BELIEFS AND BEHAVIOURS AMONG MÉTIS CHILDREN

CHAPTER 5
EVALUATING THE IMPACT OF A COMPREHENSIVE SCHOOL HEALTH INTERVENTION ON PHYSICAL ACTIVITY AND NUTRITION KNOWLEDGE, ATTITUDES, BELIEFS AND BEHAVIOURS AMONG MÉTIS CHILDREN

5.1 Introduction

Promoting the health and wellness of children is a primary focus in communities particularly as it is believed that supporting health and healthy behaviours early in a child's life will build their capacity for good health in their adult years (McMurray and Clendon 2011). The health of Aboriginal children is being challenged by an increased incidence of overweight and obesity and researchers, in collaboration with Aboriginal community stakeholders, are attempting to determine ways to intervene and reverse these trends (Young, Dean et al. 2000; Belanger-Ducharme and Tremblay 2005; Shields 2005; Downs, Arnold et al. 2009; Egeland, Williamson-Bathory et al. 2011; Gortmaker, Swinburn et al. 2011). Dietary intake along with physical and sedentary activity patterns have been identified as key elements involved in healthy body weights of children (Katzmarzyk, Janssen et al. 2003; Tremblay and Willms 2003; Janssen, Katzmarzyk et al. 2004), and are strongly influenced by the environments in which we live (Gortmaker, Swinburn et al. 2011; Swinburn, Sacks et al. 2011). As such, creating culture- and school-based multi-level interventions to support children to be more active, less sedentary and eat healthier foods is one proposed way to promote health in a climate of rising pediatric obesity rates (Mullally, Taylor et al. 2010; Naylor, Scott et al. 2010; Gortmaker, Swinburn et al. 2011).

The Active Healthy Kids Canada 2011 Report Card on Physical Activity for Children and Youth gave children and youth a grade of 'F' for 'physical activity levels' and 'active play and leisure' categories. Only 7% of Canadian children and youth were achieving the minimum recommended 60 minutes of moderate-to-vigorous physical activity (MVPA) per day, as measured by accelerometers (Tremblay, Shields et al. 2010; Colley, Garriguet et al. 2011).

Furthermore, physical inactivity has been shown to be a predictor of obesity among Canadian children, youth and adults. This has been demonstrated in both Aboriginal and non-Aboriginal populations (Katzmarzyk, Janssen et al. 2003; Katzmarzyk 2008; Janssen and Leblanc 2010). Studies have previously indicated that low self-reported physical activity and high sedentary behaviours have been shown to be important determinants of obesity in Aboriginal children and youth (Macaulay, Paradis et al. 1997; Hanley, Harris et al. 2000; Horn, Paradis et al. 2001; Nakano, Fediuk et al. 2005; Katzmarzyk 2008; Receveur, Morou et al. 2008; Ng, Young et al. 2010). However, recent self-reported physical activity data indicates that among some Aboriginal child populations physical activity levels may be slightly higher than that reported among non-Aboriginal children and youth. Aboriginal youth who participated in the CCHS in 2004 (Statistics Canada 2004) self-reported higher levels of physical activity participation compared to non-Aboriginal youth (Ng, Young et al. 2010); however, it was also observed that these Aboriginal youth consumed less vegetables and dairy products and spent more time viewing TV compared to non-Aboriginal youth (Ng, Young et al. 2010). Interestingly, an analysis of the 2005 Canadian Community Health Survey (CCHS) indicated that First Nations people (living off-reserve) and Métis people self-reported that they were more likely to engage in leisure-time physical activity compared to non-Aboriginal people: 37% and 39% versus 30%, respectively (Findlay 2011). Physical activity levels were measured objectively by accelerometers among a group of First Nations youth living in two remote villages in northern British Columbia (Mitchell, Gaul et al. 2010). The average amount of time that participants spent in MVPA was reported as 139.8 ± 33.8 min/day (Mitchell, Gaul et al. 2010), a value much greater than that observed from national Canadian data (boys averaged 61 min MVPA/day while girls averaged 47 min MVPA/day) (Colley, Garriguet et al. 2011). Of these participants, 61%

and 31% of the females and males, respectively, were observed to experience overweight or obesity, similar to findings by others (Connelly, Hanley et al. 2003; Bruner, Chad et al. 2009; Chateau-Degat, Pereg et al. 2009; Oster and Toth 2009; Bruce, Riediger et al. 2010; Imbeault, Haman et al. 2011; The First Nations Information Governance Centre 2011). These data highlight the need for more objective physical activity measurements to clarify any under- or over-reporting of physical activity levels by self-report. Taken together, these references also suggest that although physical activity is an important determinant of health and obesity development (Tremblay and Willms 2003; Katzmarzyk 2008; Janssen and Leblanc 2010), it alone may not directly lead to improved health. The role of other important factors such as diet and social, physical and cultural determinants must also be acknowledged.

Energy-dense and nutrient-poor foods are readily available within the food environments that children are exposed to daily (World Health Organization 2000; Olstad, Downs et al. 2011). Researchers believe that unhealthy food environments are responsible for influencing the dietary behaviours that put children at risk of developing obesity and other subsequent health conditions (Olstad, Downs et al. 2011) (Lake 2006). Numerous researchers have reported that Aboriginal youth consume diets high in fat, cholesterol, carbohydrates, and sugar, but low in dietary fibre, fruits, vegetables and dairy products (Receveur, Boulay et al. 1997; Wolever 1997; Hanley, Harris et al. 2000; Bruner 2008; Downs, Arnold et al. 2009; Khalil, Johnson-Down et al. 2010; Egeland, Williamson-Bathory et al. 2011). It has also been found that for some Aboriginal people living in northern and remote locations the availability of affordable and high quality fresh foods in grocery stores is limited, further impacting the food choices of Aboriginal children and their families.

Choices individuals make related to physical activity and food are influenced to a large extent by the environments in which we live and interact with daily. Changes that are needed to promote healthy lifestyle choices among Métis children are complex and likely involve social, cultural and physical levels of change over sustained periods of time (Gortmaker, Swinburn et al. 2011). There are powerful determinants influencing children's food and physical activity choices that exist at all of these levels including schools, homes, neighborhoods as well as relationships (Spence, Cutumisu et al. 2009; Gortmaker, Swinburn et al. 2011; Swinburn, Sacks et al. 2011). Schools have been identified as key venues for implementing public health interventions to lower or prevent overweight and obesity (Story, Kaphingst et al. 2008; World Health Organization 2008; Veugelers and Schwartz 2010). In Canada, comprehensive school health (CSH) attempts to effectively teach school curriculum while also influencing student health behaviour through a planned and integrated way (Veugelers and Fitzgerald 2005; Veugelers and Schwartz 2010; Joint Consortium for School Health 2011). The Joint Consortium for School Health (JCSH) identifies that school policies, the social and physical school environments, community stakeholders and families all play a role in school health and the subsequent health of children (Joint Consortium for School Health 2011). Schools that not only provide high quality nutrition and physical health education but also nurture active and healthy living through the social and physical environments have positively influenced the adoption of healthy lifestyle habits among children (Sallis, McKenzie et al. 1999; Veugelers and Fitzgerald 2005; Reed, Warburton et al. 2008; Chomitz, Slining et al. 2009; Mullally, Taylor et al. 2010; Veugelers and Schwartz 2010). There have been a handful of culturally appropriate comprehensive school health-based programs designed to encourage physical activity and healthy eating among First

Nations children in Canada and American Indian children in the United States, but not among Métis populations.

The purpose of this research project was to evaluate the impact of implementing a culture-based comprehensive school health intervention on the physical activity and nutrition knowledge, attitudes, beliefs and behaviours of Métis children living in a northern, remote community. The school health intervention was designed in collaboration with, and for use within, a Métis community to ensure the material was culture-based and relevant. The specific design components and attributes of the health promoting intervention are described in Chapter 4.

5.2 Methods

5.2.1 Design

The study design was a pretest/post-test design with a comparison group, conducted during the first 4 months of the Grade 3/4 school year, September to December 2010, at the elementary school in Île-à-la-Crosse, Saskatchewan. The participating class receiving the intervention was a Grade 3-4 split class (n=16). The intervention primarily included a series of classroom lessons and activities related to health, physical activity, healthy eating and ways to prevent diabetes. Two other classes, an independent Grade 3 and Grade 4 class (n=21), also attending the elementary school participated as a standard care group and acted as a comparison to the class receiving the intervention. The standard care group did not receive any formal intervention but did undergo testing on two occasions, during the same time points as the intervention group. Testing included an assessment of food choices, physical activity and psychosocial and behaviour measures. All assessments were conducted at baseline prior to the implementation of the health-promoting lessons and at follow-up, immediately upon completion of the intervention. The research team did not conduct anthropometric measurements pre- and

post-intervention as it was agreed that the project was meant to approach health promotion from a strength-based perspective and any pre- and post-intervention anthropometric measurements were not anticipated to change during the short intervention time frame.

Signed informed consent was obtained from all parents of participating students and the participating students provided assent (Appendix XVI). As previously described, the study design and intervention implementation plan was approved by the community research team, including members of the town council, Sakitawak Métis Council, Île-à-la-Crosse School Division, and administration and teachers at the Rossignol Elementary School, along with the Research Ethics Board at the University of Saskatchewan.

5.2.2 Participants

Participants were Métis children living in the northern Saskatchewan community of Île-à-la-Crosse and attending Grades 3 and 4 at the elementary school. The community of Île-à-la-Crosse, Saskatchewan, is located 520km northwest of Saskatoon, on a peninsula surrounded by Lake Île-à-la-Crosse. This group of children were chosen to participate because of their young age with the intention that creating healthy lifestyle patterns at this young age may translate into the adoption and maintenance of healthy lifestyle patterns into adulthood (Dobbins, De Corby et al. 2009). As well, the school administration had recommended this class for participation because of the Grade 3-4 homeroom teacher's keen interest in participating to allow her to teach students these health promoting lifelong skills.

5.2.3 Intervention

The intervention included a series of health promoting lessons, take-home material, classroom exercise breaks, storytelling, goal setting activities and two whole-school activities, described in detail in Chapter 4. The focus of the intervention was on promoting physical activity, healthy eating and preventing diabetes. The intervention was created using multiple

resources derived from several other culturally appropriate school-based health promotion programs implemented in Sandy Lake, Ontario (Saksvig, Gittelsohn et al. 2005), Kahnawake, Quebec (Macaulay, Paradis et al. 1997) and in the United States (Davis, Going et al. 1999).

5.2.4 Assessments

Food Frequency Questionnaire

The food frequency questionnaire, also referred to as the "Eating Behaviours Survey", is a validated self-administered questionnaire that assesses the frequency of food intake of elementary-age students (Mullally 2010) (Appendix IX). Participants were given a list of 27 food items to identify the frequency of their intake for each food item. This survey was initially created with the intent to identify categories of foods and food choices that can be problematic for children such as consumption of adequate amounts of milk products or fruits and vegetables, or over-consumption of low nutrient-dense foods (such as chips or other "junk" food) (Evers 2010; Mullally 2010). This tool does not measure total energy intake or assess total diet but it does allow the evaluation of changes in general dietary choices. The reliability and validity of the Eating Behaviours Survey has been previously examined among school-aged children aged 9-12 years (Grades 4 – 8) living in Prince Edward Island and Ontario (Evers, Taylor et al. 2001). The content of the food frequency questionnaire was modified slightly to include culturally relevant food items, as described in Chapter 4, in conjunction with input from the community research team.

Each participating student received a copy of the food frequency questionnaire and a member of the research team read each question out loud and provided the students with time to fill in the appropriate answer. Members of the research team and a teacher were present to help students if required, and to respond to any questions that arose. Participants indicated their

frequency of consumption during the past seven days as follows: “at least twice a day”, “once a day”, “4 to 6 times a week”, “1 to 3 times a week”, and “never”. In the analysis, these 5 response categories were reduced to three new categories which were re-named as: “daily”, “weekly”, and “never”. Participants who indicated that they ate a selected food one or more times per day were considered to have a “daily” intake of that food. Likewise, if they stated that they consumed the food between 1 to 6 times in the past seven days, their intake was recorded as “weekly”.

Data were also recoded and sorted into 3 different food categories based on Canada’s Food Guide to Healthy Eating, including (1) ‘Fruits and Vegetables’, (2) ‘Milk and Alternatives’ and (3) ‘Low Nutrient Density Foods’ (LNDF) (Health Canada 2007). Mean servings for these three categories were determined by adding all the daily scores for the food items belonging to these categories. Vegetable and fruit consumption was evaluated by adding all responses to fruit, 100% fruit juice, potatoes (not including French fries), salad and other vegetables together. Initially, daily consumption was calculated from any ‘weekly’ consumption responses by dividing the score by 7. Alternatively, for weekly responses that included ranges, the following protocol was followed: (1) foods consumed 1-3 times per week = 2/7 or 0.29 servings per day; (2) foods consumed 4-6 times per week = 5/7 or 0.71 servings per day. Subsequently, the total number of daily servings of Fruits and Vegetables for each participant was estimated by adding the number of daily servings of each food item in that group. This was repeated for all Milk and Alternatives food items including milk, cheese, yogurt, and frozen yogurt. Mean daily intakes were calculated for French fries, cakes, cookies, snacks, candy and soft drinks all of which were classified as LNDF foods based on their high calorie content relative to their low nutritive value.

Comparisons between the food items consumed never, weekly or daily were compared between September and December responses using the McNemar’s test. This comparison

revealed if there were any changes in frequency of food consumption pre- and post-intervention. 'Improve', 'no change' or 'worse' scores were given according to Tables 4 and 5.

Table 4. FFQ scores depicting pre- and post-intervention change for frequency of healthy food consumption

		December		
		Never	Weekly	Daily
September	Never	No Change	Improve	Improve
	Weekly	Worse	No Change	Improve
	Daily	Worse	Worse	No Change

Table 5. FFQ scores depicting pre- and post-intervention change for frequency of low-nutrient dense foods

		December		
		Never	Weekly	Daily
September	Never	No Change	Worse	Worse
	Weekly	Improve	No Change	Worse
	Daily	Improve	Improve	No Change

Physical Activity Questionnaire for Children

The Physical Activity Questionnaire for Children (PAQ-C) provides a general measure of physical activity for children between the ages of 8 and 20 years and is most appropriate for children who are currently in the school system and have recess as a regular part of their school week. The PAQ-C is a self-administered 7-day recall questionnaire which measures overall moderate to vigorous physical activity taking place during the school year (Kowalski, Crocker et al. 2004). This instrument is a low cost tool that provides a reliable and valid assessment of general physical activity within child populations. General physical activity scores were calculated as an average physical activity score in a continuous range from low active (1) to high active (5). The questionnaire was administered at baseline (September 2010) and again at the end of the intervention (December 2010).

Knowledge, Attitudes and Beliefs Questionnaire

A Knowledge, Attitudes and Beliefs (KAB) questionnaire was administered to both the intervention and standard care groups in September 2010 and again in December 2010 at the completion of the intervention. The KAB questionnaire used for this project was adapted from KAB surveys created by the Pathways study (Stevens, Cornell et al. 1999) and the school-based health intervention program implemented by Saksvig et al. (Saksvig, Gittelsohn et al. 2005). This measurement tool measured students' self-reported knowledge, attitudes and beliefs related to diet, physical activity, and psychosocial constructs (such as self-efficacy and self-esteem). The KAB questionnaire that was designed for this project integrated Métis values, language and context specific to the Île-à-la-Crosse community. The cultural modifications made to the KAB questionnaire were completed via participatory action research methods, as described in Chapter 4. The KAB questionnaire consisted of 7 sections described below.

Sections I and II provided background information related to age, grade, gender, date, primary and secondary languages, and ethnicity. These population characteristics were compared between the intervention and standard care groups, see Table 7.

Section III asked participants to identify what they would prefer or what they would choose given 2 different food options, one food item being a healthier option. This section attempted to obtain information on food choice intentions and to capture overall habits of food consumption. Answers in this section were given a value of 1 if they were healthy and 0 if they were not healthy. There were a total of 8 questions in this section, therefore a high score of 8 would indicate the healthiest options were chosen and a low score of 0 would indicate the least healthy options were chosen.

Section IV focused on food and physical activity self-efficacy where participants were asked "How Sure Are You"-type questions to identify how confident they felt they were in participating in physical activities and choosing healthier food options. Categories were coded as follows: "I know I can" = 3, "I think I can" = 2, "I'm not sure I can" = 1, and "I know I can't" = 0. Therefore, given a total of 11 questions for this section, a score of 33 would indicate high confidence and a score of 0 would indicate low confidence.

Section VII focused on leisure time activities with a focus on screen time, television viewing and video game playing. Overall screen time was coded as 0 hours = 0, 1-2 hours = 1, 3-4 hours = 2, and > 5 hours = 3. Individuals scoring 12 points out of a total 12 would have a high level of sedentary, screen time activity; any individual scoring 0 would have no screen time reported in their leisure time.

The overall pre-intervention scores for each section of the questionnaire were then compared to the post-intervention scores. The McNemar's test was used to analyze categorical data while the Wilcoxon test was used to analyze all continuous data.

Accelerometry

Physical activity was also measured using the Actical accelerometer (Mini Mitter Co., Inc. Bend, OR). This Actical accelerometer is small (28 x 27 x 10 mm), light (17g) and omnidirectional, which is sensitive to movement in all directions. These accelerometers have a wide range of sensitivity which allows for the detection of sedentary movements as well as high-energy movements (Puyau, Adolph et al. 2004; Bruner, Chad et al. 2009). The use of Actical accelerometers with youth populations has been shown as a valid means of obtaining reliable information on activity counts and energy expenditure (Esliger and Tremblay 2006; Esliger and Tremblay 2007; Bruner, Chad et al. 2009). Participating students were fitted with the

accelerometer device and instructed to wear the device (on an elastic belt) just above their right hip for seven consecutive days, removing the device only for sleep and bathing purposes (Chen and Bassett 2005; Esliger and Tremblay 2006; Esliger and Tremblay 2007). Each device was programmed to begin reading activity counts at 6 a.m. each morning. Participants were instructed to record the on/off time for wearing the device on a 7-day log sheet. This log sheet further enhances the validity of the data as it is used as guide in determining the start and stop wear times, non-wearing and sleeping time periods.

Calibration protocols were strictly followed to ensure high quality, reliable and valid data were included in the analysis. Data were assessed for any biologically implausible and unrealistic results to determine whether files should be included in the final analyses (Masse, Fuemmeler et al. 2005; Colley, Connor Gorber et al. 2010). Specifically, thresholds for the accelerometer were set to exclude incorrect high values (from such things as monitor aberrations) but to include legitimate high values reflective of vigorous activity (Colley, Connor Gorber et al. 2010). Any participant whose data output was equal to 0 for 60 or more consecutive minutes was excluded from the analysis, as these data are generally indicative of non-wearing times, or wearing interruptions (Troiano, Berrigan et al. 2008). Criteria for inclusion in the data analysis was set at a minimum of 600 minutes of wear time on at least one day out of 7. Participants who do not meet the minimum wear time criteria were excluded from the analysis.

Accelerometer data were analyzed using the custom software KineSoft version 2.0.95 (KineSoft, New Brunswick, Canada), following procedures outlined by Esliger et al. (Esliger, Copeland et al. 2005; Esliger and Tremblay 2007; Esliger, Tremblay et al. 2010). The main variables computed included average accelerometer counts of sedentary-, light-, and moderate-to-vigorous-intensity physical activity per day that were re-calculated into total minutes of

activity per day. Accelerometer count cut-points corresponding to each intensity level are outlined in Table 6.

Table 6. Physical activity intensity cut-points for Actical accelerometer (Puyau, Adolph et al. 2004; Colley, Garriguet et al. 2011)

Intensity	Activity Energy Expenditure (kcal-kg^{1}-min^{1})	Example	Acceleromter Count Range (counts per minute)
Sedentary	Less than 0.01	Sitting, reclining, standing	Less than 100 (including wear-time zeros)
Light	0.01 to less than 0.04	Walking less than 3.2 km/h, light play	100 to less than 1,500
Moderate	0.04 to less than 0.10	Walking more than 3.2 km/h, aerobics	1,500 to less than 6,500
Vigorous	0.10 or more	Jogging, running	6,500 or more

Photovoice

Photovoice methods used in this portion of the research project were previously established and described in more detail elsewhere (Chapter 4). Participating children were given digital cameras pre- and post-intervention and were oriented to the use of the cameras. Parental consent for the use of the photographs that included the participating children was obtained through the consent and permission obtained from the school and in the consent form that parents filled out to allow their child to participate in this project (Appendix XVI). Participating students were educated about the importance of respecting individual's privacy. Participating students in the intervention group were given a photograph assignment asking them to take photographs of "things they like to eat" and "things they do in their spare time". The research

team asked these questions in this way in order to allow the participants to take pictures of all types of food, healthy or less healthy, and all types of activities, sedentary or moderate to vigorous. The photographs provided visual representation of the children's perceptions and experiences related to leisure time activities and eating habits both pre- and post-intervention.

Participants were given the camera for 24-hours and were then asked to participate in one-on-one interviews to discuss several of the pictures they were interested in talking about. Digital images were displayed for the participants and they described the pictures they took and were asked questions about the pictures in order to stimulate discussion and obtain their perspectives on the topics discussed. (Please see Appendix XV for a list of questions that were posed to the participants). Participants were given a printed photograph of their choice from their photograph collection, as a thank-you for participating. All photographs, interviews and focus group discussions were transcribed and analyzed using qualitative analysis software. Photographs, interviews and focus group discussions were completed pre- and post-intervention.

Parent Interviews to Explore Usefulness of Family Activity Packs

Parents and/or caregivers of the students in the intervention group, who consented to participate in interviews, were asked several open-ended questions related to the effectiveness of the family activity packs. An overview of the questions asked is found in Appendix XII. Questions related to whether or not parents/caregivers found the information helpful and useful to themselves and their families and whether or not they felt that the information provided to them enhanced their ability to change their own and their family's behaviours around physical activity and healthy eating.

Data Analysis

Overall pre- and post-intervention scores for each section in the food frequency and the knowledge, attitudes, behaviours questionnaires were analyzed for changes using the McNemar's test for all categorical data (Munro 2005). Continuous data were analyzed using either the Wilcoxon test (dependent samples) or the Mann-Whitney test (independent samples) (Munro 2005). Average PAQ-C scores were compared pre- and post-intervention for the intervention and standard care groups using the Mann-Whitney test. Pre- versus post-intervention objective physical activity (accelerometer) measurement comparisons among the intervention and standard care groups were analyzed for changes using the Wilcoxon test for paired samples or the Mann-Whitney test for independent samples. All quantitative analyses were performed using PASW Statistics, Version 18. Results were considered significant at $p<0.05$.

Interview transcripts with parents and photovoice photographs and associated transcripts from interviews and discussions were analyzed using the computer software program, Atlas-ti, which stores, codes, and retrieves text, audio files and photographs. Initially, once transcripts and photographs were imported into Atlas-ti, content analysis occurred. Content analysis involved breaking up the interview transcripts into smaller data chunks referred to as 'quotations' (Krueger and Casey 2000; Saskatchewan Population Health and Evaluation Research Unit (SPHERU) 2009). These quotations were then given meaningful labels and any inter-related quotations were grouped as concepts (or 'codes') (Krueger and Casey 2000; Saskatchewan Population Health and Evaluation Research Unit (SPHERU) 2009). Codes consisted of a word, phrase or sentence that contained an inter-related idea from the data, including any similarities or differences expressed by participants (Krueger and Casey 2000; Saskatchewan Population Health and Evaluation Research Unit (SPHERU) 2009). The theoretical framework for the analysis of

the data was based on the socio-ecological framework which helps researchers understand how people interact with their environments and considers the influence of the social context on behaviour, including institutional and cultural variables (Sallis, Kraft et al. 2002; Glanz, Rimer et al. 2008). During the analysis, quotations and codes were identified that were thought to be the most useful and relevant to community members, but it's important to consider that this was from an "outsider" perspective. All material was analyzed with the intention that it would support the community member's perspectives. Every attempt was made to include the community research coordinator but her input was limited due to her restricted availability.

5.3 Results

Results from this project are based on the students who participated in the intervention group and the standard care group. All population characteristics are depicted in Table 7.

Table 7. Population characteristics of participating students

Population Characteristics	Intervention Group	Standard Care Group
Male	56.3% (n = 9)	50.0% (n = 11)
Female	43.8% (n = 7)	50.0% (n = 11)
Mean age	8.4 years	8.9 years
Grade 3	56.3% (n = 9)	27.3% (n = 6)
Grade 4	43.8% (n = 7)	50.0% (n = 11)
Grade 5	0.0% (n = 0)	22.7% (n = 5)

5.3.1 Food Frequency Questionnaire

Overall mean intake of fruits and vegetables, milk and alternatives, low nutrient dense foods (LNDF) were not significantly different among participants in the intervention and standard care groups.

Consumption of specific low-nutrient dense foods (LNDF) were further analyzed comparing any changes in frequency of intake of "cakes, cookies, pie, doughnuts", "potato chips,

nacho chips, Cheezies, pretzels and snack foods", and "regular soft drinks" categories (Table 8). No statistically significant differences were noted.

5.3.2 Physical Activity Questionnaire for Children

Self-report physical activity was assessed using the PAQ-C with all participating students. No significant group differences in the self-reported physical activity were observed from the PAQ-C data. Mean scores of the Intervention Group were 3.0 and 3.1 in September and December respectively, while those of the Standard Care Group were 2.95 and 3.26 in September and December respectively.

Table 8. FFQ scores for intervention and standard care groups, pre- and post-intervention

Variable	Intervention Group		Standard Care Group	
FFQ: consumption of cakes, cookies, pie, doughnuts	Improve	46.2%	Improve	27.8%
	No change	30.8%	No change	44.5%
	Worse	23.1%	Worse	27.8%
FFQ: potato chips, nacho chips, cheezies, pretzels	Improve	35.6%	Improve	20.3%
	No change	50.0%	No change	72.3%
	Worse	14.3%	Worse	5.6%
FFQ: Candy, chocolate bars	Improve	42.9%	Improve	42.2%
	No change	35.7%	No change	36.9%
	Worse	21.3%	Worse	21.1%
FFQ: Regular soft drinks	Improve	50.0%	Improve	31.0%
	No change	35.7%	No change	47.3%
	Worse	14.2%	Worse	21.1%

5.3.3 Physical Activity and Nutrition Knowledge, Attitudes and Beliefs Questionnaire

Knowledge, attitude, beliefs (KAB) scores pre- and post-intervention are shown in Table 9. No significant differences were noted among the majority of the sections of the knowledge, attitudes and beliefs questionnaire when comparing the intervention group pre- and post-

intervention and when comparing the intervention and standard care groups at the end of the intervention

Table 9. KAB scores pre- and post-intervention for intervention and standard care groups

	Intervention Group				Standard Care Group			
	Pre-Intervention		Post-Intervention		Pre-Intervention		Post-Intervention	
	Median	Range Min-Max	Median	Range Min-Max	Median	Range Min-Max	Median	Range Min-Max
Section III: Food choice intention (/8)	3.5	2 - 8	4.0	2 - 7	5.0	3 – 8	4.0	1 - 7
Section IV: Food & PA Self-Efficacy (/33)	25.0	7 – 30	27.0	13 - 33	24.0	15 - 30	28.0	21 - 33
Section V: Curricular concepts and knowledge (/7)	3.0	2 – 6	4.5	3 - 6	4.0	2 – 7	4.0	1 - 7
Section VI: Fat in food knowledge (/5)	3.0	0 – 5	3.0	1 – 5	2.0	0 – 5	3.0	1 - 5
Section VII: Leisure time sedentary activities (/12)	6.0	0 – 10	5.5	1 – 10	5.0	1 – 12	5.0	3 - 12

5.3.4 Accelerometer Objective Physical Activity

Results of the direct monitoring of physical activity through accelerometer measurements are shown in Tables 10 and 11. Table 10 is comprised of data based on 1 valid wear day that was suitable for analysis due to the fact that 91.8% of participants met the minimum wear-time criteria for one day. MVPA decreased in both groups over the intervention time frame

(September to December) but the decrease noted in the MVPA minutes per day in the standard care group decreased statistically (p=0.004) whereas there was no statistical difference in the MVPA minutes per day in the intervention group (Figure 9).

At the same time, analysis of sedentary activities in the 2 groups revealed a significant increase in minutes spent in sedentary activities in the standard care group (p=0.016) but no significant difference noted in the intervention group (Figure 10). The standard care group experienced significant decreases in light (p=0.01) and moderate (p=0.003) physical activity minutes per day when comparing the pre- and post-intervention measurements while the intervention group did not (Figures 11 & 12).

Table 10. Average minutes per day spent in various intensities of physical activity

	Intensity of activity (average minutes per day)				
Study Group	Sedentary (SD)	Light (SD)	Moderate (SD)	Vigorous (SD)	Moderate-to-vigorous (SD)
Intervention Group, pre-intervention	484 (74)	210 (45)	65 (30)	7 (5)	72 (34)
Intervention group, post-intervention	495 (43)	203 (42)	51 (20)	5 (3)	56 (23)
Standard care group, pre-intervention	463 (79)	222 (46)	68 (22)	5 (3)	73 (24)
Standard care group, post-intervention	527 (55)	196 (32)	47 (16)	3 (2)	50 (18)

SD = standard deviation

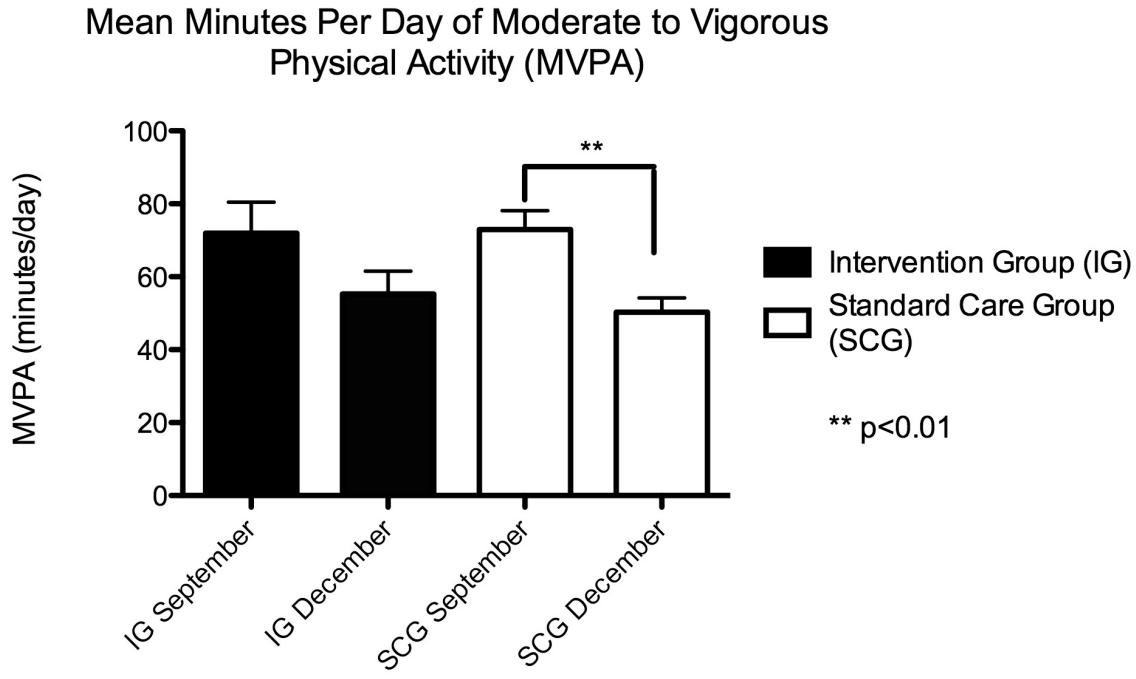


Figure 9. Graph of mean minutes per day spent in moderate-to-vigorous physical activity for intervention and standard care groups, pre- and post-intervention.

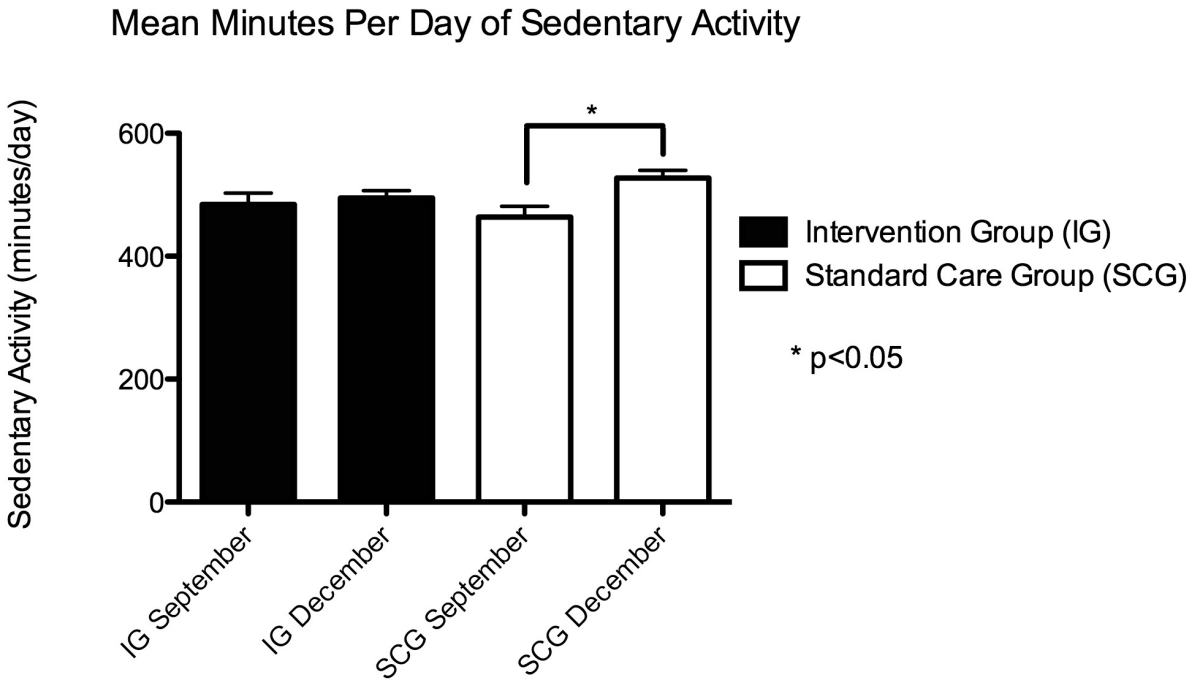


Figure 10. Graph of mean minutes per day spent in sedentary activity for intervention and standard care groups, pre- and post-intervention.

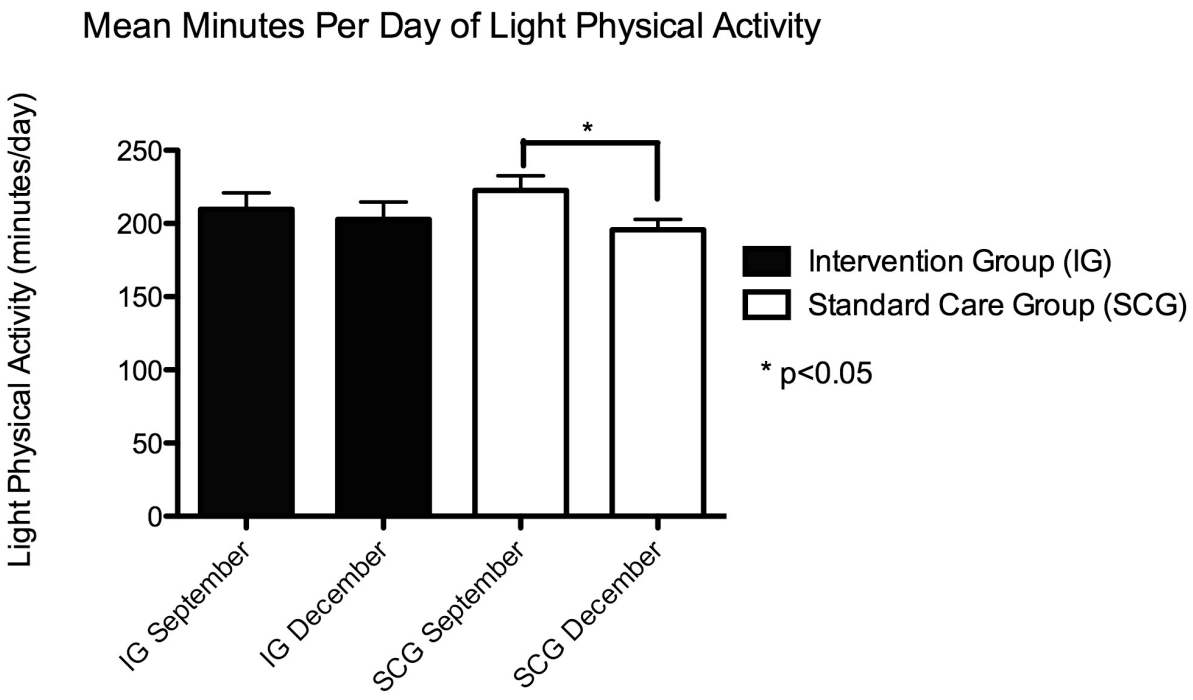


Figure 11. Graph of mean minutes per day spent in light physical activity for intervention and standard care groups, pre- and post-intervention.

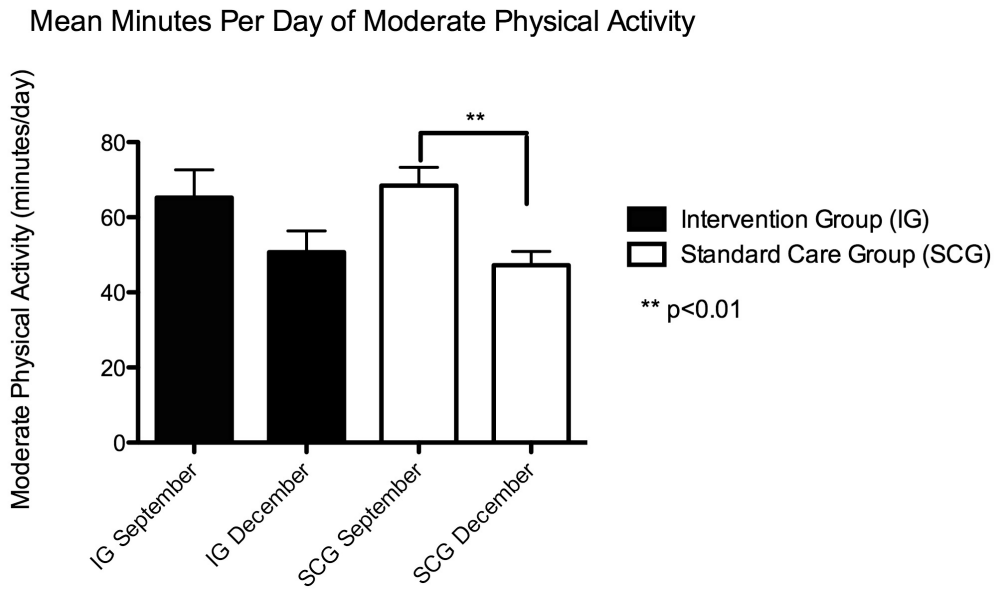


Figure 12. Graph of mean minutes per day spent in moderate physical activity for intervention and standard care groups, pre- and post-intervention.

Considering that these data reflect only 1 valid wear day, further analysis consisted of analyzing those students who wore accelerometers for 3 or more valid wear days, which accounted for 42% of the total participant number. Of this 42%, 7 students were from the intervention group and 9 students were from the standard care group. Table 11 outlines the results based on 3 or more valid wear days. Moderate-to-vigorous and moderate physical activity levels decreased significantly for both intervention and standard care groups. Only the standard care group were observed to have significant decreases in light and vigorous physical activity levels. Sedentary activity levels indicated that while the standard care group had significant

increases in time spent in sedentary activities, no significant increases were noted in the intervention group.

Table 11. Average minutes per day spent in various intensities of physical activity (for 42% of participants who achieved 3 or more valid acceleromter wear days)

	Intensity of activity (average minutes per day)				
Study Group	Sedentary (SD)	Light (SD)	Moderate (SD)	Vigorous (SD)	Moderate-to-vigorous (SD)
Intervention Group, pre-intervention	479 (70)	224 (30)	67 (22)	8 (5)	75 (25)
Intervention group, post-intervention	501 (42)	201 (39)	43 (6)	4 (4)	48 (9)
Standard care group, pre-intervention	405 (45)	249 (32)	83 (14)	6 (3)	89 (16)
Standard care group, post-intervention	533 (40)	206 (34)	47 (10)	3 (1)	49 (11)

5.3.5 Power Calculations

Power calculations were performed for all tests particularly since the sample sizes in this study were small. Based on mean daily intake of fruits and vegetables data power was calculated to be 22%. However, based on MVPA (1 valid wear day data) objective physical activity data, power was calculated at 99%. Power calculations for MVPA within the group of participants who wore accelerometers for 3 or more valid days was calculated to be 95.5%.

5.3.6 Photovoice

Photographs taken by the participating students in the intervention group provided visual representation of the children's perceptions and experiences related to leisure time activities and food and eating habits. Photographs taken at baseline and at follow-up identified the children's activity and food preferences and their perceptions around what they enjoy to do during their

leisure time and what they eat during the day. Through discussions related to the photographs, an attempt was made to try to identify any barriers or enablers that may exist for the participating children to engage in physical activity and healthy eating. The photographs, interviews and focus group discussions allowed the research team to determine the various words and images that the students associated with leisure time activity and food.

The various photographs that were taken at baseline are shown in Figure 13 (photo collage of all of the students' photos from September). A number of these photographs along with the associated interview quotes from the students are displayed below. The first main category of pictures reveals the children's experiences with food, where they describe getting their food from and their ideas on the various types of food that they report eating on a regular basis (Figures 14-21).

Figure 13. Collage of photographs taken by intervention group at baseline

Many of the children described that their families purchase their food at the local grocery store but that also various family members will drive reasonably long distances to purchase their

food. The children interviewed did not appear to find this an unusual event as it became apparent that many families who have the means and ability to travel will generally travel to other communities at least once per month to purchase groceries and complete other important banking and business transactions. One student described being very excited about the picture he took of his refrigerator because his parents had just returned from a trip to Edmonton, Alberta and while they were there they purchased a variety of items for their family. Figure 14 captures this individual's excitement over having a large Fruitopia juice container in his refrigerator. Many other healthy food items are viewed in the photograph of the refrigerator such as fresh strawberries, oranges, apples, snap peas, blueberries and yogurt, however this particular child was more focused on the presence and availability of Fruitopia. Figure 15 also shows a picture of cookies that were purchased in another community, Meadow Lake, which is one of the larger centres that is geographically closest to the community of Ile-a-la-Crosse.

Figure 14. "My Dad bought this (Fruitopia) in Edmonton… I really, really like Fruitopia"

Figure 15. “We bought these cookies in Meadow Lake. I ate them all… yesterday”

In the late summer and early fall, many of the bushes surrounding Île-à-la-Crosse are filled with fresh berries. One student took a photo of the cranberries that her father had picked from bushes near their home (Figure 16). She described that many of the cranberries that were picked were given away to other family members or friends. This student also reported that she did not help her Dad pick them and didn’t recall picking other kinds of berries in the area. Another food item that is considered a local and traditional Métis food, that was photographed, was bannock. One student recalls eating bannock made and baked by her Grandmother everyday after school (Figure 17).

Figure 16. “Fresh cranberries. My dad picked them.”

Figure 17. “Bannock! My Grandma makes bannock. I eat it everyday after school.”

Several of the children who participated in this project also took pictures of food items such as hotdogs and reported enjoying eating this type of food regularly (Figures 18 & 19). Hotdogs appeared to be photographed the most frequently among the children in the September portion of the photovoice project. Overall there were not many photographs taken of chocolate, candy, or cakes, however one student reported that her Mom made homemade lemon meringue pie and her and her family enjoy eating this on occasion (Figure 20). Another common food item identified and photographed by the participants was pasta. As described by one participant, they always eat their pasta with some form of tomato or tomato and meat sauce (Figure 21).

Figure 18. “My lunch yesterday. Ketchup. Two hotdogs.”

Figure 19. “It’s a hotdog. I like to eat it. Everyday.”

Figure 20. “That’s my favorite kind of pie. Because it’s lemony.”

Figure 21. “My Mom made spaghetti. It has sauce on it and I ate about, like, three bowls.”

Leisure time activities were also captured through photographs taken by the participating students. In response to being asked to take pictures of “the things you like to do”, students reported doing many activities both indoors and outdoors, active and sedentary. The majority of the pictures taken were primarily outdoor photographs, with an increasing number of indoor photographs being taken during the follow-up photograph assignment in December.

Participating students took photographs of the school playground frequently as this is the main focal point of the elementary school grounds. This playground structure is a relatively new structure in the community and attracts many children during recess, even in the winter months (Figure 22). Some children described coming to this play structure outside of school hours and one student, who doesn't live very close to the school, stated that he sometimes comes here to play. He indicated that he will sometimes bike to get there, but not in the winter because he doesn't use his bike in the winter. Another student described "I like to go to the park in my spare time" and "I like being outside".

Figure 22. "The playground. I like it… like, in winter, the tall bridge is slippery. Everyone goes there. This is at recess."

Again, Figures 23 and 24, feature the playground structure as an important part of the play that occurs during recess. The same participant took these photographs during the baseline measurement phase in September and again during follow-up in December.

Figure 23. “Playing on the monkey bars with my friends. (I like to play on these) at recess and most of the time after school.”

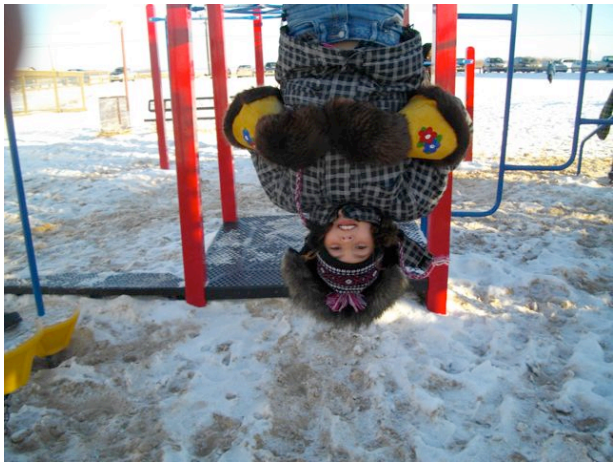


Figure 24. “That’s my cousin hanging upside-down from the monkey bars. I like those mittens. It’s fun to play outside.”

The playground area surrounding the elementary school is very large and also has a large field to play in, a basketball court, as well as a few swings. The large field is used for a number of different things and, as one participant indicated, many students make teams during recess and play sports such as soccer (Figure 25). Recess is usually spent outdoors, with friends, and is a

time when many students participate in physical activity. Photographs and interviews with the students further identified the important role that friends play in being physically active. Several students reported playing such games as tag and ‘cops and robbers’ with their friends both during recess and at home. Figure 26 depicts several children playing in the grass and when asked what this participant does during recess, he stated that he usually likes to play with his friends and run around. When asked if he would rather run around at recess or play video games, he indicated that he would rather be playing video games.

Figure 25. “My brother… playing soccer. Most times I play basketball.”

Figure 26. “2 boys and 2 girls. My friends. Running around at recess.”

Another important area that was photographed was children’s backyards and pets. Many of the children were physically active at home in their backyards and many children reported having a trampoline in their yard. One participant described jumping on their trampoline as often as possible, in the morning, at lunch, after school (Figure 27). Other students reported jumping on their trampoline even in the winter time, but described having to be careful to shovel off the snow and take care not to ‘snap’ the trampoline because of the cold. Students also described using swings that were in their backyard to play on and have fun with (Figure 28).

Figure 27. “Me and my sister… jumping on the trampoline. Everyday.”

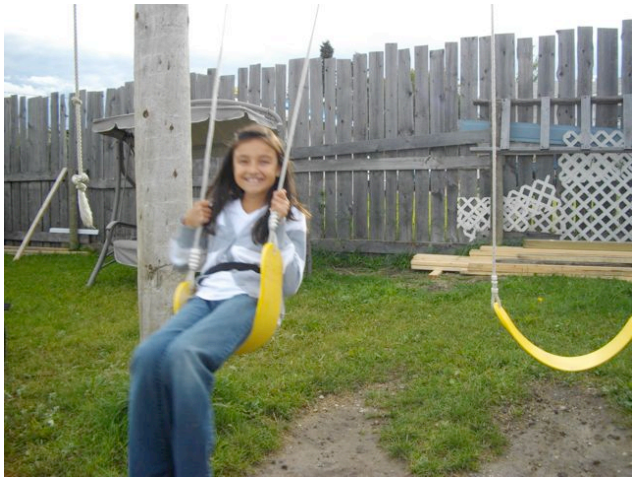


Figure 28. “I like swinging. Before school… at lunch… after school… after supper.”

Many students reported playing with their pets, primarily dogs, in their yards and at home as a main activity in their leisure time. One young boy talked a lot about playing fetch with his dog, walking with his dog, brushing and taking care of his dog (Figure 29). A small number of children spoke about gardening and only student indicated that she was active in gardening with her family (Figure 30). This particular student lived with her grandparents and it appeared from

her interview discussion that she is more involved with local, 'traditional' activities and foods than other students in her class. This same student also took pictures of her and her family snowmobiling in the winter, an activity that she described as something fun to do outside in the winter (Figure 31).

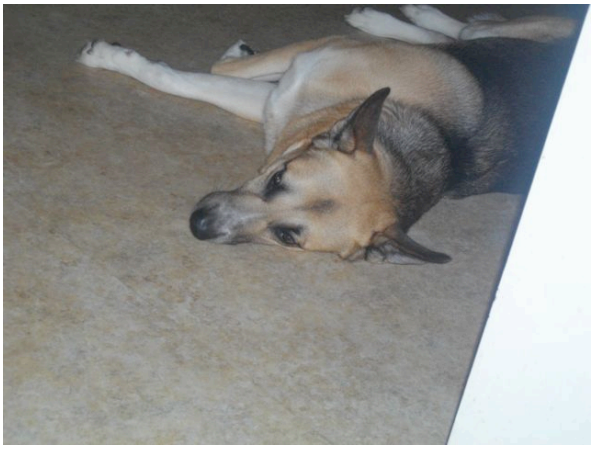


Figure 29. "I play with my dog. I like fetching, sticking… sometimes I brush him."

Figure 30. "Potatoes. I helped plan the garden. When I first pulled one (potato) out, I fell… they're hard."

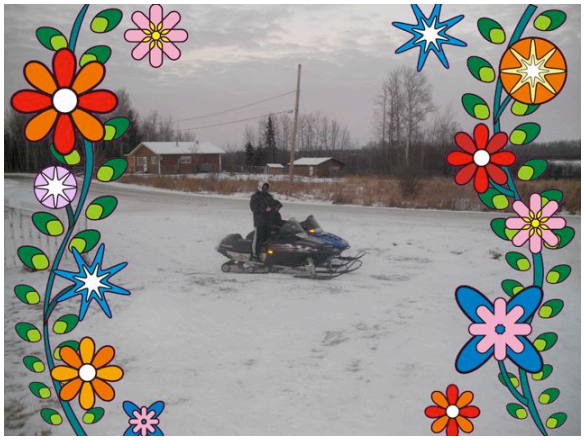


Figure 31. “Snowmobiling… we were in the bush. We saw wolf tracks. I was with my uncle.”

The various photographs that were taken at the end of the intervention (in December) are shown in Figure 32 (photo collage of all of the students’ photos from December).

Figure 32. Collage of photographs taken by Intervention group at the end of the intervention

When comparing the percentage of photographs that were Fruit and Vegetable, Milk and Alternative, Breads and Grains, and Low Nutrient Dense Foods in September versus December there are some differences noted. In September, 45% of the photographs taken of food were in the LNDF category while only 30% of the photographs in December were categorized as LNDF. At the same time, 27% and 40% of photographs taken in September and December, respectively, were of Fruits and Vegetables. (It is important to note that this quantification of qualitative results may not be accepted by all qualitative researchers however, it was performed here as a comparison to enhance the global understanding of changes in awareness and knowledge of healthy versus less healthy foods.)

Photographs depicting leisure-time activities also reveal differences when comparing photographs taken at baseline (September) and at follow-up (December). In September, a total of 14 photographs were taken of leisure-time activities all of which were outdoor activities except for 2 photographs, or 14% of the leisure-time photographs taken. Children certainly spoke about watching television and playing video games in their day-to-day lives in their interviews, but not very many of these participants actually took pictures of these activities. Alternatively, in December, a total of 21 leisure-time photographs were taken. Of these 21 photographs, 10 were indoor photos (48% of the leisure-time photos taken). When looking closer at these 10 photographs, 6 were of televisions or video games and 4 were of other indoor activities such as coloring, playing with toys and games. It was expected that the number of indoor photographs taken would increase in December compared to September because of the weather and the amount of daylight available for children to play outside.

There were other aspects of discussion that were brought up throughout the interviews that were not always associated with a photograph, but that anecdotally revealed some

'successes' of this health promotion project. A sample of comments related to student perceptions, experiences and learning from the intervention are provided (Table 12).

Table 12. Sample quotes from participating students in the intervention group

		Sample quote
Student Perceptions	Student awareness of diabetes	"I think about it (diabetes) and my Mom worries about it… because she has diabetes too, type 2."
		"My Grandma has diabetes"
		"I know 2 people with diabetes… my sister's kokum and my Dad's friend"
		"My friend, she is only like 12 and she has diabetes"
	Student perceptions of the intervention	"I liked learning how to stop me from getting diabetes"
		"It's good to learn about diabetes so you know how to not get them…"
		"I liked learning about to prevent diabetes"
		"You should eat healthy foods to prevent diabetes"
	Student perceptions of impact of the intervention	"I learned that I should eat more fruit and vegetables…"
		"(Since taking these lessons) I play outside more… before I didn't"
		"I used to play more video games"
		"Shouldn't eat sugary stuff everyday. You should eat vegetables, like from the food groups."
		"I think now I eat healthy foods more…"
		"I eat the same but I'm starting to change a little bit… everyday I start to change…"

5.3.7 Parent Interviews to establish effectiveness of Family Action Packs

Six parents and/or caregivers participated in one-on-one interviews and were asked to highlight their experiences with the materials they received within the Family Acton Packs that

were brought home by their children. Overall, parents/caregivers felt very positive about the program and the family activity packs and were welcoming of the information they received. A sample of comments related to parent/caregiver perceptions related to the impact of the family action packs are provided (Table 13).

Some families indicated that they felt they were already trying to live healthy by eating healthy foods and being active and they stated that although the information in the family packs did not bring them new knowledge, it reinforced some of what they already knew. For other families, the information was very useful and helpful. Also, many parents/caregivers felt that it encouraged discussions related to health and diabetes to occur more readily with their children than if they had not received this information. It provided families with an opportunity to talk about these subject matters, matters that may not have been talked about otherwise.

Table 13. Sample quotes from parents, caregivers, families of students in the intervention group

Level of change		Sample quote
Parent, Caregiver and Family Perceptions	Perceptions of overall impact of family action packs	"They (family packs) helped big time… in fact, we still have them here."
		"It helped to reinforce things… plus I liked the stories that went with it. We read them together."
		"Good basic information to start working with… from my end, I have gone through the whole process having been diabetic, and uh, and have kidney and eye problems. So I was able to explain all this (to him)…"
		"All these things are good and supplement the messages I've been trying to teach him."
		"There was activity and nutrition information in there… and, uh, I'm a diabetic. It was good for her to learn. She was having too much sugar… and I put her right off the sugar stuff, eh? This information helped with this…"
		"The information packets were helpful because they gave her the information to help her make the change… she understands now. And it helps me also – it was pretty informative."
	Student perceptions of impact of the intervention	"It's good that (she) is aware of all of that… what drinks are good for her… and she was sharing it with all of us at the supper table. And telling us…; we were into pop really, really bad and now we watch what kind of drinks we drink."
		"One of the things I did, in terms of eating, I downloaded the Canada Food Guide… it's more for my… to encourage myself to have balanced meals. We do it much more this year than previous years. I try to have a good balanced meal when we sit down to eat. It (this information) is certainly a good boost to get it from the school…"
		"Now whenever we go shopping, she always reads the labels on foods to see how much sugar is in there… and she wasn't doing this before. The awareness has helped her quite a bit…"

5.4 Discussion

5.4.1 Nutrition

Mean daily intake of fruits and vegetables, milk and alternatives and low-nutrient dense foods were not significantly influenced in the intervention group as compared to the standard care group. Further exploration is warranted, however, to determine if trends towards improvement would be observed if more data collection time-points were included in future

studies. Interestingly, during the winter month of December in a rural, remote community, decreases in consumption of fruits and vegetables might have been expected due to the lower quality and higher cost of fresh produce during this time (Kuhnlein, Receveur et al. 2004; Popkin 2004; Saksvig, Gittelsohn et al. 2005; Willows 2005; Skinner, Hanning et al. 2006; Downs, Arnold et al. 2009). However, no such significant decreases were noted in either the intervention or the standard care groups.

Our data indicate that large numbers of participants in both the intervention and standard care group are not eating the recommended daily amounts of fruits and vegetables or milk and alternatives (Health Canada 2007). These data are consistent with data collected in other parts of Canada and the United States where a concerning number of children are not eating adequate amounts of fruits and vegetables per day (Kirby, Baranowski et al. 1995; Trifonopoulos, Kuhnlein et al. 1998; Wilkinson Enns, Mickle et al. 2002; Dowdell and Santucci 2004; Stroehla, Malcoe et al. 2005; Veugelers, Fitzgerald et al. 2005; Downs, Arnold et al. 2009; Mullally 2010). Generally, in specific regions in Canada, First Nations children are consuming less than the recommended amounts of milk, fruits and vegetables at the same time as consuming diets high in fat, cholesterol, carbohydrates, and sugar (Hanley, Harris et al. 2000; Paradis, Levesque et al. 2005; Willows 2005; Hanning, Woodruff et al. 2007; Bruner 2008; Downs, Arnold et al. 2009; Ng, Young et al. 2010; Egeland, Williamson-Bathory et al. 2011). Our study indicates that the self-reported dietary patterns and behaviours of many of the Métis children participating in this study are similar to those observed in First Nations children living in other specific regions in Canada.

Evaluating the reported consumption of low nutrient dense foods such as cakes, cookies, pie, doughnuts, along with pop beverages revealed greater improvements in the intervention

group as compared to the standard care group. Although these changes were not found to be statistically significant we speculate that these improvements were due to the impact of the intervention itself. However, without the appropriate sample size it would be worthwhile to conduct another study with greater numbers of participants to determine if the intervention could lead to statistically significant change. These data support other findings that it may be initially easier for children to modify pop consumption, for example, rather than modify the types of meals they consume that are usually prepared for them at home (Milligan, Burke et al. 1997; Neumark-Sztainer, Story et al. 1999; Bassett, Chapman et al. 2008). Considering that children are generally consuming more food away from home, are drinking more soft drinks, and are snacking more frequently during the day, influencing snack food choices among children is an important nutritional issue (Story and French 2004). The findings in our study suggest that a more focused pop-reduction program, for example, implemented in the community and/or whole elementary school could result in more dramatic changes in energy consumption among these Métis children. Again, further evaluation is warranted to explore the role of targeting more specific food items through a health promoting intervention. Interestingly, it appears that the standard care comparison group may also have experienced indirect positive changes associated with the intervention due to the fact that improvements were also noted with their reported consumption of 'cakes, cookies, pie, doughnuts' and 'soft drinks'.

The interviews and photographs that were taken by the students at baseline compared to follow-up confirmed an increased awareness regarding fruit and vegetables due to the fact that more students took pictures of these healthy foods at follow-up. There were also several families who, upon receiving healthy food messaging and tips through the family action packs, made important changes in the types of foods and beverages they were purchasing for their homes. For

example, one family reported no longer purchasing pop beverages for their home due to the influence of this CSH intervention. It has been previously cited that environmental influences such as availability and accessibility of healthy foods had more influence on dietary behaviours than did changes in psychosocial factors, particularly among younger school-aged children (Baranowski, Cullen et al. 1999). In our study, the family who limited the purchasing of pop beverages changed the environment that the children in the family were exposed to, thereby influencing their pop drinking behaviour.

Another family reported that the increased awareness helped supplement the messages they were giving to their granddaughter, particularly as they addressed her sugar intake. They noted that their granddaughter was able to read food labels which has helped her to learn what foods are higher in sugar than others. This increased awareness of healthy foods is a positive step towards further dietary behaviour change. This area of identifying specific factors that may play more influential roles in dietary behaviour change is an important one in order to continue to develop interventions to target these areas. Further research is required to clarify this aspect of intervention research.

5.4.2 Physical Activity

The other focus of this research project was identifying the impact of the health promoting intervention on physical activity behaviours in participating students. National level accelerometer data is currently available for comparison with the data collected in this study. Recently, the Canadian Health Measures Survey (CHMS) used Actical accelerometers to obtain data on physical activity and sedentary behaviour for a group of Canadian children ages 6 to 19 years (Colley, Garriguet et al. 2011). CHMS data indicate that only 9% of boys and 4% of girls accumulate the recommended 60 minutes of moderate-to-vigorous physical activity on at least 6 days of the week (Colley, Garriguet et al. 2011). On average, according to CHMS data, children

ages 6 to 10 years of age participate in approximately 54 minutes of moderate-to-vigorous physical activity per day. In our current study, when considering data collected at the beginning of the intervention during the month of September when weather was still conducive to outdoor play, children were found to participate in 72 (± 34) and 73 (± 24) minutes of MVPA per day in the intervention and standard care groups, respectively. However, in December when winter weather may have had an influence on physical activity levels, the same groups of children participated in 55 (± 23) and 50 (± 18) minutes of MVPA per day, in the intervention and standard care groups respectively. When the September and December MVPA minutes per day were averaged, the intervention group achieved 63.5 minutes of MVPA per day compared to 61.5 minutes per day in the non-intervention group. Interestingly, in these groups of children, there appears to be an increased number of minutes spent in MVPA, on average, than that measured in the general Canadian child population (54 minutes MVPA/day).

Although no noted differences were observed in the self-reported levels of physical activity in both groups, there were some noteworthy changes in the objective physical activity measurements. Significant decreases were noted with MVPA levels in the standard care group from September to December. Previous studies confirm that seasonal decreases in MVPA are expected throughout the year, and the standard care group data confirm this decrease (Rifas-Shiman, Gillman et al. 2001; Rowlands and Hughes 2006; Rowlands, Pilgrim et al. 2009). However, no significant decreases in MVPA were noted in the intervention group which suggests that exposure to this intervention had a protective effect on any decreases in MVPA that would otherwise be expected during the winter months.

At the same time, significant increases in sedentary activity were observed in the standard care group while no significant changes in sedentary activity were found in the intervention

group. Again, these data suggest that involvement in the intervention protects the transition into a more sedentary lifestyle during the winter months. This could potentially be attributed to the increase in the amount of physical activity taking place within the intervention, in the classroom, on a daily basis. This suggestion is based on the observation that light and moderate physical activity levels in the intervention group did not drop during this time-frame as well. This, however, is merely speculation but it warrants further investigation to determine if the intervention design itself integrated increased physical activity during the school day, or whether physical activity behaviours outside of school-hours were increasing as knowledge and awareness were influenced.

It is interesting to point out that when the data was analyzed according to the 42% of participants who wore the accelerometers for 3 or more valid days, the data shows slightly different results. Minutes spent in MVPA and vigorous physical activity is shown to be significantly different for both the intervention and standard care groups, comparing September to December. This suggests that the expected seasonal differences did have an influence on the decreasing levels of leisure time MVPA and vigorous physical activity. However, these data also support that sedentary levels in the intervention group do not increase significantly (as they do in the standard care group), further suggesting that the intervention was protective against dramatic increases in sedentary behaviours.

These data are unique in evaluating the impact of this health promoting intervention because no other health promotion intervention conducted in collaboration with a Métis community and school have measured objective physical activity levels with accelerometers. The Pathways program attempted to measure objective physical activity with accelerometers but due to technical limitations researchers were unable to confirm significant changes (Going,

Thompson et al. 2003). Other Aboriginal-specific intervention studies that have been conducted in Canada, specifically the Sandy Lake Diabetes Prevention Program and the Kahnawake School Diabetes Prevention Program, did not integrate accelerometer measurements into their studies. So there is little to no other comparison data to reflect upon as it relates to the findings in this study. Having Métis-specific objective physical activity levels as measured by accelerometers is a the strengths that this study brings to the research community and general literature.

5.4.3 Photovoice

The mixed methods approach to evaluating the impact of this health promoting school program was valuable because what may not have been detected or appropriately measured in a quantitative sense was further explored in the qualitative analysis. The photographs the children took along with the associated interviews allowed the research team to further understand the experiences the children were having with food and physical activity. Although the knowledge, attitudes and beliefs questionnaire did not reveal many significant changes in healthy food awareness, the photographs and comments from the students clearly indicated some positive changes. More photographs of healthy foods were taken in the follow-up photovoice session compared to the baseline measurement. This could suggest a number of things, one of them being that they were more inclined to take pictures of food items they 'thought' that the teacher or research team would prefer to see. However, it may not matter why they took photos of healthy foods, but that they, in fact, took more pictures of healthy foods overall, suggesting an increased awareness of what types of food would be preferable and healthier.

The photographs also clearly portrayed the important topic of food availability and accessibility. Many students identified that a family member would often drive several hundred kilometers to a larger centre in order to buy groceries. Although these students did not talk about why this occurred, it was apparent that it was a common occurrence in their lives. Interestingly,

there were a few photographs taken of more locally obtained foods such as the picture of freshly picked cranberries or the picture of potatoes growing in someone's garden. The few number of photos that displayed images of locally obtained foods is certainly indicative of the increased reliance on market foods in the majority of families living in this community, and a move away from more local, traditional food procurement. These qualitative data are essential components for understanding and designing culturally safe and culture-based physical activity and nutrition programs that are relevant for participating Aboriginal communities

Photographs taken of leisure-time activities also revealed some interesting themes. Access to playgrounds and parks as well as backyard play structures (swings, trampolines) were highlighted as important ways children were active. It appeared that children played on playground structures generally during the school day but used backyard play equipment more during evenings and weekends. One student reported purposely going back to the school grounds to play on the playground structure but this didn't seem to be a priority for all students.

A large majority of children indicated that they regularly played outside and some would even rather play outside than be inside, especially when they had friends to play with. More indoor photographs were taken during the follow-up phase of this project, in December, when the daylight was diminished. It appears that these children played indoors primarily when the days were shorter and they could no longer play effectively outside because of the dark. Other children highlighted the importance of playing with their pets, a finding that was also emphasized in research conducted in Australia (Fitzgerald, Bunde-Birouste et al. 2009). Pets have been found to play a positive role in the physical activity of children, and our project supports this.

The qualitative photovoice and interview data suggest that knowledge and awareness around what lifestyle choice changes should be made to live a healthier life and prevent the development of obesity and diabetes did, in fact, improve. The children more readily discussed the impact of diabetes in their families and were able to talk about what they could do differently, and in some cases what they reported doing differently already, in order to stay healthy and prevent the development of diabetes. A recent report by Willows et al. (Willows, Marshall et al. 2009) indicated that children with increased awareness of diabetes were more likely to choose an obese drawing of a person as at-risk for diabetes than those children with less diabetes awareness. This heightened awareness and understanding of the link between diabetes and increased body weight may be an important step in promoting healthy lifestyle choices as a way of preventing diabetes (Willows, Marshall et al. 2009).

5.4.4 Limitations

This intervention was a first attempt at collaborating with a Métis community to develop, design, implement and evaluate a CSH approach to promoting health among Métis children. It is clear that more participants are needed to establish more powerful relationships between the intervention and measurement outcomes. Future collaborations with the community of Île-à-la-Crosse, along with other Métis communities, in the future may help to address this limitation.

It is important to consider what changes could be made to the intervention in order to improve upon our current findings. A larger sample size is necessary and given some of the success noted from the qualitative aspect of the study, research team members from the community may be more interested in expanding the intervention to include greater numbers of students. This would also address the limitation that the standard care group consisted of students who were a slightly different age and grade than the intervention group. It may also be worthwhile to further modify the knowledge, attitudes and behaviour questionnaire in an attempt

to be more sensitive to any changes in the measured domains. This, in turn, may reveal more parallel findings to those identified in the qualitative data analysis. It could be speculated that the constructs that were measured within the KAB questionnaire may not have been the correct constructs to measure. The length of time of the intervention could be extended which would allow for more measurements over a longer period of time and to allow students to absorb the information over a longer period. Trends in data would then be possible to observe. Furthermore, by increasing the length of the intervention, accelerometer measurements could be made at more timepoints throughout the year, thereby addressing any seasonal influences noted on physical activity measurements (Rowlands and Hughes 2006; Rowlands, Pilgrim et al. 2009).

Accelerometer wear times are often an issue in obtaining reliable objective physical activity data. In our study, the students were asked to wear the accelerometers for seven consecutive days, but due to compliance issues 91% of participants wore their accelerometers for 1 valid wear day while only 42% wore them for 3 or more valid wear days. It may be useful to determine ways to improve wear-time compliance for future studies.

5.4.5 Conclusions

In summary, exposure of the Grade 3-4 split class to this Métis culture-based CSH intervention resulted in inconclusive results. We speculate that the intervention may have had a positive impact on reported pop consumption and intake of cakes, cookies, pies, doughnuts, particularly when the qualitative results are considered. However, the small sample size prevented any detection of significant differences to be measured between the intervention and standard care groups.

Moderate-to-vigorous physical activity levels were protected in the intervention group such that no significant decreases in MVPA were observed in this group at the same time that there was a significant drop in MVPA among standard care group participants. Sedentary activity

levels did not increase among intervention group participants as they did among standard care group participants. All of these data suggest that this health promoting intervention had a positive influence on the physical activity and nutrition knowledge, attitudes, beliefs, perceptions and behaviours of Métis children.

CHAPTER 6

REFLECTIONS ON USING PARTICPATORY ACTION RESEARCH TO PROMOTE HEALTH IN A MÉTIS COMMUNITY

CHAPTER 6
REFLECTIONS ON USING PARTICIPATORY ACTION RESEARCH TO PROMOTE HEALTH IN A MÉTIS COMMUNITY

6.1 Introduction

There is a growing body of evidence supporting the important role that participatory action research methods play in attempting to understand and rectify the disparities in health that Aboriginal peoples experience in comparison to the general Canadian population (Macaulay, Commanda et al. 1999; Story, Stevens et al. 2003; Willows 2005; Anand, Davis et al. 2007; Bruce, Riediger et al. 2010; Egeland, Williamson-Bathory et al. 2011). Chronic conditions such as obesity and T2D continue to persist at higher rates in Aboriginal populations living in Canada compared to the non-Aboriginal Canadian populations, thereby highlighting the critical need for culturally appropriate interventions to be developed and implemented to address such concerns.

Culture based interventions ensure that Aboriginal ways of knowing and community-specific processes and protocols are integrated into programming which, in turn nurture an environment of self-determination and respect of Aboriginal rights (Macaulay, Commanda et al. 1999; Smith 1999; Potvin, Cargo et al. 2003; Smylie 2008). Integrating cultural values, beliefs and language into interventions and programming can be effectively attained by including community member perspectives and expertise, the individuals who will be directly affected by research programming, in the research process. In this paper, we provide rationale for applying PAR methods to a health promoting research project in order to integrate and include Aboriginal perspectives. We comment on the experiences and reflections on using a PAR framework to promote health in a Métis community in northern Saskatchewan.

6.2 Health Disparities and the Social Determinants of Health

It is becoming more evident that the health disparities that exist between Aboriginal and non-Aboriginal peoples living in Canada can be largely attributed to the social determinants of

health (Loppie Reading and Wien 2009; Raphael 2009; Halfon, Larson et al. 2010). These social determinants have been described as income, employment, education, housing and food security (Smylie 2008; Raphael 2009). Lower employment rates and education levels (Statistics Canada 2008) impact household income (Statistics Canada 2003; Hull 2005) which, in turn, influences individuals' living/housing conditions (Statistics Canada 2008) and their ability to afford high quality, nutritious food (Willows, Veugelers et al. 2009; Willows, Veugelers et al. 2011). Some researchers believe that many of these social determinants of health (income, education, employment, housing, food insecurity) have stemmed from the underlying turbulent processes of European colonization (Smylie 2008; Loppie Reading and Wien 2009; Czyzewski 2011). Considering that all of these determinants impact overall health outcomes of individuals, it is therefore imperative that researchers acknowledge that these influential factors exist, particularly when developing and designing health promotion community-based interventions. One way to do this is by including research participants and community members in every step of the research process.

6.3 Addressing Health Inequities through Participatory Action Research (PAR)

Participatory Action Research (PAR) methodology is being acknowledged as a more respectful way of conducting research within Aboriginal communities. A common theme of PAR is the 'participatory' nature of this methodology which is intended to be collaborative with the research participants thereby ensuring that the focus of the research meets the needs and desires of the research participants (Kemmis and McTaggart 2000; Minkler and Wallerstein 2003). Also a common requirement of PAR is the action-reflection component of the research design that produces experiential learning among research participants and researchers (Stringer 2007; Reason and Bradbury 2008; Genat 2009). PAR attempts to incorporate the richness of the true human experience and include community values, culture and ideology into the research process

to make it more relevant and meaningful for the communities in which the research is taking place. This experiential learning leads to the creation of shared local knowledge related to health within a local context or environment which is further developed and applied through action (Kemmis and McTaggart 2000; Stringer and Genat 2004; Genat 2009).

The community of Île-à-la-Crosse has a strong and positive history of research partnerships with the University of Saskatchewan to date, many of which have been implemented with components of PAR methods. Each PAR project is unique but many share similar themes. Other work by Dickson (Dickson 2000), McHugh (McHugh and Kowalski 2009) and Macaulay (Macaulay, Commanda et al. 1999) all share the critical importance of the participant involvement in all aspects of the project and the development of respectful relationships. This active involvement is what leads to empowerment and positive, relevant change that is applicable to the community. Other similar themes that have been reported are flexibility, adaptation to intervention elements, timelines, and financial restrictions (Potvin, Cargo et al. 2003). Another element that was highlighted in one project was paying attention to what participants do not say, particularly when dealing with populations who have been marginalized and silenced (Dickson 2000).

In developing our CSH research project in partnership with the community of Île-à-la-Crosse and based on PAR methodology, it became clear that many of the successes and challenges our team experienced were unique to this project while other observations supported the "lessons learned" from other PAR projects. The goal of this paper is to highlight some of the methodological considerations, successes and challenges we encountered in our CSH-based PAR project with Métis children. All of these methodological considerations are broken down and

discussed within the context of these four main themes: (1) Relationships and Rapport; (2) Flexibility; (3) Reciprocity; (4) Finding Balance.

6.4 Relationships and Rapport

6.4.1 Including Community Members on the Research Team

Development of strong and trusting relationships are critical elements to embarking on a PAR project due to the integral contribution that both community and academic team members provide throughout the research process (Potvin, Cargo et al. 2003; Stringer and Genat 2004; McHugh and Kowalski 2009). In our project, two Elders invited individuals from the community to act as community research team members/representatives; these individuals were invited because they could provide important contributions to the research team. The various roles of the community members on the research team were discussed and outlined in the development of the Memorandum of Understanding (MOU; Appendix I). The MOU provided us with a great opportunity to outline our expectations and perceptions as to what our roles might look like during the project, in a safe and open format. The development of the MOU was based on pre-existing research relationships and research agreements that had been established in the past with one of my Ph.D. supervisors, and because of this it was well received by the community members of the research team. The MOU clearly laid the foundation for creating an open, respectful and collaborative research environment and relationship between the community and university research teams.

The initial creation of the research proposal and the outline of the roles and responsibilities that were agreed upon were completed with minimal challenges. One of our noted challenges, however, was related to the changes of the community members who were part of the research team during the first few years of the project. We initially started the project with one primary community research assistant but due to the demands of the work she was involved

in she had requested to have her position taken over by another individual in the community. This transition went smoothly due to her commitment to ensure that the individual taking her place was comfortable with her roles and responsibilities, but this did delay the progression of the project to a certain degree because of the time taken to orient the new research team member. Interestingly, this was not the only time during the project that a different person was recruited to the position of research assistant. There were 2 other research assistants who became involved before the end of the project, again causing some disruption to the timeline of the project. This is discussed further in the Flexibility portion of this paper.

Within the first year of collaborating with the Île-à-la-Crosse research team members it was finally decided that a health promotion project should focus on the health of the children in the community. This led to another time of transition as two other community members joined the research team and the project. One of these individuals was the principal of the elementary school, the location where the project was to be implemented; the other individual was the Grade 3-4 teacher from the elementary school who had identified an interest in the project. The difficulty with having these individuals join the research team one year after the commencement of discussions was that they reported feeling 'out of the loop' and had some frustration with trying to 'learn the ropes' after much of the issues they were bringing up had already been discussed as a group previously. These newer members of the research team also described frustration with what they perceived as the "lack of commitment" from the other team members including those who were involved at a higher governance level and who were part of the initial formulation of the project. We tried to remedy some of these concerns by ensuring regular meeting times but we suddenly found ourselves in a situation where none of the initial research team members from the community were attending group meetings and only the newer research

team members were participating in the weekly meetings. This was likely due to the fact that several of the initial research team members felt that their various roles and responsibilities were related to the overall governance of the project rather than the day-to-day responsibilities. Perhaps these roles and responsibilities were never made explicit to the newer members of the team and even though I felt that I had described the situation to these individuals it may have helped to have a full group meeting to have the team members discuss this among themselves. The newer members of the research team described feeling like the initial team members generated the ideas but that the details and the work were to be carried out by the newer individuals, thereby creating a sense of tension. As well, when the newer members of the research team joined this process, I did not have an opportunity to travel up to the community for a face-to-face meeting and this could have also played a role in the general sense of uncertainty at this time. Developing strong relationships by phone is difficult and planning a face-to-face meeting may have helped in establishing greater confidence in the newer members of the community. Another retrospective idea that may have helped this situation was to have another, newer MOU made up to include the newest members of the research team along with the initial members of the team. In other PAR projects throughout Canada and within Aboriginal communities, it was difficult to ascertain if similar issues of roles and responsibilities existed however, several researchers have emphasized the critical importance of developing strong relationships with clarified roles and responsibilities (Macaulay, Commanda et al. 1999; McHugh and Kowalski 2009). We felt that although these issues did not hinder the progression of our project, they did create frustration and perhaps elements of distrust among some of the newer members of the research team. On reflection we feel these issues may have been

overcome by integrating more forms of communication such as a larger team meeting taking place more regularly and the development of an updated MOU.

6.4.2 Building Research Capacity and Community Ownership

A sense of community ownership of the project was another topic area that I have reflected on during and since completing this project with the community of Île-à-la-Crosse. For the most part, my overall sense was that different community research team members felt various amounts of "ownership" for the project at different stages of the project. This 'sense' was established from various things that were said, such as "Sarah's project" and also from general observations made throughout the project. I became aware that some items or activities would not have occurred if I had not been continually asking about things and this added to my sense that community 'ownership' of the project was sometimes wavering. However, other than my interpretation of these events, no other objective evidence is available and these interpretations may not be accurate. I believe that community members involved in the project were made to feel included and had opportunities to add their perspectives into things throughout the whole process. In saying this, however, due to the fact that I am not from the community and have never lived in Île-à-la-Crosse, these are purely my perspectives and I may never truly know what each community research team member really thought about their involvement in the process, particularly since I did not ask each of them directly about this. It was difficult for me, the researcher, however when I would ask for community input on a document that I had created and minimal edits or feedback were delivered back. In one example, community members declined the offer to participate in the writing of a document but had had the opportunity to read through a document that I had created, and reported to me that they had reviewed things but no other feedback was provided; in this instance I had to trust that if any of the information did not meet the needs and cultural ideology of the community members, they would have informed me.

Barriers to obtaining feedback could have been due to a number of factors such as time and money. I relied extensively on one or two community members for guidance throughout this project who were very busy individuals and very involved in many other community events and activities. These indivduals were not paid for their time but had agreed to provide advice and direction for the project so they likely had many other obligations competing for their time. The fact that I had very few opportunities to participate in face-to-face meetings and discussions may also have led to barriers in obtaining feedback, so this would be another consideration in future projects. However, this was difficult for me to navigate the various barriers that inhibited community members from being able to fully engage in all of the aspects of this project, barriers that were often related to their important role in their community. I wanted to stay as true to PAR as possible but individual and community realities made this a challenge. I have realized in my reflections on my experience with the project that although community research team members were not always able to engage in some of the writing aspects of the project, they were always appreciative of being given the opportunity to provide feedback on what documents I had put together. I realized that when I did ask for their input it was easier for them and perhaps less time intensive if they had something concrete to look at or review (eg. a powerpoint presentation or a word document), rather than starting from a blank slate. In saying this, however, I was always very cognizant of asking for their input and clarification of their expected or perceived role in the various aspects of the research project, ensuring open communication was occurring. At no time did I ever make an assumption as to what I thought their response or involvement might be and it was because of this, I think, that our project was successful and that we developed a strong and respectful research relationship. McHugh reports similar experiences in her research where the choice of the participants to decline any writing opportunities was respected and participant

inclusion in her PAR project was integrated in other more meaningful ways for the participants (McHugh and Kowalski 2009).

In the early phases of this research project, a summer garden and playground initiative was undertaken in response to some of the community suggestions that came out of one of the initial focus group discussions. The research assistant at the time was very keen for the community garden project to move forward and I felt that she felt a significant amount of 'ownership' over the garden portion of the project. There were many evenings when I would attempt to contact her and she was out at the community garden making sure everything was running smoothly. Due to her involvement in the garden project, the garden thrived for the most part of the summer until this individual commenced a job that did not allow her as much time to spend on the garden project. It was also at this time, therefore, that many weeds took over at the garden and the research assistant expressed some frustration and difficulty with finding time to keep up with the garden. She continued to perceive the garden as a positive experience, however, and was able to share her experiences and thoughts on how things could be done differently in the following summer. In the end, the garden produced a moderate amount of lettuce and several tomato plants produced fruit. Carrots were also successful in the community garden. This example of community capacity building and creation of community ownership over the project indicates the critical need to have key community stakeholders involved in a project, individuals who will feel ownership over a project and see the project as benefiting them and their community.

On the other hand, during the garden project, we also attempted to initiate a summer physical activity program for young children (ages 8 to 10 years). For this portion of the project it was difficult to find a community organization or individual who would take a leadership role

in running such programming. It is difficult to ascertain why this was the case because even after extensively chatting with the research assistant, she was not able to share with me why this was occurring either. It was at this time that I also realized that when Elder Marie connected with different individuals and/or organizations to ask for their support or involvement in the project, there seemed to be a greater chance of integration into the community. This indicated to me that different individuals play very different roles in the community and without having this understanding, particularly as an individual living away from the community, programs may or may not be successful. This speaks very clearly to the fact that complex social systems exist within the community of Île-à-la-Crosse and when a person does not live in such an environment it is impossible to understand how these social systems can impact research and programming.

We created a physical activity 'traveling playground' kit that contained a physical activity play or games book (Appendix XIV), along with the associated equipment, some healthy snacks and drinks and a few age-appropriate prizes. The goal of the physical activity phase of this project was to train an older youth or young adult to mentor the younger children and run the physical activity programming. Initially we engaged with a youth leader in the community but due to several various circumstances, she was unable to follow-through with leading the physical activity project. She did, however, help connect our team with the community sports and recreation department who offered to help us out by assigning one of their youth workers to the physical activity program for young children. Throughout the course of the summer, however, only a few of the sessions were conducted and it was reported by the community recreation department that it was the availability of their youth workers that hindered the progression of the physical activity programming. At one time I recall someone mentioning that this project was sometimes referred to as "Sarah's project". The idea that these individuals were merely trying to

"help" me out was a matter that I was not comfortable with and it encouraged me to strongly reflect on why this part of the project was not seen as a component of the programming that the recreation department offers their children. As the summer progressed through to the end of August it became clear that due to the circumstances and the short time-frame that we attempted to get such physical activity programming organized, that there was not enough time to build community capacity and ownership over this phase of the project. Community ownership over programming is a critical element for initial and sustained uptake of any health promoting programming, as we have witnessed in this project.

Interestingly, the idea for the physical activity 'traveling playground' program was developed from a focus group discussion conducted with several community members. So even though the idea for this health promoting project was generated by community members it was still difficult to develop community ownership of the physical activity summer project. I feel that this can be attributed to a number of factors and barriers, one of the primary challenges being the amount of time that was devoted to the development and implementation of the 'summer traveling playground' program, thereby impacting on the overall relationship and rapport that was developed between community members and the research team. The community garden project was organized and led by a paid community member of the research team who had already had time to get to know the goals of the project and understand the overall role and impact a garden may have with respect to the health of the children living in Île-à-la-Crosse. It was this individual who would monitor the garden and was directly involved in the maintenance and problem solving associated with the garden. The 'summer traveling playground' project, however, did not have one person devoted to lead the project or be paid to do this work and less time was available to build rapport with such an individual. The community members who

offered to help with leading this program were adding this project as an extra ‘to-do’ to their list and it was not their priority. In summary, therefore, merely obtaining ideas about priority programming to deliver in a community setting is not enough. Research teams need to ensure that the highlighted priorities are priorities for the individuals or organizations who will offer such programming to ensure appropriate uptake and sustainability. The barriers to delivering a successful ‘summer traveling playground’ were primarily related to the process with which the delivery was attempted and having this understanding will help our team in future projects.

6.4.3 Understanding the Role of Community-specific Social Structures

Community member perceptions of the community research assistant and community research team members along with the local relationships among community members also play an important role in the rapport building aspects and successes of such a community-based participatory action research project. The dynamics of a population of people living in a community, along with unspoken political undertones, can play a role in community capacity building and the development of ownership over portions of such a community-based research project. Several situations arose during the life of this research project that created obstacles in the progression of the research project. Often these situations were not always clearly understood by the academic team members but it became clear that open communication and the need for one-on-one conversations with the involved community members helped resolve many of these unforeseen situations. This example points to the importance of creating an environment that promotes open communication with all research team members. As well, academic researchers, particularly those who do not live within the community participating in the research project, must be aware that political forces are often at play and may likely be woven into the research process as well. In our experience active listening is crucial in such situations to ensure that community members are being heard and considered in the research process.

6.5 Flexibility

6.5.1 Research Team Member Changes

Flexibility became a theme on many levels of this research project. As described above, there were several changes that occurred with the individual who took on the role as community research assistant. This individual was the person who was primarily involved as the main community liaison and who ensured that all community-specific concerns were highlighted and integrated into the project, and who also provided updates to the rest of the research team. During the 4-year life of this project, we had 3 different research assistants which occurred primarily because of the many changes in employment these individuals were engaged in. As an academic research team member it became apparent that change played a very large role in the lives of community members, from change in employment to change in the places they lived. This change also affected the roles of the community research team members in this project. One research assistant was very involved in caring for her grandfather and requested to step down from her research assistant position due to family demands on her time. Again, this highlights the important role that family relationships play in community members' lives and allows a glimpse of the unspoken kinship systems that are still strong in the community. Academic researchers should be aware that such social systems may very well be in existence in different Aboriginal communities and having this awareness may enhance understanding and relationship building in future Aboriginal health research projects. Flexibility and adaptation, themes also identified by Potvin et al. in their work with the Kahanwake Diabetes Prevention Program (Potvin, Cargo et al. 2003), also became crucial traits of this research project and team dynamic. The Khanawake project highlighted the need for flexibility with identifying project timelines and goals outlined from successful grant applications at the same time as respecting community-specific timelines and goals. As well, as the project successfully progressed many community staff assumed

national leadership positions which led to the need to train newer community members and having flexibility with what these changes meant for project timelines was another lesson learned.

Underlying much of this change was the influence that employment and financial stability had in the lives of the community members that contributed to this work. The research assistants that I worked with were generally not employed in the community at the commencement of their role in the project, but were actively looking for more stable employment opportunities. To observe the influence of lower income levels and unemployment first-hand with the people I was working with, the people who were making significant and influential contributions to this research project, was "eye-opening" in the sense that it made me realize that much of what these community members were facing everyday (financial insecurity) were clearly affecting their lifestyle choices. This experience really encouraged me to reflect on my 'place' in the relationships I was building with these individuals and to consider how these different 'unspoken' elements (such as economic status) can influence the relationship building taking place with community members. It became easier to see that assumptions that I might hold about certain topics (such as buying fresh produce) could be very different to those held by the community members I was working with, all of which impact the power dynamic that exists in relationships (even if I didn't want to acknowledge that they did exist). This was a very humbling experience and I hope that it will impact the way I participate in PAR in the future. The very issues I have been writing and learning about over the past several years as they relate to the social determinants of health were clearly visible not with the minority of the community members I was linked with, but rather the majority.

6.5.2 Project Timelines

Another area where flexibility was required to ensure the success of this project was in relation to the proposed timeline of this project. There were several instances where the original plan and timeline for research events could not be maintained due to the various real-life, non-research-related demands placed on certain community research team members. During the life of the research project, there were several research assistants who were employed at various stages of the research process. This had both advantages and disadvantages as it brought an element of flux that challenged the flow and timeline of the research project, but, at the same time, and perhaps more importantly, it allowed more individuals in the community to have exposure to working as a research assistant in the research process and encouraged an even greater amount of community input into the project. Unfortunately, these changes meant that no one individual was involved in the many stages involved in planning, designing, implementing, analyzing and disseminating of the research results. In fact, one of the limitations of this project was near the end of the project when there was no longer consistent community input by a community research assistant into the results analysis and interpretation of the data. The academic research team members relied primarily on feedback from the community research team members who were volunteering their time to the project. The opinions of the volunteer members of the team have been critical to the final stages of the research project but it became difficult for some of these volunteer community research team members to fully share their input as they did not have the specific context for interpreting all of the data that had been collected, nor did they have the time to devote. We were very cognizant of the amount of time the community research team members were devoting to the project, time they were volunteering to the project and likely giving up other elements important in their lives; therefore, we asked of their time and input as minimally as possible. The academic research team member

interpretations and analysis became more prominent than perhaps they should have been. This, clearly, is a very important observation that we have learned from in doing this project, one that we hope to address and do differently in future research projects.

At one point in my Ph.D. training, I had several more senior researchers question me on the practicality of doing PAR as a Ph.D. project with the concern that it would take a much longer time to do it based on the PAR framework. At the time I wasn't sure how to respond effectively but as I reflect on this question and the experiences I have had, I would have to respond with another question: "How could I practically do it any other way?". If we, as researchers and health care professionals, really want to support communities and individuals, primarily of different ethnicities and cultures, to improve their overall health outcomes and address the disparities that currently exist, we cannot do this without their expertise. Without their input into what they experience on a day-to-day basis, we have no idea where the starting point should be. The priorities, challenges and successes of one community can be very different to another and only the people living in those communities can help highlight these differences. As well, as researchers working in rural and remote locations where it is not practical to spend long durations of time integrating into the community, it makes sense to include community members in the various stages of research. The health concerns related to obesity and T2D are complex ones, ones that require many different lenses and vantage points to come together, to work together, to address them.

Integrating a PAR-based framework into a Ph.D. project in a timely manner that fits with the timeline guidelines of University institutions and expectations, however, is a valid question. In my experience, there were a few key elements that enabled me to complete my Ph.D. project within an 'acceptable', Western timeframe. First, we chose to work with a community that had

already identified that diabetes was a concern and a priority for their community. Second, the community we worked with had already established a respectful research relationship with one of my supervisors. These initial elements, of working with a community that had already established trust with one of our academic research team members, was a critical one as it enabled dialogue between the community and academic research team members to commence immediately. It was very helpful that the topic of discussion was identified as a priority for both the community and academic groups. It was still critical, however, for me to build further trust and respect with the community members throughout the duration of the project, but the initial dialogue had already been started indicating that the community was keen to proceed with a project related to health promotion with a group of children living in the community. In following with previous recommendations, the research priority was a pre-existing focus of the community and through discussions an agreement was made to focus on preventive strategies with children in the community, before they even start experiencing signs and symptoms of either obesity or T2D.

6.5.3 Listening to Integrating Community Perspectives and Ideas into the Research Project

Another element integral to the success of this project was the initial establishment of a research team consisting of community members early in the research process. Identifying several key members of the community who could be involved in decision-making and overall governance of the project at the out-set of the project was very helpful as it allowed me to have a few people to contact as I was navigating the initial steps of building rapport and integrating community perspective into aspects of the project. In this case, as well, the initial research team consisted of a diverse group of community stakeholders including the mayor of the community, a member of the Sakitawak Métis Council, an Elder, a teacher from the high school and the principal from the high school. These individuals were all recruited by the Elder in the group

who had also been involved in previous research projects with my supervisor and who understood the importance of working collaboratively with the academic research team members to generate timely decisions. If it had not been for the dedication of this Elder to the health of her children and community, and her leadership ability to garner increased interest in this project, it may have taken significantly more time to form this community portion of the research team. Having such a community leader, someone who the community knows well and trusts, was integral in maintaining the momentum that was being built at the beginning of this project. I strongly recommend the involvement of such a person in any participatory action research project. This person understands the language and culture of the community members, is usually well respected in the community, and can easily navigate the underlying socio-political currents that may exist to allow discussions to occur between community and academic individuals.

The development and signing of a Memorandum of Understanding (MOU) created an opportunity to openly discuss both community- and academic-specific issues important to the project. At the time of the commencement of the project, we based components of the MOU on the CIHR Guidelines for Health Research Involving Aboriginal Peoples (Canadian Institutes of Health Research 2007). The MOU was initially developed using a template that had been previously and successfully used with the community in the past. Having a draft of a document to refer to regarding appropriate language and key elements was exceptionally useful for me, the graduate student, who had never been involved in this process with a Métis community before. The MOU development allowed important dialogue to ensue on topics related to data ownership, roles and responsibilities of both community and academic team members and generally opened the floor for community research team members to voice any concerns they may have had as they related to the research project. Specifically, it allowed a ‘safe’ and neutral environment for

discussing issues related to reciprocity, respect, data ownership and overall trust building. It was critical for me, during this time that I was actively listening to any concerns brought up by the community, to ensure that individuals from the community felt that they were being listened to. I was keen to learn as much as I could from their perspective in order to be able to integrate it into this initial MOU document and being sincerely and genuinely interested in a neutral and agreeable way enhanced the building of our trusting relationship. One specific concern that was discussed was related to data ownership and some of the wording around that topic. The community research team members felt strongly that they wanted to have the ability to control how any data from this project, taking place in their community, was going to be shared. Several iterations of the wording and phrasing around the data ownership and control element of the MOU took place before the agreement was signed. In the final document it was stipulated that any document that is to be published must first be reviewed and approved by a community research team member. I had absolutely no issue with this and worked diligently between the requirements of the community and the University of Saskatchewan Research Ethics Board to ensure that both parties were satisfied.

6.6 Reciprocity

Participatory action research (PAR) methods emerged in resistance to the 'mainstream' Westernized way of conducting research in communities, primarily in marginalized communities. PAR generally allows research to be conducted in a collective way, with the individuals who will also be the participants in the project, in order to produce and diffuse new local and Indigenous knowledge (Pyrch 2007). PAR is based on a philosophy of partnership, collaboration, Aboriginal self-determination, equity, social justice, all of which focus on resolving barriers the have historically existed between the researcher and the researched (Maiter, Simich et al. 2008). An important practice and principle of PAR is the concept of

reciprocity which plays a role in the quality of research relationships, outcomes, new local knowledge and consequences secondary to research (Maiter, Simich et al. 2008).

Respect, reciprocity and relationships are the three R's integral to PAR all of which relate to performing research in an ethical way. Reciprocity describes the mutual exchange of knowledge and action that takes place within a respectful research relationship between researcher and participant community (Maiter, Simich et al. 2008). Reciprocity has been previously defined as "exchange between social equals" (Kottak 1986) (p. 136) where there is an expectation of exchange between two socially bonded groups, a bond that is further strengthened by the exchange.

In our CSH-based physical activity and nutrition program there were many elements of reciprocity that occurred on many different levels. Initially the community research team members identified the topic area of diabetes to be the focus of the research project and they wanted to design the project for the children of the community in an attempt to promote their health and work towards enhancing a healthy future for them. So even from the start of the project, before the design of the project, elements of reciprocity existed in the exchange of dialogue and sharing of concerns about the best way to address the health concern of diabetes. Community input regarding the Michif language, culture and values were integrated into the design of the classroom lessons that were developed, all of which are forms of reciprocity that was integrated into the project. The culturally relevant classroom set of health promoting lessons that were developed have been left with the community in order for these lessons to be continued to be delivered to the Grade 3-4 children and is an important way that the academic research team members were able to 'give back' and embrace the concept of reciprocity with the community.

The school that was involved in the project also received several various honoraria in return for their active participation in the research project and process. A class set of pedometers were provided for the school which were items that the school was looking to purchase in the future. The students who participated in the study all received a soccer ball and a water bottle with their school logo as a token of appreciation for their involvement. All of these items were not only meant as tokens of thanks for the community participants but also as important tools that would further enhance and support an environment in which children could remain active.

Providing a funded position for a community research assistant/coordinator was a very strong way of integrating concepts of reciprocity into this project. Ensuring that grant money was directly flowing into the community affected the general community economy and supplemented the family income of the research assistant that was hired. As well, this allowed for enhanced knowledge acquisition for the community research assistant which promotes the capacity building taking place in the community and support the community to further explore their own research goals independently.

Another community-specific capacity building element we included was hiring a high school student to help out with various components of data collection. This individual was hired on the recommendation of the high school principal and she was invited to spend her 'spare' class time helping out our team with data collection. This student was hired to enhance their exposure to research and to help shape their learning experience, at the same time this individual was able to share their perspectives and experiences during the process.

One of the more final acts of reciprocity and 'giving back' to the community has been in the way of disseminating the important results of the project back to the community participants and interested stakeholders. Sharing the results of the project with the community has also

provided another opportunity for community members to provide their feedback and local interpretation of the results to the research team. As well, it has ensured that the community stakeholders are fully aware of what the results and conclusions are of the project and has allowed them to be involved in the dissemination of the results.

Building the capacity for Aboriginal community members to develop their research skills is one part of the reciprocity equation, however, increasing the academic research team members' ability to learn from community expertise is the other aspect of this. My personal experiences and the knowledge that I gained as a Ph.D. student engaging in community-based research in partnership with the Île-à-la-Crosse community were tremendous and continued through to the very end of my Ph.D. project. The importance and value of face-to-face meetings became clear to me not only because of the verbal communication that takes place in a conversation but also the non-verbal communication. It can be difficult in telephone conversations or through email correspondence to identify underlying meanings or feelings about various topics compared to engaging in face-to-face meetings. These underlying meanings and unspoken attitudes are particularly important when attempting to establish relationships and ensure that unintended assumptions or interpretations do not occur.

Respecting the intentions and expectations of the community research team members is another important aspect of community-based research that I learned to respond to very quickly. As academics we live and breathe research methods, design and processes, all of which may be foreign to community-based research team members. Situations arose that required minor modifications to the design and timeline of the project in response to requests made by community research team members. This flexibility in modifying what had been already planned

out enhanced the trust building relationship in the sense that community members felt they were actively engaged and had a sense of control over various aspects of the project.

Participating in this community-based research project enhanced the building of my skill set in understanding that my perspective and viewpoint are different from that of the community members. I was able to practice first-hand the skill of stepping back to accept and respect the opinions and viewpoints of community members and value their input into the project. Bringing my knowledge system and research practices together with those of the community was an important part of this project and allowed me to experience the concept of meeting in an open 'ethical space' to share the strengths of both the Indigenous and the Western Eurocentric perspectives (Ermine 1995).

6.7 Finding Balance

Finding balance was required in establishing relevance for both the academic and community research team members. On one hand, I was focused on the various elements that fulfilled the requirements of completing my Ph.D. On the other hand, I had to always be aware of the relevance of this project for the community. If I had merely focused on completing what was needed for the requirements of my Ph.D. project I would have been significantly neglecting the needs of the community and would have faced issues of distrust and disrespect. Ensuring that the project had relevance for the community at the same time that it met requirements of my Ph.D. program, allowed me to view my Ph.D. slightly differently. It allowed me to embrace the process of doing research in collaboration with the community, and encouraged me to move away from focusing primarily on the final product-driven outcome of my Ph.D. and also focus on the 'bigger picture', the true meaning and impact this work was having on the children and members of the community.

Balance was also important from the perspective of integrating much of these newly developed health promoting lessons into the teacher's already 'full' teaching load. I attempted to ensure that the teacher was not feeling overwhelmed with any of the 'extra' lessons by checking in with her to discuss her challenges with integrating this information into the classroom. These discussions led me to reflect on the importance of the content of the legislated provincial curriculum to ensure that health promotion topics are integrated in ways that are not difficult, but rather mandatory, for teachers thereby increasing the sustainability of health promoting messaging.

Finding the balance between sharing my ideas and thoughts with community members and listening to their perspective was ongoing. This, again, was another skill that I worked to improve upon throughout the life of this project. Sitting down and having the 'real' conversations with people, stopping to take a step back and help out at times when community members needed help with something, things that were often not even related to the research project itself, but to life in general, made the largest leaps in the trust building process. There were times when I would ensure to ask the community members I worked with if they needed any specific items from Saskatoon, knowing that they did not have easy access to particular resources or services. If asked, I would pick up items from Saskatoon for the community research assistant(s) and transport them up to the community when I was planning a trip. These were the most important relationship-building practices that I engaged in ~ helping out where and however I could. I think it allowed the community research team members to realize that I was not just in this project for the final end product of my Ph.D. and the results, but that my heart was truly involved in this project and that I was serious about building lasting relationships with this group of individuals. Trust and rapport building was enhanced by being a genuine and

sincere person, losing any pretenses and academic lingo and communicating and engaging with the community members on a human level and discussing health issues important to both themselves and myself.

6.8 Conclusions

In summary, applying PAR methods into a health promoting project in collaboration with a Métis community such as this one was a highly effective way of ensuring that community-driven priorities, values and culture were integrated throughout. This paper highlights the need for academic members of collaborative research teams to be aware of important aspects such as building respectful relationships with community members in order to neutralize any underlying power differentials that may exist between academic and community research team members. Researchers should find balance between attempting to meet Westernized concepts of project timelines and deadlines with understanding the realities that community members face that may not fit with original project plans. Research team members must all learn from each other and embrace the concept of reciprocity so that future research projects can be enhanced and built from the learning that both academic and community research team members experienced.

CHAPTER 7

GENERAL CONCLUSIONS, LIMITATIONS, KNOWLEDGE TRANSLATION AND FUTURE RESEARCH

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GENERAL CONCLUSIONS, LIMITATIONS, KNOWLEDGE TRANSLATION AND FUTURE RESEARCH

7.1 General Conclusions

Several general conclusions can be drawn from the data and work completed included in this thesis manuscript. The primary purpose of this project was to evaluate the impact of implementing a culture-based CSH intervention on the knowledge, attitudes, beliefs and behaviours related to physical activity and nutrition among Métis children in a Grade 3-4 split class in rural northern Saskatchewan. The overall effectiveness of the intervention on dietary knowledge, attitudes, intentions and behaviours did not show statistically significant changes in the domains measured. However, there were small, informative changes that were observed in specific categories of low-nutrient dense foods (cakes/cookies/pies and pop consumption) that warrant further research to determine if these were in fact due to the intervention. The photovoice and interview portion of the study indicated increased awareness of what foods constitute healthy foods among students in the intervention group.

Improvements in physical activity behaviours also occurred within the group of children receiving the CSH intervention. No significant decreases in Moderate-to-Vigorous Physical Activity (MVPA) were noted in the intervention group, at the same time that the standard care group were observed to have significant decreases in MVPA. These data suggest that exposure to this health promoting program had a protective effect on any decreases in MVPA that would otherwise be expected. The significant decreases in MVPA among standard care participants are consistent with previous studies confirming that seasonal decreases in MVPA are expected throughout the year (Rifas-Shiman, Gillman et al. 2001; Rowlands and Hughes 2006; Rowlands, Pilgrim et al. 2009). Furthermore, participants involved in the CSH intervention did not have any

significant increases in sedentary levels of activity, while their peers in the standard care showed significant increases.

An unintended, but important aspect of this project was the unique objective physical activity data set that was collected. Objective physical activity measurements obtained through the use of Actical accelerometer devices were used for the first time within a Métis child population to provide an objective view of physical activity levels in these children. This has allowed a better assessment of the actual contribution of daily physical and sedentary activities taking place in the lives of the participating children in a rural Métis community. These data have been collected at an important time as objective physical activity measurements are now available for the general Canadian child population through the data collected from the CHMS. Findings from this project indicate that Métis children living in Île-à-la-Crosse, Saskatchewan generally spend more time participating in MVPA than the general Canadian population.

A secondary purpose of this project was to reflect on the process of using Participatory Action Research (PAR) to implement the CSH intervention in partnership with community stakeholders. The results indicate that using PAR was a critical and integral part of implementing this comprehensive school and classroom health promotion intervention. Including members of the community from the start of the project was integral to capturing community-specific concerns and ideas even before the research questions were fully developed. Input from community members was obtained prior to determining the research focus and questions related to the project and the community 'voice' was interwoven throughout the development of the health promoting physical activity and nutrition lessons that made up the main portion of the health promoting intervention. Inclusion of community member opinions, ideas and expertise led to an enhanced level of community ownership over the health promoting lessons which further

supported the uptake of teaching these lessons in the Grade 3-4 classroom during the school-based intervention phase of the project. The teacher and students who participated in this intervention were able to more fully relate to the lessons that were shared with them due to the fact that they included Métis language, culture and values throughout. Thus, health promotion programming and school-based interventions must be developed in conjunction with community partners to ensure that the unique cultural and community-specific values can be integrated into the programming. Furthermore, this project focused on including research participants in all aspects of the research process, including the data collection phase. This project has outlined a successful method for using photovoice as a means of actively engaging young participants living in a rural and remote location in the research process. In so doing, the children's perspectives, ideas, views and cultural experiences were brought forward and highlighted in ways that may not have been possible without the use of the photovoice methodology.

There were several successes and challenges identified in engaging in research in collaboration with a community partner, all of which are important to highlight and identify in order to learn from and apply to in future PAR projects. The main 'lessons learned' through engaging in research in collaboration and partnership with a Métis community included the importance of building a trusting relationship and establishing roles and responsibilities early on. Ensuring that the academic research team is as flexible as possible with changes that may occur during the life of the research project, as community members' input are integrated into programming. Finally, ensuring that reciprocity as adhered to throughout the research relationship was a large part of achieving success with this community-university partnership and research project.

7.2 Limitations

The primary overarching goal of this research project was to determine the effectiveness of a CSH intervention on the physical activity and nutrition knowledge, attitudes and beliefs of Métis children using PAR methods. The new knowledge gained from this project will add to the area of promoting health of Métis children in collaboration with a Métis community, particularly since there is a very limited amount of health data available within a Métis context. This project has been a first step towards addressing health inequities among Métis children and because of this there are limitations to this project that are noted and acknowledged. The first limitation in this project is the short length and duration of the intervention phase of the research project, which was chosen in response to feedback from the community research team and to ensure appropriate timeframes for a Ph.D.-level project. Second, in respecting the community members' request of starting this project with one grade of students, a small sample of students participated in the research project. These limitations influenced the power of the quantitative data however important changes among physical activity and nutrition behaviours were observed and were strengthened with the integration of the qualitative data. The generalizability of the findings may therefore be limited and application of the results to other children in the community or to other Métis communities may not be appropriate. Finally, the main data collection time points only occurred 2 times during the project due to the short duration of the intervention. Implementing such an intervention over longer periods of time would allow more data collection measurements to be taken and potential trends in changes related to physical activity and nutrition knowledge, attitudes, beliefs and behaviours.

7.3 Knowledge Translation

Health care systems and communities are continually facing the challenge of improving the quality of care to individuals and groups of people and working toward increasing positive

health outcomes (Straus, Tetroe et al. 2009). In order to improve community health care systems, services, products and population health outcomes, research projects are continually taking place to examine various research questions with the goal of exposing new knowledge that can be applied to community health care delivery and system management (Canadian Institutes of Health Research 2009). The application of knowledge from research settings to the clinical setting has been coined Knowledge Translation (KT) and is one focus of the research community in order to work towards closing the knowledge-to-action gap. The CIHR has defined KT as "a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system" (Canadian Institutes of Health Research 2009). In an Aboriginal context, KT has been defined as "sharing what we know about living a good life", where oral traditions, practical and experiential knowledge, along with cross-cultural sharing form the building blocks of Aboriginal KT tradition (Kaplan-Myrth and Smylie 2006; Estey, Smylie et al. 2009).

In a project such as this, where a Métis-specific CSH intervention was implemented and evaluated in a northern, remote Métis community, it is important to share and translate this new knowledge. Knowledge transfer should occur with many of the grades and the schools in the community to apply new knowledge to their learning and school experiences, as well as with the greater community including business owners and stakeholders so that they can further apply this knowledge to their areas of expertise and services that they provide. The new knowledge generated from this project will be most applicable to the community partners however, there are many other northern and remote Métis communities who could benefit from learning about the

successes, challenges, and knowledge gained from this project as well, particularly when there is a paucity of Métis-specific information and data available to such communities.

The knowledge translation that has occurred and that will occur related to this research project attempts to combine and build on both the Western and Aboriginal perspectives of what KT is defined as. To date, the community has received a detailed presentation along with question and answer periods related to the final results of the project. Key community stakeholder groups such as the elementary school teachers and the Île-à-la-Crosse School Division school board have been presented with these final results. The goal of sharing this knowledge with these groups is that these are the primary knowledge users who can gain tremendously from understanding the impact this CSH intervention has had on the participating students. This may impact future programming decisions made by these community members which, in turn, could lead to improved local health outcomes. Members of the community research team were involved throughout the results dissemination process and continually provided input at this critical stage of the research process.

Communications experts from the Indigenous Peoples Health Research Centre and the University of Saskatchewan have also been involved in enhancing the transmission of the knowledge gained in this project to various media outlets. This, in turn, has led to the sharing of these research results with many communities throughout Saskatchewan and has started building momentum that seems promising in the context of spreading and sustaining such programming. It is expected that sharing new knowledge in this way, at the local level, will improve the knowledge-to-action gap.

Finally, as this project concludes, papers adapted from this thesis dissertation will be submitted to peer reviewed journals with the long-term expectation of sharing the unique

knowledge created from this project within the academic community. Sharing the knowledge gained from this project with other academic teams provincially, nationally and internationally will fill the information gap that exists within the health promotion community as it relates to Métis populations.

Overall, it is anticipated that the information gathered from this project will be practical and applicable to the community, specifically the teachers, parents, school board members and most importantly the children. It is hoped that community stakeholders can build on the successes of this project and apply this knowledge to enhance programming, services, and influence education curriculum development in order to support and promote healthy and active lifestyles in order to prevent the development of chronic conditions such as obesity and T2D among Métis populations.

7.4 Future Research

It is clear from the initial success of this project that using PAR in the context of designing, implementing and evaluating this CSH intervention is highly recommended to researchers planning on engaging in intervention research in collaboration with a Métis or First Nations community. Active participation of community members in any research that can have an impact on their future health and health outcomes is paramount to laying the foundation for the development of successful, respectful and meaningful research relationships. PAR methods can help to ensure that research is "being done in a good way", for the good of the people and community (Kovach 2010).

Currently, there are few intervention studies focusing on school-based health promotion that have been followed up after a period of time. The Kahnawake School Diabetes Prevention Program is one of only a few programs that has ensured follow-up measurements to monitor the long-term impact of a school diabetes prevention program within a First Nations context. No

such intervention or long-term follow-up has been recorded in the literature within a Métis context and this would, therefore, be an important future research recommendation.

Spreading and sustaining the positive and influential aspects of intervention research is a critical element of the research process that may be overlooked, particularly at the end of a Ph.D. project. Ensuring that a project such as this one is shared, that the knowledge is translated not only at the academic level but also at the community and provincial levels is a definite recommendation from this work. It would be important to extrapolate such a health promoting set of lessons to other grades within the Rossignal Elementary School in Île-à-la-Crosse. Not only within the same school, but also working with other communities to share the successes and the challenges to doing this type of work so that they may bring such programming to schools in their communities. It is recommended that future research should engage with more participants over a longer duration to be able to draw more comprehensive conclusions around trends that may be observed as a result of children participating in a CSH intervention.

Another future recommendation is to aim to engage community businesses and stakeholders who are responsible for ordering and selling food products in the community of Île-à-la-Crosse (and communities in similar situations as Île-à-la-Crosse). Developing, implementing and evaluating an intervention in partnership with such businesses would help to holistically address issues around healthy food availability and affordability. This current Ph.D. project is merely a start to looking at influencing knowledge, attitudes and behaviours related to physical activity and healthy eating in children; a continuation of this work that is recommended is working with community members to influence the food environment they are exposed to, to change it in ways that meet community wishes and desires in order to have a positive impact on the food choices that are made.

Expanding on the accelerometer data that was collected, a further recommendation is to further examine and identify the factors that are leading to the finding that Métis children living in Île-à-la-Crosse spend more time participating in moderate-to-vigorous physical activity (MVPA) compared to the general Canadian child population. It will be helpful for future development of policies, programs, services, and/or the built environment to have increased knowledge about what supports, nurtures and encourages young children living in rural, remote locations to spend increased amounts of time in MVPA.

Finally, in engaging in collaborative research in partnership with Métis, First Nations or Inuit communities, it is important for academic researchers to be cognizant of the different 'lens' and viewpoint they come to the research table with. As previously described, researchers must act respectfully and ethically, in accordance with specific guidelines (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada et al. December 2010) to ensure that trusting relationships are built. Just as importantly, researchers need to acknowledge their Western perspectives and work towards realizing how different these often are to Indigenous ways of knowing. In the end, in this project, the research was done in a good way, to influence healthy lifestyles and provide Métis children with tools that will help them to make healthy choices now and in the future. As eloquently stated by one of the research participants "… I'm starting to change a little bit. Everyday I start to change."

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Appendix I

Memorandum of Understanding

APPENDIX I

Memorandum of Understanding
for the
Community-based Diabetes Prevention Program

It Takes a Village: Preventing Obesity and Type 2 Diabetes Through a Culturally Sensitive Health Enhancing School Program for Métis Youth

Principal Investigator: Dr. Karen Chad
Co-Investigator: Dr. Janet Smylie
PhD Student: Sarah Oosman

1. Purpose of Agreement

This agreement is to help ensure that the research project – ***It Takes a Village: Preventing Obesity and Type 2 Diabetes Through a Culturally Sensitive Health Enhancing School Program for Métis Youth*** - is respectful to the culture, language, knowledge, values, and laws of the Ile-a-la-Crosse community.

This memorandum is a tool to support the success of the project and the partnership between the community of Ile-a-la-Crosse, the Ile-a-la-Crosse School, the Colleges of Kinesiology and Community Health and Epidemiology, and the Department of Interdisciplinary Studies at the University of Saskatchewan.

The community is to be involved as full partners in all aspects of the research (Participatory Action Research methodology); that includes feedback, input, analysis, interpretation and communication. The development and ongoing implementation of this project is to be based on regular and respectful communication between community members and the academic research team. All efforts will be made by the doctoral student to understand and address local concerns and recommendations at each step of the project.

2. Research Project Description

Research question: Can a community- and school-based health promotion program prevent the onset of diabetes and obesity in the northern Métis community of Ile-a-la-Crosse?

Background: Dr. Karen Chad is also a health promotion expert and has worked closely with First Nations communities and in schools to improve physical activity and nutrition choices of youth. Dr. Janet Smylie is a Métis family doctor who is interested in promoting health and preventing such conditions as obesity and type 2 diabetes in Métis youth. Sarah Oosman is a physical therapist working towards her PhD in health promotion specifically related to improving the health of First Nations and Métis youth and preventing the onset of obesity and type 2 diabetes. Dr. Smylie, Dr. Chad and Ms. Oosman believe that the key to preventing the development of obesity and type 2 diabetes is to target the youth population and encourage positive lifestyle choices through improving physical activity and nutrition. All three individuals feel that the community plays a large role in impacting the health of youth, their families and the community as a whole. This project will focus on integrating the school and its students, their families and key community members in implementing a physical activity and nutrition program with a primary focus of preventing obesity and type 2 diabetes in youth.

Graduate Student Project:

Sarah Oosman is a PhD student in the Department of Interdisciplinary Studies at the University of Saskatchewan. As Sarah's role as a student researcher, she would like to include some of the information obtained from this project as part of her PhD dissertation. Specifically, she would like to include the information gathered on the prevalence of overweight, obesity and type 2 diabetes in the youth population of the

community, the current patterns of physical activity and healthy eating of youth of the community, as well as include information related to the process of implementing a health enhancing school program focused on physical activity and nutrition. The information gathered from this project will be shared with the community and will be used to develop a community-based health enhancing school program, in conjunction with input from key community stakeholders.

Goal: To improve the physical activity levels and nutrition choices of Métis youth and their families by implementing a "health enhancing school and community program", thereby preventing the development of type 2 diabetes and obesity.

Objectives:

1. Support/facilitate community partnership and participation in the project;
2. Support community sharing and preservation of community members' and elders' knowledge about traditional activities and diet;
3. Increase understanding of how the community builds its own capacity to develop and implement and maintain health promotion strategies that lead to healthy body weights among their people;
4. Examine the influences of diet and physical activity on overweight and obesity;
5. Examine the socio-economic and environmental influences in a rural Métis community on access to and consumption of healthy food as well as regular physical activity;
6. **Link the knowledge gained from the community members and elders into the health enhancing school and community program aimed at improving physical activity and nutrition choices of youth and their families. This project's overall goal is to prevent the onset of obesity and type 2 diabetes in youth;**
7. Design and implement a culturally sensitive health enhancing school and community based program focusing on nutrition and physical activity;
8. Ensure a respectful research process.

Community Research Team:

Academic members of the research team include: Dr. Janet Smylie and Dr. Karen Chad, from the University of Saskatchewan; Ms. Sarah Oosman, graduate student from the University of Saskatchewan. Community members of the research team include: Don Favel and Marie Favel of Ile-a-la-Crosse.

3. Research Project Guidelines

This agreement is guided by the following principles.

i. Maintain mutual respect and accountability between the parties;
ii. Recognize the expertise, responsibilities, mandates and accountability structures of each party;
iii. Ensure the highest standards of research ethics.
iv. Respect the individual and collective privacy rights of Aboriginal people.
v. Recognize the value and potential of research that is scientifically and culturally validated.
vi. Recognize the value of capacity building at all levels.
vii. Support collaborative Aboriginal and University processes including the analysis and dissemination and ownership of research results/reports.
viii. Represent the different viewpoints in Aboriginal communities fairly, including viewpoints of specific groups such as age and gender.
ix. Understand and observe cultural protocols when working within the community.
x. To provide fair treatment to all persons taking part in the research project.

4. Responsibilities

The responsibility for achieving the goal and linked objectives of the project will be shared by the community research partners, the graduate student and the academic supervisors. Governance of the project will be shared between the university and community researcher team and a representative from the Ile-a-la-Crosse town council.

<u>Academic Research Team</u>

Responsibilities of the university researchers will be to:

- Facilitate achieving the goal and linked objectives of the research project

- Enable and support community participants in obtaining new skills (e.g. research design, implementation and evaluation) and knowledge (e.g. physical activity, healthy eating, healthy body weights)
- Adhere to governance protocols and ensure individual and collective community rights are respected
- Educate themselves about respectful cultural protocols
- Provide funding to support community capacity development
- Ensure that results are appropriately returned and disseminated in the community
- Ensure that any external reports are reviewed and approved by the community authority
- Maintain regular communication with the community governing partner
- Ensure the community is informed about the progress of the project in a clear, specific and timely manner
- Act as a resource to the community on questions related to various portions of the research project

Community Project Liason and Community Research Team Member (1)

Mayor of Ile-a-la-Crosse, Duane Favel

- Advise research project team
- Assist in linking research project activities with other community activities as required
- Supervise research project activities on behalf of community
- Regular communication updates with the academic research team to occur bimonthly for 1-2 hours
- Recommend capable and reliable community members to collaborate or to be employed in this project
- Keep informed about the project's progress and help in leading the project towards meaningful results

Community Research Team Members (1)

Community Research Assistant
- Assist in contacting community members and setting up interviews and focus groups
- Assist in interviews/focus groups and analysis of interviews/focus groups
- Assist in setting up community meetings
- Participate in editing and writing community reports

Community Members at Large –

1. Students from the School of Ile-a-la-Crosse (ages 8-14) –; students will be involved in completing questionnaires related to physical activity and

nutrition, participating in focus groups and key informant interviews, and will participate in activities related to physical activity and nutrition. These activities will occur over one school year term.

2. Families of students from the (School of Ile-a-la-Crosse) – parents and/or guardians will serve as role models by making personal choices to practice healthy lifestyle behaviors such as engaging in physical activity and healthy eating. These activities will occur over one school year term.
3. Ile-a-la-Crosse town council, school teachers and staff and community members - individual community leaders will support the project and also serve as role models by making personal choices to practice healthy lifestyle behaviors (such as engaging in physical activity and healthy eating). These activities will occur over one school year term.
4. Using a participatory approach (Macauley *et al.*), community members will have the opportunity to share their knowledge and expertise on details of the project such as how it should be carried out in the community.

5. Funding and Compensation

This project is funded through the Indigenous Peoples' Health Research Centre (IPHRC). The funds for this project are located at the University of Saskatchewan in Saskatoon. As principal investigator of this project, Dr. Karen Chad is responsible for the appropriate distribution of the funds and the conduct of the project.

Funding from IPHRC will be used for the following:

- Student researcher travel to and from Ile-a-la-Crosse
- To hire a community member as a Research Assistant to help with information collection
- To fund the community research team to travel to and from Saskatoon
- Miscellaneous costs associated with meetings (ie. beverages, gifts of appreciation)

6. Consent and Confidentiality

Community Level:

Prior to beginning this project, consent will be obtained from the local Ile-a-la-Crosse town council, relevant board members and appropriate community leaders and/or elders to conduct the research in the community. Specifically, the mayor, Duane Favel,

will be the community leader who advises this project. The doctoral candidate will meet bimonthly with the Mayor for the duration of the project to ensure that ongoing project implementation meets community standards.

Participant Level:

Informed consent, according to the guidelines established by the University of Saskatchewan Advisory Committee on Ethics in Behavioral Science Research and in keeping with the cultural standards and norms of the community of Ile-a-La-Crosse, will be obtained from each individual.

Informed consent will be obtained from students and their families prior to proceeding with this project. When seeking informed consent, the purpose of the project as well as the potential benefits and harmful effects of the research on the individual, on the community and/or on the environment will be explained in the participant's language of choice, using an interpreter as required. There will be no pressure placed on an individual to participate and it will be made clear that there will be no negative consequences should they choose not to participate in any or all projects, or choose to withdraw at any time. The issue of confidentiality will also be explained, and all participants will be assured that their information will remain private and confidential. Names of participants will also remain confidential and will be used only to ensure consistency between pre- and post-intervention measures.

7. Reports and Dissemination

The academic researchers commit to preparing a community report and returning results to the community. The researchers will work together to design appropriate dissemination strategies at specific stages of the project and at the conclusion of the project. Information and knowledge will be shared in the following ways:

- Conferences, workshops, seminars;
- Community newsletter;
- Story-telling;
- Local radio or newspaper.

Following this, the academic research team wishes to use this research project for the following:

- utilizing the information obtained from the project for a PhD dissertation;
- publishing articles related to the project;
- presenting the project in peer-reviewed conferences.

Scientific presentations will be made and articles published after discussion with the relevant community leaders. The community will be consulted to ensure that they agree with sharing of any data prior to the distribution of the final report, or any publication or contact with the media. In this way, members of the community and the university will have the opportunity to collaborate in data interpretation.

Regardless of where and how the data is disseminated, acknowledgements will reflect details of the research being a joint project, and the community's role in formulating its development and direction.

In the event that the academic researchers and the town council cannot agree on the content of the written report, the town council will be invited to write an editorial to accompany the report to be submitted for publication.

8. Benefits

This project will provide an opportunity for a best practice model whereby people from different communities (eg. Ile-a-la-Crosse and the University of Saskatchewan) work alongside each other to learn more about:

- Programming and policy
- Community partnerships
- Health
- A respectful research process

The benefits likely to be gained by the community through this research project are:

- Educational
- Informational
- Opportunity to implement health promotion programming relevant to the desires of the community

9. Data Ownership:

To ensure confidentiality for individual participants in the project, access to all data will be restricted only to those individuals involved in the project. The University of Saskatchewan and the community of Ile-a-la-Crosse will share ownership of the data which will be stored in a secure location at the University of Saskatchewan (as has been mutually agreed upon by Dr. Karen Chad and Mr. Duane Favel). Data will be stored for a minimum of five years after the study has been completed. The data will not be used for any purpose other than which is outlined for this project without the consent of community representatives.

10. Commitments

We have read this agreement and understand the nature of the project and how it will be carried out. All our questions have been answered satisfactorily. The risks and benefits have been explained. We agree to act according to the principles outlined above.

Appendix II

Focus Group Questions - Adults

APPENDIX II
Focus Group Discussion – QUESTIONS
Community members and community at-large

Introduction: Welcome everyone and thank-you for taking the time to come to this sharing circle. The main purpose for doing these sharing circles is to get an idea of what the community members and youth/children of Île-à-la-Crosse think of and experience when it comes to physical activity and healthy eating.

As you know, your community, along with the University of Saskatchewan, are interested in learning more about your ideas and experiences with physical activity and healthy eating and we also want your ideas and opinions on what types of things might make it easier for youth to be more physically active and for youth to make healthy eating choices in your community.

[Explain that the purpose for tape recording is to help us be as accurate as possible with the words that they say and to help prevent us from missing things that are said. Stress how important their words are to us and that no one else will listen to the tape except for Sarah and Edna. We will write everything out and go over it with them in person and if they choose at that time, they can keep the tape. Ensure that everyone has the opportunity to decide on their comfort level with being taped…]

1. What influences the children and families in Île-à-la-Crosse to be physically active?
    a. What physical activity programs exist in your community for (i) children and (ii) children and their families?
    b. Are there specific community events that provide opportunities for children/families to be physically active?
    c. Do you think more adults and families would be more physically active if there were family-friendly programs designed for youth and their families?
    d. What school programs currently exist in your community that make it easier for you to participate in PA? Do these programs also encourage families to participate in PA?

2. What types of barriers or supports exist in your community and/or school that influence physical activity levels?
    a. What, in your community, makes it easier to be physically active?
    b. What, in your community, makes it more difficult to be physically active?
    c. What types of programs or events can you think of that might make being physically active more appealing for children and families?
    d. Are there programs or events that don't currently exist in your community that you would like to have that might make being physically active easier to participate in?

3. What types of barriers or supports exist in your community and/or school that influence healthy eating?
    a. What types of things might make it easier for youth to eat healthy foods – at home, at school, or in the community?
    b. Are there things you would like to know/teach to the children, that they don't already know about, that would help them eat healthier? (eg. Participate in preparation of more traditional healthy foods?)
    c. Is there anything about living in Île-à-la-Crosse that affects what you eat? If so, what are these? Do these factors make it easier or more difficult to choose and eat healthy food?
    d. What would make it easier for you to buy and/or eat 'healthy' food?

4. Are there current school practices and policies that might influence healthy eating and physical activity by the children?

Appendix III

Focus Group Questions - Children

APPENDIX III
Focus Group Discussion CHILD QUESTIONS

Introduction: Welcome everyone and thank-you for taking the time to come to this sharing circle. The main purpose for doing these sharing circles is to get an idea of what the community members and youth/children of Île-à-la-Crosse experienced during the first PA and N program implementation phase of the project.

As you know, your community, along with the University of Saskatchewan, are interested in learning more about you and your families' experiences as you participate in this physical activity and nutrition program in your school. We also want your ideas and opinions on what types of things you liked and disliked about the program you just participated in and what types of things might still make it easier for you and/or your families to be more physically active and to make healthy eating choices in your school and community.

For the community research team, teachers and staff – we are interested in hearing your feedback on the process of implementing this program within your classroom, school and community. The information you share with us today will help us design the next phase of the program and will hopefully allow us to address some of the challenges you have faced up until now.

[Explain that the purpose for tape recording is to help us be as accurate as possible with the words that they say and to help prevent us from missing things that are said. Stress how important their words are to us and that no one else will listen to the tape except for Sarah and Edna. We will write everything out and go over it with them in person and if they choose at that time, they can keep the tape. Ensure that everyone has the opportunity to decide on their comfort level with being taped…]

1. What does healthy mean to you?
2. What is physical activity?
    a. How do you feel about being physically active?
    b. How often do you think people should be physically active?
    c. What would a physically active person be doing?
    d. What would a physically inactive person be doing?
3. Do you consider yourself to be physically active? Can you give me a description of what you do?
    a. Do these activities change with the seasons? (Are they different in the summer compared to the winter)?
4. Is it easy to be active in your village? If so, what makes it easy?
5. Do you think some children find it hard to be active? If so, what makes it hard for them?
6. What types of food do you like to eat?
7. What types of food are healthy?
8. Is it easy or difficult for you to eat healthy food? What makes it easy or difficult?

Appendix IV

Lessons and activities for Grade 3-4 Classroom

Adapted from the Sandy Lake School Diabetes Prevention Program

Grade 3: Unit 1
VISITING THE MAYO-YAH-WINS

GRADE 3: UNIT 1

Unit Expectations

1. Students will know that the Île-à-la-Crosse Elementary School Diabetes Prevention Program (IRESDPP) lessons focus on how to keep your body strong and healthy by making healthy food choices and by being physically active every day.
2. Students will create a logo for the IRESDPP, will choose one for their class and know that it symbolizes living a healthy lifestyle.
3. Students will become familiar with the "Mayoyahwin" family from "Sakitawak".

OUTLINE: UNIT 1		
		LESSON 1
TIME 35 MIN.	ACTIVITY	DESCRIPTION
10	A	Introduction to the Program
25	B	Main Activity: *Logo Creation/Identification*
		LESSON 2
TIME 35 MIN.	ACTIVITY	DESCRIPTION
10	D	Meet the Mayo-yah-wins, Chapter 1: Meet the Mayo-yah-wins
20	E	Main Activity: *Character Identification*
5	F	Recap of Unit 1

Grade 3: Unit 2
WHAT IS HEALTHY?

Unit Expectations

1. Students will know that being healthy will give us the energy and ability to do the things we like to do.

OUTLINE: UNIT 2		
		LESSON 3
TIME 35 MIN.	ACTIVITY	DESCRIPTION
5	A	Review of Unit 1
10	B	Meet the Mayoyahwins, Chapter 2: The "*Okihokew*" Arrives
20	C	Main Activity: What it Means to be Healthy – A Webbing Exercise.
		LESSON 4
TIME 37 MIN.	ACTIVITY	DESCRIPTION
5	D	Review of Lesson #3
25	E	Main Activity: *What 'Being Healthy' Means to Me*
5	F	Recap of Unit 2
2	G	Go for Goal #1

Grade 3: Unit 3
YESTERDAY AND TODAY

Unit Expectations

1. Students will describe two ways in which the lifestyles of Aboriginal people have changed over the years.
2. Students will describe two ways in which the lifestyle changes have affected the health of Aboriginal people.
3. Students will describe two ways they can be strong and healthy.

OUTLINE: UNIT 3		
		LESSON 5
TIME 35 MIN.	ACTIVITY	DESCRIPTION
10	A	Review of Unit 2
10	B	Meet the Mayoyahwins, Chapter 3: *When Moshom Joe Was Young*
15	C	Main Activity: *Traditional Foods Are Good to Eat*
		LESSON 6
TIME 35 MIN.	ACTIVITY	DESCRIPTION
10	D	Review of Lesson #4
20	E	Main Activity: *An Edler's Story*
5	F	Recap of Unit 3

Grade 3: Unit 4
WHAT IS DIABETES?

Unit Expectations

1. Students will describe diabetes as an illness which is very common among Aboriginal people.
2. Students will know that diabetes can be prevented.
3. Students will describe two lifestyle behaviours that can be done to prevent diabetes.

OUTLINE: UNIT 4		
		LESSON 7
TIME 35 MIN.	ACTIVITY	DESCRIPTION
5	A	Review of Unit 3
10	B	Meet the Mayoyahwins, Chapter 4: *The Pale Stranger*
20	C	Main Activity: *What is Diabetes?*
		LESSON 8
TIME 42 MIN.	ACTIVITY	DESCRIPTION
5	D	Review of Lesson #7
32	E	Main Activity: *Sacred Circle: Type 2 Diabetes Prevention for Aboriginal Children Video*
2	F	Go for Goal #2
2	G	Recap of Unit 4

Grade 3: Unit 5
Tahto-kiskaw Mitsowin

Unit Expectations

4. Students will understand that the term *Tahto-kiskaw Mitsowin*stands for *Everyday* Foods (foods that can be eaten daily).

5. Students will know that eating *Tahto-kiskaw Mitsowin*every day will keep our bodies strong and healthy because they are low in fat, low in sugar, high in fibre, are not fried, and do not have a lot of added fat on them, like butter or lard.

6. Students will identify at least four *Tahto-kiskaw Mitsowin(Everyday* Foods).

OUTLINE: UNIT 5		
		LESSON 9
TIME 35 MIN.	ACTIVITY	DESCRIPTION
5	A	Review of Unit 4
10	B	Meet the Mayoyahwins, Chapter 5: *The Surprise in the Backpack*
20	C	Main Activity: *Tahto-kiskaw (Everyday) Foods*
		LESSON 10
TIME 35 MIN.	ACTIVITY	DESCRIPTION
5	D	Review of Lesson #9
18	E	Main Activity: *Missy's Food Diary*
2	F	Go for Goal #3
5	G	Recap of Unit 5
5	H	Homework for Unit 6, Lesson #11

Grade 3: Unit 6
BEING ACTIVE

Unit Expectations

1. Students will understand that the term *Tahto-kiskaw Mitsowin* stands for *Everyday* Foods (foods that can be eaten daily).

2. Students will know that eating *Tahto-kiskaw Mitsowin* every day will keep our bodies strong and healthy because they are low in fat, low in sugar, high in fibre, are not fried, and do not have a lot of added fat on them, like butter or lard.

3. Students will identify at least four *Tahto-kiskaw Mitsowin (Everyday* Foods).

4. Students will be able to identify their Body Cues that tells them they have been physically active.

OUTLINE: UNIT 6		
		LESSON 11
TIME 35 MIN.	ACTIVITY	DESCRIPTION
5	A	Review of Unit 5
10	B	Meet the Mayoyahwins, Chapter 6: *Missy and Buddy Set a Goal*
10	C	Main Activity: *Physical Activity Yesterday and Today*
10	D	Go for Goal #4
		LESSON 12
TIME 35 MIN.	ACTIVITY	DESCRIPTION
5	E	Review of Lesson #11
5	F	Goal Check – going for goal #4
10	G	Main Activity: *My Favourite Physical Activity*
10	H	Main Activity 2: *Body Cues*
5	I	Recap of Unit 6

Grade 3: Unit 7
TAHTO-KISKA SNACK ATTACK

Unit Expectations

1. Students will recognize that *Tahto-kiskaw* foods are fun to make and fun to eat.

2. Students will practice reading, following and preparing a recipe for a *Tahto-kiskaw (Everyday)* snack.

3. Students will identify what makes the snack a *Tahto-kiskaw (Everyday)* snack.

4. Students will keep their own one day food diary and analyse it for *Tahto-kiskaw* foods.

OUTLINE: UNIT 7		
		LESSON 13A
TIME 40 MIN.	ACTIVITY	DESCRIPTION
5	A	Review of Unit 6
10	B	Meet the Mayoyahwins, Chapter 7: *Moshom Joe's Tahto-kiskaw Snack*
20	C	Main Activity: *What did I eat yesterday?*
5	D	Homework Preparation for Lesson 13B
		LESSON 13B
15-20	E	Main Activity: *How to read a Nutrition Facts Food Label*
		LESSON 12
TIME 35 MIN.	ACTIVITY	DESCRIPTION
5	F	Review of Lesson #13
25	G	Main Activity: *Tahto-kiskaw Snack Preparation & Taste test*
5	H	Recap of Unit 7

Grade 3: Unit 8
ASKAW MITSOWIN

Unit Expectations

1. Students will review *Tahto-kiskaw (Everyday)* foods.

2. Students will understand that the term *Askaw Mitsowin* stands for *Sometimes* foods (foods that should be eaten only once in a while).

3. Students will know that eating *Askaw Mitsowin* every day will not help to keep their bodies strong and healthy because they are high in fat, high in sugar, low in fibre, have a lot of added fat, and are fried.

4. Students will set a goal to eat a *Daso-keesheka (Everyday)* snack at least 7 times during the coming week.

OUTLINE: UNIT 8		
		LESSON 15
TIME 35 MIN.	ACTIVITY	DESCRIPTION
5	A	Review of Unit 7
10	B	Meet the Mayoyahwins, Chapter 8: *Preparing for a Tahto-kiskaw Picnic*
15	C	Main Activity: *Askaw (Sometimes) Foods*
5	D	Goal Setting: Going for Goal #5
		LESSON 16
TIME 35 MIN.	ACTIVITY	DESCRIPTION
5	E	Review of Lesson #15
10	F	Goal Check: Going for Goal #5
15	G	Main Activity: *Nellie's Tahto-kiskaw Choices*
5	H	Recap of Unit 8

Appendix V

Excerpt from the Grade 3-4 Storybook

The Mayoyahwin Storybook

CHAPTER 1: Meet the Miyo-yah-wins

Adapted from the Sandy Lake School Diabetes Prevention Program, Sandy Lake Health and Diabetes Project

"Hi! My name is Missy. I'm 10 years old, and I live here in Sakitawak. This is a great place to live and all my family and friends are here," said Missy with a big smile. She pointed to the boy next to her.

"This is my brother Buddy. He's only 9, but he is still fun to be around. We do a lot of things together, and get into a little trouble now and then."

Buddy grinned, "That's right Missy, but tell them more about our home here in Ile-a-la-Crosse. I'm sure our friends would like to hear more about where we live."

"Okay, Buddy, Sakitawak is a northern community in Saskatchewan. It's a lot of fun to live here. We have lots of moshom's (grandfathers), kohkom's (grandmothers), aunties, uncles, and Cousins here.

Missy chimed in, "Sakitawak is a great place to live. All the people are friendly and love to laugh and joke with each other. We have a Northern store, a new hospital, and two schools.

"We're real lucky here. Some places the kids have to leave home just to go to school, like my cousin Arnold from Beauval"

Missy *and* Buddy at their moshum's Camp

Buddy jumped in. "Missy and I live over by the beach. Our mom works at the store, and our moshom works at the school. And kohkom stays home and makes lots of bannock."

The thought of the bannock made Missy speak up. "kohkom cook's lots of wild foods too. Whenever moshom brings home a moose she is really happy. Last summer we spent two months out at their bush-camp. We ate really good food there, lots of *moshwa-wiyas* (moose-meat), *kinosew* (fish), and *waposh* (rabbit)."

Buddy looked thoughtful. "kohkom has something called diabetes. I don't know what it is, but she has to stick needles into her finger every day to check how much sugar is in her blood. kohkom says she needs to take good care of her body so that she doesn't have any other problems, like going blind."

Missy looked at Buddy, "Hey that must be why kohkom doesn't want to eat chips anymore! Let's go home and get some bannock; I'm hungry!"

When they got home, their moshom was talking excitedly on the phone. He was speaking Michif-Cree and so they couldn't understand everything he was saying. He said something to kohkom, and she had a big smile on her face. Then she started to make her special bannock that she cook's only when there is something special going on, like a visitor or a feast.

"Moshom, what is going on? Are we going to have a (okihokew) visitor? Who is coming?" Missy asked.

Kohkom replied, "Missy and Buddy, we're going to have a very special visitor (okihokew) tonight. So help us clean up and get ready."

Buddy asked, "But who is coming? Is it someone we know?"

Kohkom ordered *ekosi* (That's enough.) and get busy with the cleaning. You'll find out soon enough."

Missy and Buddy couldn't think of anyone they knew who would make moshom and kohkom so excited.

Who is the *okihokew*?

They wondered who this *okihokew* (visitor) was. Was it an auntie? But all their aunties lived here in Ile-a-la-Crosse; only one lived in town, and she had been home the previous week. Could it be a doctor who was coming to see kohkom? But she has had never been excited about seeing a doctor.

The children kept thinking about the *okihokew* as they cleaned up the house. As they thought, they got more and more excited and they started cleaning faster. Soon they would know who was coming to visit!

Appendix VI

Examples of Several Family Activity Packs

FAMILY ACTIVITY PACK 1

Fall, 2010

Dear Parent/Guardian,

We want to welcome you and introduce you to a new program that we are trying in Miss Caisse's Grade 3, 4 classroom this term. This program, *It Takes A Village: Promoting Health an Healthy Body Weight in Métis Children*, promotes healthful living to your child and your family.

A special part of this program is the Family Action Packs that are meant for you and your third grade child. Regularly, for the next 3 to 4 months, your third grader will be bringing home information on healthful eating and physical activity. There will also be some fun activities for your family to enjoy.

There is a Return Card in each of the Family Action Packs. After you and your child look over the information and do the activities in each pack, we ask that you complete the card and have your third grader return it to his/her classroom. If your family completes and returns at least four of these cards, your third grader will receive a little reward at the end of the term.

If you cannot be a part of the program with your child, another adult may participate with him/her in the activities.

We think you and your third grader will enjoy this new program, and we thank you for your support as your child experiences this journey.

Sincerely,

Dear Parent/Guardian,

The Grade 3-4 students in Miss Caisse's class have been asked to create their own logo or picture that symbolizes the following things:

1. Life
2. Healthy Living
3. Everyday physical activity
4. Healthy food choices
5. Children who live by these examples

The logo should make them think about following the example of living a healthy life by making healthy food choices and keeping active.

The students in Miss Caisse's class have been given classroom time to work on this logo, but we are now asking for you, as the parent/guardian, to encourage your child to finish this assignment.

All completed logos will be put together and students will vote on which one to use for the rest of the term.

FAMILY ACTIVITY PACK 2

NOTE: The following activities were adapted from the Pathways Curriculum which was created, published and copyrighted by the Pathways Cooperative Agreement. The Pathways Curriculum was made possible by grants from the National Institutes of Health, the National Heart, Lung, and Blood Institute. Grant numbers U01 HL50869, U01 HL50867, U01 HL50905, U01 HL50885, and U01 HL50907. 1998, Revised 1999

Action Interview

Directions: Students should interview a parent or other adult using the following question guide.

1. What do you like to do in your spare time?

_____

_____

_____

2. Have you ever run in a race? ____ Yes _____ No

3. What is your favorite physical activity now?

_____

4. What was your favorite game in Grade 3 or 4?

_____

5. Why is it good for people to do games or other physical activities?

_____

_____

_____

_____

Everyday Foods

"Foods to eat almost anytime"

Remember…

Everyday foods are:

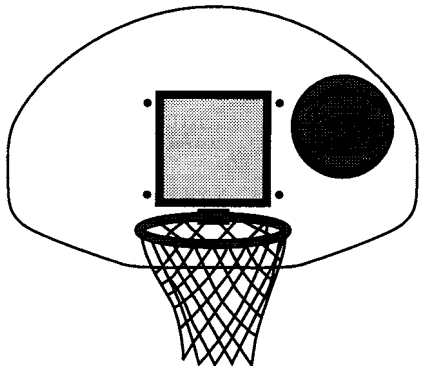
- Foods that have little or no fat
- Foods that are not fried
- Foods that have little or no fat added when cooked or served
- Water diet pop, or other beverages that have little or no sugar

Everyday Physical Activities

Directions:

1. Underline each physical activity that you have ever done either with your family, at school or on your own.
2. Circle those activities that you enjoy doing the most.

Walking
Riding a bike
Tag
Swimming
Hoeing
Stacking wood
Herding sheep
Push ups
Skate boarding
Softball
Dancing
Aerobics
Dancing to music
Hide and seek
Soccer
Hiking
Trampolining



Basketball
Frisbee
Running
Hackey sack
Kickball
Track and field
Volleyball
Lacrosse
Field hockey
Jump rope
Jogging
Riding horses
Roller skating
Roller blading
Sit ups
Climbing rocks or trees

Tahto-kiskaw Mitsowin (Everyday) Foods & Snack List

Adpated from the Sandy Lake School Diabetes Prevention Program

Vegetables (fresh, frozen)
Raw vegetables and dip
Fruit (fresh, canned in own juice, or dried)
Fruit cups (in own juice)
String cheese
Bagels
Rice cakes
Pretzels
Fig bars
Low-fat yogurt
Cheese pizza
Bean burritos
Baked potato chips
Cheese and crackers
Whole wheat bread or toast Plain popcorn (no butter added)
Cheese & ham/turkey snack packs
Sliced ham, turkey, chicken, or peanut butter sandwiches

DRINKS
Water
Diet Pop
100% fruit juice
2%, 1% & skim milk
Sugar-free powdered drinks

LOCAL SNACKS

Baked bannock
Berries
Dried moose meat

FAMILY ACTIVITY PACK 3

Invitation to Take A Family Walk…

To Parents or Other Adult:

Miss C's Grade 3-4 class would like to suggest that you and your third/fourth grader go for a walk together. You may want to invite other children and other family and friends to walk with you.

Walking is a great time to talk with your children or just a good way to spend some time with them. You can enjoy the weather or the scenery or the changes in the seasons.

Walking is good for most everyone! It burns off calories and helps with stress.

Walking is a great habit for your children to start while they are young. And think of how wonderful it will make you feel!
So, we invite you to go for a family walk – not only for yourself, but for your children!
Walk tall! Walk often!

NOTE: This activity was adapted from the Pathways Curriculum which was created, published and copyrighted by the Pathways Cooperative Agreement. The Pathways Curriculum was made possible by grants from the National Institutes of Health, the National Heart, Lung, and Blood Institute. Grant numbers U01 HL50869, U01 HL50867, U01 HL50905, U01 HL50885, and U01 HL50907. 1998, Revised 1999

Adapted from the information pamphlet:

Fall 2010

PATHWAYS TO WELL-BEING

Published By: Pathways, Quesnel Aboriginal Chronic Disease Prevention Program

Don't Be SuperSized!

• Over time, portion sizes have more than doubled.

• This increases your Weight and risk of Heart Disease and Diabetes.

5 tsp Fat in Large fries, over 2 hours walking to burn off 2 tsp Fat in Small fries, 50 min. walking

11 tsp. sugar in 480 ml pop, 30 min. walking to burn off 4 tsp. sugar in 200 ml pop, 12 min. walking

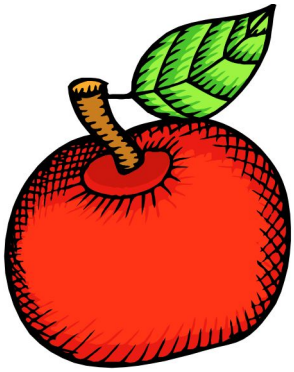
- Eat smaller portions
- Use a smaller plate

• Be active everyday • Feel great!

This you CAN Supersize

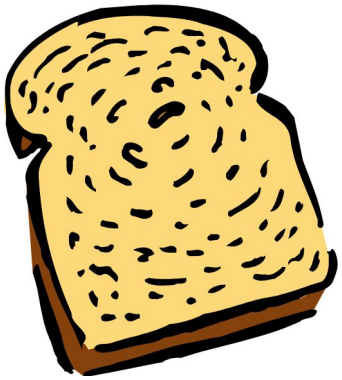
1. **Activity- Double the number of times or length of time you are active.**

2. **Fruit and Vegetables - Try to eat 5-10 servings a day**



3. **Water bottle - Drink 6-8 glasses a day**

4. **Your Fiber-**
Eat more whole grain breads and cereals



For additional information on the program this was adapted from, please contact:

Quesnel Native Friendship Centre Pathways Program Coordinator
pathways@quesnel-friendship.org Phone: (250) 992-8347 Fax: (250) 992-5708 This program is funded by the Northern Health Authority

Appendix VII

School Nutrition Guessing Game

Guess How Much Sugar

Is In These Drinks?

Guess how much sugar is in each drink and you might win a prize!

All guesses must be entered before FRIDAY, OCTOBER 22ND AT NOON!

Nutrition Guessing Game – Education Week October 18 to 22, 2010

This educational activity is to demonstrate the excessive amounts of sugar in some popular drinks that students enjoy. This activity is meant to be done as a guessing game to see what students' perspectives and perceptions are about the amount of sugar in some popular drinks.

Preparation for the contest/guessing game:

1. Buy the following items from your local grocery store:
    a. Small bag of sugar
    b. Snapple drink
    c. Fruitopia drink
    d. Pepsi/coke can
    e. Apple juice (1 cup)
    f. Small Ziploc bags to measure sugar into.
    g. Small, empty containers for storing sugar and/or 1 cup of beverages

2. Use the following chart to determine the amount of sugar to measure out and put in a clear plastic ziploc bag:

Drink Name:	*Number of Teaspoons of Sugar:*	*Sugar Bag #*
Snapple drink	15	A
Fruitopia	11	B
Pepsi/coke can	9	C
Apple Juice (1 cup)	6	D

3. Using a marker, label the Ziploc bags as indicated in chart above, and write down the number of teaspoons of sugar that are in each of the Ziploc bags.
4. For the apple juice, just use one juice box on display.
5. Prepare a table in front of the 'math competition' bulletin board in the school. The table should have each of the beverages listed above on it (maybe tape them into place or secure them somehow so they are not stolen – or have the bottles empty so they are not enticing to take?).
6. Print out the Ballot Guessing cards, photocopy them so there are enough for students in Grades 3 and up to fill out, cut them out and/or staple them. Attach these to either the bulletin board or the table, and have a few pencils attached with string to the bulleting board or table as well.
7. Print out the Title Page – and post it on the bulletin board/table.
8. At the end of each 'Guessing Day', tally up the answers and put aside the individuals who had the correct answers for all of the drinks. On the last 'Guessing Day' all individuals who guessed the correct answers will be eligible to win a prize.

Guessing Ballot Name: _____

Guess how much sugar is in each of the drinks on the table. Write the letter of the bag that you think matches the amount of sugar in each drink!

Snapple _____

Fruitopia _____

Can of Coke _____

Apple juice _____

Guessing Ballot Name: _____

Guess how much sugar is in each of the drinks on the table. Write the letter of the bag that you think matches the amount of sugar in each drink!

Snapple _____

Fruitopia _____

Can of Coke _____

Apple juice _____

Guessing Ballot Name: _____

Guess how much sugar is in each of the drinks on the table. Write the letter of the bag that you think matches the amount of sugar in each drink!

Snapple _____

Fruitopia _____

Can of Coke _____

Apple juice _____

Appendix VIII

Physical Activity Questionnaire for Children (PAQ-C)

Physical Activity Questionnaire (Elementary School)

Name:_____ Age:_____

Sex: M_____ F_____ Grade:_____

Teacher:_____

We are trying to find out about your level of physical activity from *the last 7 days* (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

Remember:

1. There are no right and wrong answers — this is not a test.
2. Please answer all the questions as honestly and accurately as you can — this is very important.

---

1. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? (Mark only one circle per row.)

	No	1-2	3-4	5-6	7 times or more
Skipping	○	○	○	○	○
Rowing/canoeing	○	○	○	○	○
In-line skating	○	○	○	○	○
Tag	○	○	○	○	○
Walking for exercise	○	○	○	○	○
Bicycling	○	○	○	○	○
Jogging or running	○	○	○	○	○
Aerobics	○	○	○	○	○
Swimming	○	○	○	○	○
Baseball, softball	○	○	○	○	○
Dance	○	○	○	○	○
Football	○	○	○	○	○
Badminton	○	○	○	○	○
Skateboarding	○	○	○	○	○
Soccer	○	○	○	○	○
Street hockey	○	○	○	○	○
Volleyball	○	○	○	○	○
Floor hockey	○	○	○	○	○
Basketball	○	○	○	○	○
Ice skating	○	○	○	○	○
Cross-country skiing	○	○	○	○	○
Ice hockey/ringette	○	○	○	○	○
Other:					
_____	○	○	○	○	○
_____	○	○	○	○	○

2. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only.)

I don't do PE ..... ❍
Hardly ever ..... ❍
Sometimes ..... ❍
Quite often ..... ❍
Always ..... ❍

3. In the last 7 days, what did you do most of the time *at recess*? (Check one only.)

Sat down (talking, reading, doing schoolwork)..... ❍
Stood around or walked around ..... ❍
Ran or played a little bit ..... ❍
Ran around and played quite a bit ..... ❍
Ran and played hard most of the time ..... ❍

4. In the last 7 days, what did you normally do *at lunch* (besides eating lunch)? (Check one only.)

Sat down (talking, reading, doing schoolwork)..... ❍
Stood around or walked around ..... ❍
Ran or played a little bit ..... ❍
Ran around and played quite a bit ..... ❍
Ran and played hard most of the time ..... ❍

5. In the last 7 days, on how many days *right after school*, did you do sports, dance, or play games in which you were very active? (Check one only.)

None ..... ❍
1 time last week ..... ❍
2 or 3 times last week ..... ❍
4 times last week ..... ❍
5 times last week ..... ❍

6. In the last 7 days, on how many *evenings* did you do sports, dance, or play games in which you were very active? (Check one only.)

None ..... ❍
1 time last week ..... ❍
2 or 3 times last week ..... ❍
4 or 5 last week ..... ❍
6 or 7 times last week ..... ❍

7. *On the last weekend*, how many times did you do sports, dance, or play games in which you were very active? (Check one only.)

None ..... ❍
1 time ..... ❍
2 — 3 times ..... ❍
4 — 5 times ..... ❍
6 or more times ..... ❍

8. Which *one* of the following describes you best for the last 7 days? Read *all five* statements before deciding on the *one* answer that describes you.

A. All or most of my free time was spent doing things that involve little physical effort ..... ❍

B. I sometimes (1 — 2 times last week) did physical things in my free time (e.g. played sports, went running, swimming, bike riding, did aerobics) ..... ❍

C. I often (3 — 4 times last week) did physical things in my free time ..... ❍

D. I quite often (5 — 6 times last week) did physical things in my free time ..... ❍

E. I very often (7 or more times last week) did physical things in my free time ..... ❍

9. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

	None	Little bit	Medium	Often	Very often
Monday	❍	❍	❍	❍	❍
Tuesday	❍	❍	❍	❍	❍
Wednesday	❍	❍	❍	❍	❍
Thursday	❍	❍	❍	❍	❍
Friday	❍	❍	❍	❍	❍
Saturday	❍	❍	❍	❍	❍
Sunday	❍	❍	❍	❍	❍

10. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

Yes ..... ❍
No ..... ❍

If Yes, what prevented you? _____

Appendix IX

Food Frequency Questionnaire

Food Frequency Questionnaire

Adapted from the School Nutrition & Activity Project (SNAP)

Section 1: All About Me.

Name: _____

1. What grade are you in?

Grade 2	Grade 3	Grade 4
○	○	○

2. How old are you?

8 years or younger	9 years	10 years	11 years or older
○	○	○	○

3. Are you a girl or a boy?

Girl	Boy
○	○

4. How often do you have something for breakfast?

Every day	Some days	Rarely	Weekends only	Never
○	○	○	○	○

5. What type of milk do you usually drink?

- ○ Whole milk
- ○ 2% white milk
- ○ 1% white milk
- ○ Skim milk
- ○ Chocolate milk
- ○ Don't drink milk

Section 2. The Foods I Eat

6. How often have you eaten any of these foods in the last seven days? For each food, please fill in the circle.

Food	**At least twice a day**	**Once a day**	**4 to 6 times/week**	**1 to 3 times/week**	**Never**
Milk (alone or on cereal)	○	○	○	○	○
Cheese	○	○	○	○	○
Yogurt and frozen yogurt	○	○	○	○	○
Eggs	○	○	○	○	○
Ice Cream	○	○	○	○	○
French fries	○	○	○	○	○
Mashed or baked potatoes	○	○	○	○	○
Salad	○	○	○	○	○
Other vegetables	○	○	○	○	○
Baked beans, beans & pork	○	○	○	○	○
Peanut butter	○	○	○	○	○
Fruit	○	○	○	○	○
Fruit juice	○	○	○	○	○
Bread, bagels, crackers, tortillas	○	○	○	○	○
Bannock	○	○	○	○	○

Food	At least twice a day	Once a day	4 to 6 times/week	1 to 3 times/week	Never
Rice	○	○	○	○	○
Spaghetti, macaroni, or other pasta	○	○	○	○	○
Pizza	○	○	○	○	○
Cheerios, Shreddies, Rice Krispies, Corn Flakes, Raisin Bran, Frosted Flakes and other cold cereals	○	○	○	○	○
Oatmeal, cream of wheat and other cooked cereals	○	○	○	○	○
Hamburgers, beef, pork, hot dogs, sausages, lunch meats, other meats	○	○	○	○	○
Chicken, turkey, fish	○	○	○	○	○
Moose meat, rabbit or duck soup	○	○	○	○	○
Cakes, cookies, pie, doughnuts	○	○	○	○	○
Potato chips, nacho chips, Cheezies, pretzels, other snack food	○	○	○	○	○
Candy, chocolate bars	○	○	○	○	○
Regular soft drinks (not diet)	○	○	○	○	○

Appendix X

Knowledge, Attitudes, Beliefs Questionnaire (KAB)

A Knowledge, Attitudes and Behaviours Questionnaire about Physical Activity and Nutrition
For: Grade 3 & 4 students at Rossignol Elementary School

The following questions ask about foods, snacks and meals you eat, and what activities you do. We want to find out more about what children your age eat, what they do and what they know about nutrition and physical activity. This is not a test. Please be as honest as you can.

NOTE: This questionnaire was adapted from the Pathways Curriculum which was created, published and copyrighted by the Pathways Cooperative Agreement. The Pathways Curriculum was made possible by grants from the National Institutes of Health, the National Heart, Lung, and Blood Institute. Grant numbers U01 HL50869, U01 HL50867, U01 HL50905, U01 HL50885, and U01 HL50907. 1998, Revised 1999.

I. General Information

Name: _____

1. Today's Date:
2. How old are you?
3. What grade are you in?
4. Are you a boy or a girl: ☐ Boy ☐ Girl
5. Measurement phase:
    a. June 2010
    b. July 2010
    c. August 2010
    d. September 2010
    e. October 2010
    f. November 2010

II. Background Information:

1. What ethnicity do you identify yourself with:
    a. Métis
    b. French Canadian
    c. Canadian
    d. First Nations

2. Do you understand Michif Cree when someone else speaks it?
    a. Yes
    b. No

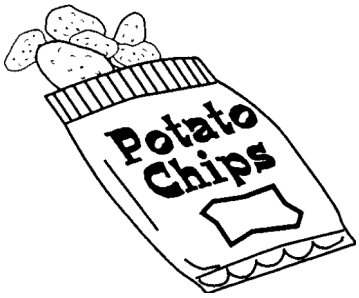
3. Can you speak Michif Cree?
    a. Yes
    b. No

4. What do you speak most at home?
    a. English
    b. Michif Cree
    c. French

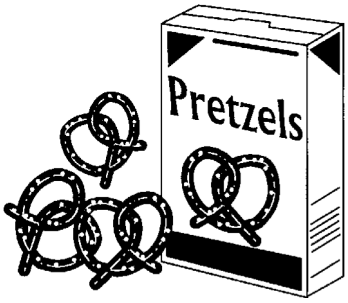
5. Do the adults in your house teach you about Métis people?
    a. Yes
    b. No
6.

III. What would you do?

1. Which would you pick for a snack?

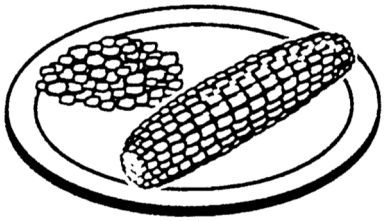


1
Potato chips

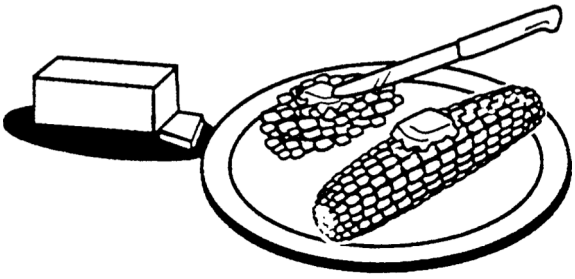


2
Pretzels

2. Which would you do?

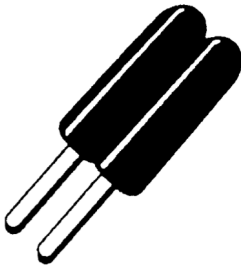


1
Corn without butter



2
Corn with butter

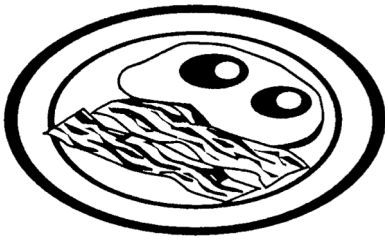
3. Which one would you ask for?



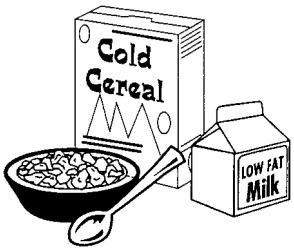
1
Popsicle

2
Ice Cream

4. Which would you choose for breakfast?

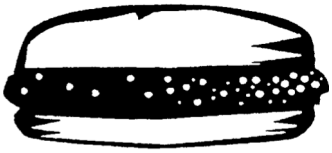


1
Eggs, bacon

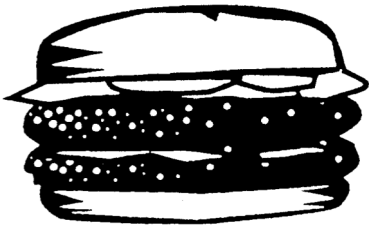


2
Cold cereal

5. Which would you order at a fast food restaurant?

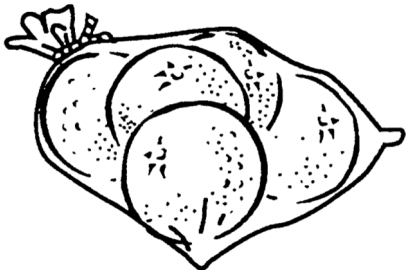


1
Regular hamburger



2
Extra big hamburger

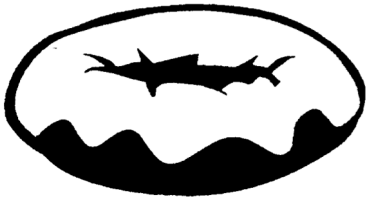
6. Which food would you ask the adults in your house to buy?



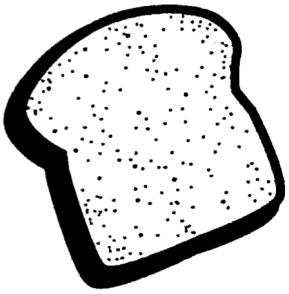
1
Bag of oranges

2
Bag of tortilla chips

7. Which would you choose to eat in the morning?



1
Doughnut



2
Toast with no butter

8. Which would you choose to drink?

1
Diet pop

2
Regular pop

IV. How Sure Are You?

		1 I know I can	2 I think I can	3 I'm not sure I can	4 I know I can't
1.	I can play hard during most of recess.	○	○	○	○
2.	I can play hard during most of PE class.	○	○	○	○
3.	I can play hard every day.	○	○	○	○
4.	At the store, I can ask for a popsicle instead of ice cream.	○	○	○	○
5.	I can eat fruit (for example: banana, apple, or orange) every day	○	○	○	○
6.	I can drink water instead of regular pop or Kool-aid.	○	○	○	○
7.	At home, I can ask for cheese pizza instead of pepperoni pizza.	○	○	○	○
8.	I can ask for corn with no butter	○	○	○	○
9.	I can drink diet pop instead of regular pop.	○	○	○	○
10.	At school I can try a new vegetable.	○	○	○	○
11.	At the store, I can ask to buy fruit instead of potato chips.	○	○	○	○

V. Curriculum Scale (Grade 3)

1. What kinds of foods are the most healthy to eat every day?
    a. Foods with no fat or very little fat
    b. Foods that are fried
    c. Foods that have butter or margarine added to them

2. Which lets you know you are doing an exercise that is healthy for your body?
    a. Breathing harder
    b. Getting dizzy
    c. Becoming sleepy

3. Which food has the lowest amount of fat?
    a. Pretzels
    b. Doughnuts
    c. Potato chips

4. Which kind of milk has the lowest amount of fat?
    a. Whole mild
    b. Skim milk
    c. 2% milk

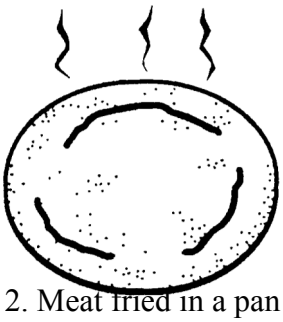
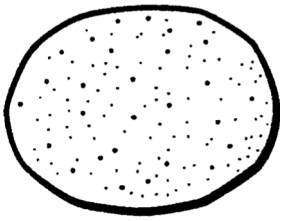
5. Which of these breakfasts has the lowest amount of fat?
    a. Cereal and low fat milk
    b. Fried eggs and bacon
    c. Pancakes and sausage

6. Which will get rid of the most fat in ground meat before you eat it?
    a. Fry the ground meat until well done
    b. Cook the ground meat without using oil
    c. Cook the ground meat, drain it, and rinse it with hot water

7. Which one of these foods is the healthiest choice for a snack?
    a. Buttered popcorn
    b. Taco chips
    c. Frozen juice bar

VI. Which Food has more Fat?

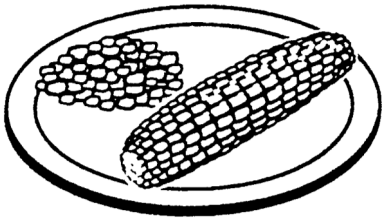
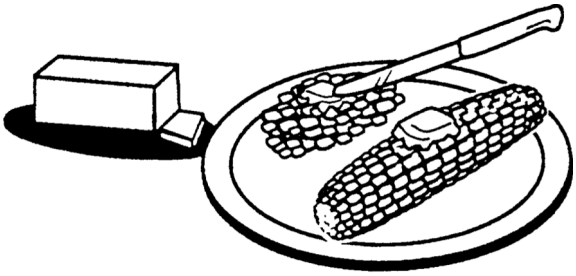
1. Bannock Tortilla Don't know

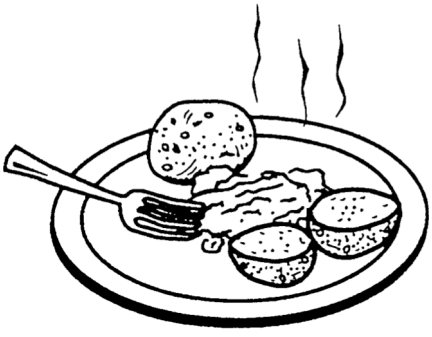

2. Meat fried in a pan Meat cooked on a grill Don't know



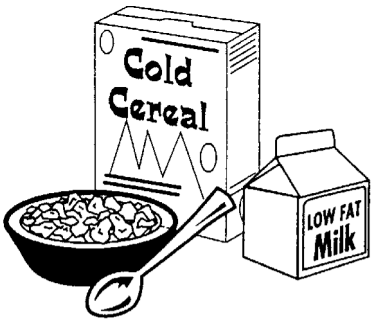
3. Corn with no butter Corn with butter Don't know

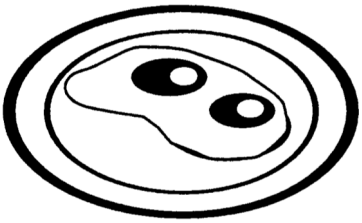




4. Boiled potato Fried potato Don't know



5. Cold cereal Fried eggs Don't know





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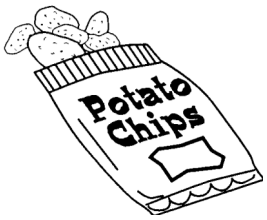
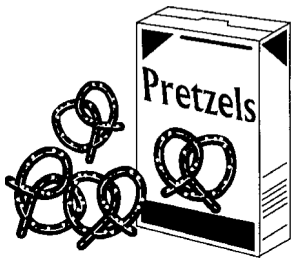
6. Chips Pretzels Don't know





?

VII. In Your Spare Time…

1. How many TV shows or movies do you watch during the week?
    a. None
    b. 1-2 shows or movies per week
    c. 3-4 shows or movies per week
    d. >5 shows or movies per week

2. How many TV shows or movies do you watch during the weekend?
    a. None
    b. 1-2 shows or movies per weekend
    c. 3-4 shows or movies per weekend
    d. >5 shows or movies per weekend

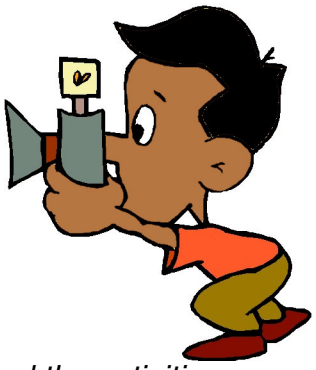
3. During the week, how many hours <u>per day</u> do you spend playing video games like Nintendo, X-box, Playstation, Wii, Game Cube or the computer to surf the internet?
    a. None
    b. 1 hour per day
    c. 2-3 hours per day
    d. >3 hours per day

4. During the weekend, how many hours <u>per day</u> do you spend playing video games like Nintendo, X-box, Playstation, Wii, Game Cube or the computer to surf the internet?
    a. None
    b. 1 hour per day
    c. 2-3 hours per day
    d. >3 hours per day

Appendix XI

Grade 3-4 Photovoice Assignment

Camera Assignment: The things I like to eat and do…



Name: _____
Date: _____
Camera Number: _____

Dear parent/caregiver,
Your child is being asked to take pictures of the foods they eat, and the activities and hobbies they do (both relaxed and active). Your child is encouraged to take pictures at school, at home and while out in the community. Please support them as they take pictures over the next few days.

Take pictures of the things you eat and the things you do everyday – during recess, after school, on weekends.

Take pictures of:

The FOOD I like to eat everyday.

The THINGS I like to DO in my spare time.

Appendix XII

Parent Interview/Manipulation Check Questions

Parent Interview Questions (Manipulation Check)

1. Did you, the parents/caregivers, have an opportunity to see the handouts that were to be brought home by their students in the Family Action Packs? (ie. is the method of delivery appropriate… allowing for parent awareness that these information packs existed?)
2. What was your understanding of the purpose of the Family Action packs?
3. Did you find the information in the Family Action packs useful? If so, were you able to incorporate some of this information into your own family life?
4. Did you find the information in the Family Action packs not useful? If not, could you explain in a little more detail?
5. Was there anything in the handouts that made you feel uncomfortable? Or anything that made you feel excited and motivated?
6. Did you find the information to be motivating in being active and eating healthy?
7. How could things be done differently to improve the effectiveness of the Family Action packs?
8. Was it helpful to have some home materials provided to you that delivered similar messages about healthy eating and activities that your child was receiving in the classroom?
9. Were the handouts useful to you, to help support your student/child as they explored ways to eat and play in healthy ways?
10. What, if anything, have you (the parent/caregiver) started doing differently based on the things your child is learning? And also, based on the information you received in the Family Action packs?

Appendix XIII

Goal Card Example

1

Go for Goal 1

I, _____, set my first health goal to _____

_____ before next Monday.

_____ → _____

(write in today's date) (Sign your name)

Goal Check: ✓ the box **after** you reach your first goal.

☐ Yes! I did it!

I _____, so I reached the goal I set.

_____

(Sign your name)

NOTE: Adapted from the Pathways Curriculum which was created, published and copyrighted by the Pathways Cooperative Agreement. The Pathways Curriculum was made possible by grants from the National Institutes of Health, the National Heart, Lung, and Blood Institute. Grant numbers U01 HL50869, U01 HL50867, U01 HL50905, U01 HL50885, and U01 HL50907. 1998, Revised 1999

Appendix XIV

Excerpts from the Travelling Playground Games Booklet

B'gawk! (The chicken game!)

Description:

- Stand in a circle.
- Make two circles (one with each hand) with the index finger and the thumb. H old a circle over each eye. The person starting drops one hand (a quick bounce, as if the hand was tied to elastic) and says "B'gawk!" The direction is decided by which hand is used; if the first person drops his right hand, the person to his right must then continue the action. If he drops his left hand, the person to his left continues.
- If BOTH hands are dropped, the action continues in the same direction, but the person directly opposite is skipped over. The first person cannot use a double B'gawk, because direction has not yet been established.
- If someone messes up (ie: B'gawks when they shouldn't, or hesitates too long), they must run around the circle flapping arms and making chicken noises until they return to their original spot, and rejoin the play.
- *Note:* the group continues to play while the chicken run around the circle - this adds to the chance of being distracted, making mistakes, and becoming a chicken. More chickens, more fun!
- The goal of the game is to look ridiculous and go as fast as possible.
- This a good, short, warm up game.

Foxes and Bunnies

Description:

- Some students are named foxes and some bunnies.
- The rest of the players form shelters by standing facing one another with their arms raised and hands touching.
- Foxes attempt to tag the bunnies. If this happens, the successful fox and tagged bunny switch roles. To escape, bunnies may enter a shelter, and replace one of the players that were making up the shelter.
- The person removed from the shelter is now the new bunny, and remains so until tagged by a fox.

Variations:

- Instead of switching foxes and bunnies, once tagged, there are now two foxes, instead of one.
- Change space, locomotion etc.

Birthday Line-up

Description:

- Have the group line up in order of their birthdays (month and day, year isn't necessary).
- The trick is, they CANNOT TALK AT ALL.
- *Note:* You'll find they resort to sign language, nudges, someone might try to start directing, etc.

Variations:

- Try to line up by height, colour of t-shirt, age, alphabetical by first or last name, etc.
- Try and have a leader organize the group
- Race two groups against each other

Sort first by age then height.

Rock, Paper, Scissors Skip

Equipment: Long skipping rope

Description:

- Turn a long skipping rope between two players.
- One person starts skipping. Another player jumps in and plays rock/paper/scissors with the original skipper.
- The winner stays in and the loser jumps out getting back in the line to repeat the pattern.
- If a player tangles the rope he becomes the new turner.

Appendix XV

Interview Questions for Children in the Photovoice Project

The following questions were asked to each student participating in the photovoice portion of the project:

1. What do you see here?
2. What is really happening in this picture?
3. How does this relate to your life?
4. Why does this problem, concern or strength exist?
5. What can we do about it?

Other probing questions that were used if necessary:

1. Where does your family buy their food?
2. Is this a picture of your favorite food?
3. Can you think of other ways to get your food (besides at the local grocery store)?
4. In this picture, you say that you are (eg. playing outside). How often do you play outside? How often do you play inside?
5. What do you like to play outside? Inside?
6. Is this a picture of your favourite leisure time (spare time) activity?
7. If you could do anything at recess what would you do?

Appendix XVI

Parental Consent and Student Assent Forms

Consent Form
For
Participation in Health Promoting School Project

Your child is invited to participate in a school- and community-based health promotion project called *It takes a village: Promoting healthy body weights in Métis children.* The children who participate in this project will learn more about health and the importance of physical activity and nutrition through a summer playground component and a school curricular component. This program has been designed and developed by the Île-à-la-Crosse community research team, in conjunction with a research team from the University of Saskatchewan.

We are also inviting you to participate in this project as an individual who will support your child as he/she progresses through this program and also by inviting you to provide us with information on your activity levels and food choices. We are interested in gathering information from the parents and teachers who are involved in this project to determine if the activities the children are participating in, in the program, have any impact on the adults they interact with on a daily basis. This information will be obtained through **2 short adult questionnaires** that will be given to you in person or over the phone. There are no foreseeable risks associated with participating in this project.

Please read this form carefully with your child. And, please feel free to ask any questions.

This project is funded by the Indigenous Peoples Health Research Centre. The community researchers in this project are: Edna Daigneault, Marie Favel, Don Favel, Dwayne Favel, Vince Ahenekew, Barb Morin, and Ruby Caisse. The academic researchers are from the University of Saskatchewan and include: Sarah Oosman (PhD candidate), Dr. Karen Chad, and Dr. Janet Smylie.

***It takes a village: Promoting healthy body weights in Métis children* will work to**:

- Enhance the attitudes, beliefs, skills and behaviours of Métis children as they relate to physical activity and nutrition;
- Enhance Métis community and youth leadership in promoting health in the community;
- Encourage children to participate in health promoting activities and encourage children to involve their families in these activities;
- Increase the use of traditional ways that community members and children can participate in physical activity and/or nutritious eating;
- Enhance the ability of Métis community members and children to act as research partners in the implementation and evaluation of health promoting programming;
- Assist in developing future physical activity and nutrition programs for your community.

The Île-à-la-Crosse community research team (ICRT) and partners from the University of Saskatchewan have developed a health promoting school and community program for Grade 3 and 4 children. This health promoting school and community program consists of 2 main components: a **summer playground** component and a fall/winter Grade 3-4 **classroom curriculum** component.

The design of this project has been based on the information collected through the focus group discussions that occurred in April 2010 in your community. As well, significant input from the ICRT on issues related to curriculum development and the various community-specific activities related to physical activity and nutrition have been integrated into the project design.

We are now inviting children from Grades 2, 3 and 4 to participate in this project where the children will participate in lessons focused on health, physical activity and nutrition. There are minimal risks to participating in this project, *It takes a village: Promoting healthy body weights in Métis children*. During this project, the children will participate in various physical activities and projects focused on nutrition (in the classroom and in the community) which may cause you and/or your children to experience change and disruption in your daily routine or an emotional response to these changes and experiences.

At the beginning, during and at the end of the project your children will participate in several measurement pieces that will allow us to obtain information on any changes to their knowledge, attitudes, beliefs and behaviours that may occur, related to physical activity patterns and/or eating habits. Measuring these changes are critical to understanding if the health promoting school program has had any influence on your child.

For parents who agree to complete the 2 adult surveys on physical activity and healthy eating, these surveys will be given once at the beginning of the project and once at the end.

The measurement tools we will use are as follows:

- Questionnaires and/or surveys - focusing on the foods they eat and the activities they participate in. A research team member will ask these questions, in the presence (and with the help) of a parent or teacher. These questions will be asked at 3 different times during the next 6-8 months (June, August and October). *Adult questionnaires* will be given either in person (at a convenient time/place) or over the phone (at a convenient time).
- Photograph assignment – encouraging children to take pictures of the food they eat, the activities they do, what healthy bodies look like and what healthy people eat and do regularly in their community. Your child will be asked to choose several of these photographs and give a written or oral report on them, in front of their class and one or more of the research team members. This photograph assignment will take place twice during the next 6-8 months (June and October).

- Physical activity measurements – Children will be taught how to put on a small belt that has a device called an accelerometer (similar to a pedometer) on it. These devices measure the amount of activity and energy your children use during a given day. The information from these devices will give the research team an idea of how much actual activity your child participates in. The devices will be worn for a 7-day duration and should be warn at 3 different times during the next 6-8 months (June, August and October).
- Focus group discussions or interviews – you and/or your child may be asked to share your/their experiences during and at the end of this health promotion project. In these situations, you and/or your child will be asked questions related to this project which will help the research team to adapt the program to better suit community needs in the future. After each focus group discussion or interview, and before the final report to the community, **you and/or your child will have a chance to add, change, or delete any information in the focus group transcripts**. You and/or your child will be given **copies of the transcripts** for your personal safekeeping and use. The community will also receive a copy for their own records and to use as they determine. The head researcher, Karen Chad, will also keep copies for her confidential records.

This project has the potential to become a nationally recognized demonstration project because it:
- is a participatory research project that involves Metis communities;
- combines local Indigenous knowledge and analysis of quantitative knowledge; and
- applies this knowledge to a public health problem.

Success in the community partnership aspect of this project will make it easier to have Métis community–researcher partnerships in the future. Sharing the knowledge from this project **may or may not** help to directly benefit health programs and policies in your community.

The ICRT, Dr. Chad, Dr. Smylie and Sarah Oosman will use the information gathered during this project to prepare a:
- community report;
- synthesis report of the health promoting program design and implementation progress;
- manuscript for academic publication, and;
- grant proposal to extend the funding support of this project for a longer-term project on addressing healthy body weights in Métis children through physical activity and nutrition school- and community-based programming.

Participant anonymity will be maintained for all of these and any other written reports.

This project was reviewed by the University of Saskatchewan Behavioural Research Ethics Board on June 10, 2009.

Please check the following boxes, as appropriate:

☐ I agree to have photographs taken and released of my child for the purposes and objectives of this project, for display at school or in the community, for promotion of

this project and/or health in our school and community, and to highlight the successes of this program.

- ☐ I agree have photographs taken and released of myself, that might be taken during this project, for the purposes and objectives of this project, for display at school or in the community, for promotion of this project and/or health in our school and community, and to highlight the successes of this program.
- ☐ I agree to have my child take part in the measurement aspects of this research project, including answering questionnaires, participating in focus group discussions and interviews, and wearing an accelerometer.
- ☐ I agree to release the transcripts of any focus group discussion or key informant interview that I/my child might participate in, for the purposes of this project, after having the opportunity to add, change or delete any information in these transcripts.
- ☐ I agree to have my child attend any summer playground and game programs that will be organized and implemented by trained older youth living in Île-à-la-Crosse.
- ☐ I agree to have my child participate in any school and/or classroom programs that are planned for the 2010 fall school year.
- ☐ I agree to participate, as a parent/caregiver, in this project by filling out an activity and a food questionnaire.

I, _____, have read the information and I consent for my child, _____, to participate in the *It takes a village: Promoting healthy body weights in Métis children* project prepared by the Île-à-la-Crosse community research team, Dr. Chad, Dr. Smylie, and Sarah Oosman, with the support of the Indigenous Peoples' Health Research Centre.

I, _____, also voluntarily consent to complete 2 adult questionnaires on physical activity and nutrition. I understand the purpose of the project as stated and I have discussed this with my child. I understand that I may withdraw this consent at any time.

_____
Signature of parent/caregiver

_____
Date

I also understand that:

- My child's participation in the *It takes a village: Promoting healthy body weights in Métis children* project will involve them in physical activity and nutrition measurements (as described above), 2-3 different times during the next 8 months. These measurements may be taken during or after school hours;

- My child will take photographs of food and activities they participate in at school and at home, and will be asked to discuss several of these photographs with the community and academic research team. Discussions will occur during class time at the Rossignol Elementary School;

- My child will be asked to wear an accelerometer belt that will record their activity and energy levels, and I will encourage and support them to wear these for the requested and recommended time;

- There is minimal to no risk to my child's well-being through their participation, although taking part may disrupt their daily routine;

- Focus group consultations and/or interviews may be recorded and transcribed;

- The information that my child shares will remain anonymous in written reports. I/my child has the right to edit their own transcripts. I/my child will inform their teacher and/or the Investigator of his/her wishes;

- Unedited focus group/interview transcripts will be held in a confidential, locked cabinet in Dr. Karen Chad's office at the University of Saskatchewan. The information will be kept for a period of five years and then it will be destroyed;

- The final report will be available for my and my child's review and feedback before they are shared with anyone else besides the researchers. I and my child will receive a final copy of the written report when it is completed;

- I have the right to withdraw consent for my child to participate in this project at any time before or during the program. Any of my child's information recorded or reported will be destroyed or deleted if my child withdraws. I can also refuse for my child to participate and to respond to questions. This will not affect my or my child's relationship with the University of Saskatchewan or the services provided by Dr. Chad and her research team;

- There are two copies of this consent form. I may keep one for my records.

If you have any questions concerning the study, **please feel free to ask them at anytime**. You can contact the researchers at (306) 966-1099 or (306) 652-3761 if you have questions.

This study has been approved on ethical grounds by the University of Saskatchewan Behavioural Sciences Research Ethics Board on June 9, 2010.

If you have any **questions about your rights as a participant**, you may contact the Behavioral Research Ethics Officer of the University of Saskatchewan at 966-2084 or ethics.office@usask.ca. If you are not in Saskatoon, you may call collect.

Thank you.

Assent Form for Grade 2, 3, & 4 Children
Participation in Health Promoting School Project

You are invited to take part in a project that will teach you more about health, physical activity and nutrition. You will be invited to participate in a **summer playground and games program** this summer, and also a **Grade 3 class program** in the fall/winter 2010 school year.

This project is called ***It Takes A Village: Promoting Healthy Body Weights in Métis Children*** and your community has been involved in planning and designing this project specifically for you, in the Grade 2, 3 & 4 classes.

As you may remember, we asked you and/or some of your fellow students some questions about health, physical activity and nutrition. We also spoke to other people in your community. The information has been used to develop a program that we are now inviting you to participate in. If you decide to participate you will take part in lessons that will require you to move around more and be more active, other lessons will help you learn more about eating healthy, and many of the things you will learn about will help you to stay healthy. We hope that you can get your family involved in these activities as well. If you decide not to participate in these activities and lessons, for any reason, you will not cause anyone to be upset or angry, and you will not lose marks or have any penalty like that happen either.

At the beginning, during and at the end of this project **we will ask you to help us measure what you know about being physically active and eating well, and to measure what you eat and what your activity levels are in the day.** The information you share with us will be kept private and other children, parents and teachers will not find out who shared this information.

This is how we will measure what you do and what you eat:

- Food and Activity Questions – We will ask you questions about what you eat and ask you to think about all the foods you eat in one day, including all of your meals and snacks. You might have your parent or teacher help you with this. These questions will be asked at 3 different times between now, June, and the next school year, October.
- Photograph assignment – You will be given an assignment with a disposable camera and we will ask you to take pictures of what you do for activities at breaks in school, at home and during the weekend, and also take pictures of what you eat for meals and snacks. We will ask you to pick some of these pictures and talk about them with your families, your teachers and the research team. It is important to know that the people you might take pictures of will not be shown to others unless you agree to show the pictures and the person you took a picture of agrees to be shown. If there is anything you tell us about your health, your physical activities or your eating that you would like to add to, change, or erase from the discussions we have, then you will have a

chance to do that at anytime. This photograph assignment will take place twice between now, June, and the next school year, October.

- Physical activity measurements – You will be taught how to put on a small belt that has a device called an accelerometer (similar to a pedometer) on it. These devices measure the amount of activity and energy you use during the day. The information from these devices will give the research team an idea of how much energy you burn during the day. You will be asked to wear these devices for 7 full days (except during sleeping and bathing). This will happen 3 times between now, June, and the next school year, October.
- Focus group discussions or interviews – You may be asked to share your experiences during and at the end of this project. The information you share with us will help us decide what activities to keep doing with other Grade 3 and 4 children, or how we might change things. After each focus group discussion or interview, **you will have a chance to add, change, or delete any information you want**. You will be given **copies of these conversations**.

This project is an important one because:

- You are invited to take part in it and you are welcome to help us evaluate how different activities and lessons make it easier or more difficult to stay active and eat healthy.
- You will do different physical activity and healthy eating projects with your family and learn how to be and stay healthy together, as a team.
- You will help other students and teachers in your school, as well as your families, learn about ways to stay healthy.
- You might even help other Métis Grade 3 and 4 students, in other places, learn to stay healthy, be more active and eat healthy.
- You are helping another person, a student at the University of Saskatchewan, with her research project – a project that will later help many other children your age.

The different ideas and experiences you share with us during this project will be written out in a way that makes sure that you can't be identified by others, and this information will also be published in journals and presented at different conferences.

There are a few things you should know about taking part in this health project – there may be times when your routine at home or at school might change, these changes might make you feel a certain way (eg. happy, sad, excited, confused, energetic). This is normal but you can always talk to your family, your teacher or other community members if you need to. Other than that, you will carry on as usual while you take part in this project.

It is important for you to understand what this project is about and why we are asking you to help us by taking part in it – so if you have any questions at all, please ask your family, your teacher, or the University student, Sarah at any time. This project is meant to help you stay and be healthy.

This project was reviewed by the University of Saskatchewan Behavioural Research Ethics Board on June 10, 2009 – (this is a group of people who want to make sure that you are being respected and taken care of properly during this research project).

I, _____, have discussed participating in this project with my parent/caregiver, and I agree to take part in the *It Takes a Village: Promoting Healthy Body Weights in Métis Children* project. I understand that there will be fun activities to participate in in the summer, and I will try to find out about these and attend them. I also understand that there will be different lessons to learn during the fall 2010 school year.

If I, or my caregiver, have any questions, I can call the University of Saskatchewan, Office of Research Services at 306-966-2084; email ethics.office@usask.ca. I will be given a copy of this form to keep.