WHAT GOES INTO THE MIX? Examining Interventions Implemented by the Kahnawake Schools Diabetes Prevention Project

By

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A thesis submitted to the School of Kinesiology and Health Studies in conformity with the requirements for the degree of Master of Arts

Queen's University

Kingston, Ontario, Canada

September, 2006

Your file Votre référence
ISBN: 978-0-494-18712-8
Our file Notre référence
ISBN: 978-0-494-18712-8

ABSTRACT

More health promoters are designing culturally relevant, theory-based packages based on an ecological approach; however what constitutes the "best" intervention mix for a given population remains unknown. The purpose of this study was to apply an ecological lens and to examine theoretical and cultural underpinnings of interventions designed to enhance physical activity involvement, healthy eating, and diabetes awareness in children and community members from Kahnawake, Québec.

Fifty-nine interventions implemented from 2003-2004 by the Kahnawake Schools Diabetes Prevention Project (KSDPP) were examined. Activity Report Forms developed and completed by KSDPP intervention staff (n=3) were analyzed to distil intervention settings, targets, and strategies according to the Intervention Analysis Procedure (Lévesque et al., 2000; 2005; Richard et al., 1996). Implementation Checklists were assessed to identify integration of theoretical constructs from social cognitive theory, action strategies from the Ottawa Charter of Health Promotion, and factor groupings from the precede-proceed planning framework. Activity descriptions were examined to determine what strategies were employed to enhance the cultural relevance of interventions.

Descriptive statistics, chi-square analyses, and Wilcoxon tests were conducted to examine trends. Results demonstrate that 39.0% of KSDPP interventions focused on nutrition only while 20.9% included a nutrition, physical activity, and diabetes awareness component. Intervention staff ratings of success were not related to any intervention characteristics ($p>.05$). Nearly three-quarters of KSDPP intervention planning and implementation occurred with a community partner. KSDPP intervention staff used nine

different intervention strategies and implemented interventions in both organizational and community settings. Predisposing factors were targeted significantly more than enabling and reinforcing factors. Strategies to enhance behavioural capability were used significantly more than all other social cognitive theory constructs. Both developing personal skills and strengthening community action were principles targeted significantly more than other Ottawa charter action means. Peripheral and socio-cultural strategies were used in 25.4% and 33.9% of the interventions examined.

Results revealed a complex mix of theoretically and culturally driven multi-target, multi-setting intervention strategies that favour the individual level. Next steps are to link findings with intervention outcomes to identify which combinations represent the "best" intervention mix.

ACKNOWLEDGEMENTS

I would like thank so many people who have helped me with this project. First, to my advisor, Dr. Lucie Lévesque, thank you so much for all that you have done for me. Your knowledge and passion to inspire others makes you an incredible role-model.

This project would not have been possible without all of those involved with the Kahnawake Schools Diabetes Prevention Project. Thank you to the KSDPP intervention and research teams, and to the members of Community Advisory Board for all of their support and guidance. I would like to extend a special thanks to Joyce Rice, Lois Montour and Rhonda Kirby, members of the KSDPP intervention team, and to Jon Salsberg, Dr. Margaret Cargo, and Dr. Ann Macaulay, members of the KSDPP research team.

To Jennifer Robertson-Wilson, thank you for your statistics expertise and unbelievable patience. Thank you to Allison Kirby for her assistance with previous versions of this document. To the other graduate students in the PHE department, many of whom have become great friends, thank you for making my experience at Queen's so enjoyable. It is become of you that I have managed to keep me sane during this process.

Finally, I owe the biggest thanks to both of my parents. Mom and Dad, without your unconditional love and incredible support I have no doubt that I would not be where I am today.

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Chapter One INTRODUCTION

The type 2 diabetes epidemic among Aboriginal nations (Young, Reading, Elis, & O'Neil, 2000) and strong association between obesity and type 2 diabetes requires lifestyle interventions promoting regular physical activity and healthy eating to prevent this disease (Schulze & Hu, 2005). Health promotion program planners often use theories to guide lifestyle interventions as they can provide insight on the structural and psychological processes hypothesized to change behaviour (Rothman, 2004). Recent research advocates that intervention planners should take an ecological approach, which recognizes that numerous determinants of health influence behaviour on multiple levels, when designing interventions (McLeroy, Bibeau, Steckler, and Glanz, 1998; Pearce, 1996; Sallis & Owen, 1997). Growing evidence also suggests that health promotion planners should use culturally appropriate strategies to increase program effectiveness (Resnicow, Baranowski, Ahluwalia, & Braithwaite, 1999).

The Kahnawake Schools Diabetes Prevention Project (KSDPP) is a culturally appropriate project developed to prevent type 2 diabetes among future generations. KSDPP is a community-based participatory research project in Kahnawake, a Kanien'keha:ka (Mohawk) community located 15 kilometers outside Montréal, Québec. Interventions implemented by KSDPP are designed to raise diabetes awareness as well as encourage regular physical activity and healthy eating habits. To help guide ongoing intervention planning, KSDPP developed an ecological intervention model consistent with traditional Kahnawake community values and beliefs (Macaulay et al., 1997).

To ensure that interventions were culturally relevant to members of the Kahnawake community, the KSDPP intervention model incorporated traditional learning styles. For KSDPP, the precede-proceed model (Green & Kreuter, 1991) provided a planning framework to apply theories to guide appropriate intervention strategies. Since individual, interpersonal, and community change theories are deemed useful during the educational and ecological planning phase of the precede-proceed model, social cognitive theory, an interpersonal theory which recognizes the triadic reciprocity between behaviour, personal factors, and the environment, was chosen to identify appropriate intervention strategies (Bandura, 1986). Core elements of the Ottawa charter for health promotion (Ottawa Charter for Health Promotion, 1986), consistent with the traditional values and beliefs of the Kahnawake community were incorporated into the KSDPP intervention model. The Ottawa Charter for Health Promotion specifies action means intended to promote health: developing personal skills, strengthening community action, creating supportive environments, building healthy public policy, and reorienting health services (Ottawa Charter for Health Promotion, 1986).

Despite the advancement of knowledge into how health promotion planners should design interventions, there remains a weak understanding as to what creates the optimal intervention mix for a given population. Since interventions require a substantial investment of time, money, resources, and effort, it is crucial to determine which components lead to successful outcomes so that future intervention planners can reproduce successful efforts and eliminate ineffective attempts (Weiss, 1998).

The effectiveness of an intervention is often based on an outcome evaluation that measures whether or not behaviour change occurred. This type of assessment however fails to indicate how interventions achieve behaviour change (Weiss, 1998). Process evaluation, which occurs during program implementation, offers insight into what program components were implemented. This type of evaluation provides the first step into understand what ultimately influences behaviour change. This type of evaluation can inform program improvement and aid in the development and refinement of behaviour change theories (Weiss, 1998).

Although outcome evaluations have been conducted to assess the impact of KSDPP interventions on physical activity levels and dietary habits of Kahnawake children, (Paradis et al., 2005) they were unable to speak to which intervention model components contributed to changes in behaviour. Performing a process evaluation will not only allow for the identification of gaps during implementation and provide program improvement suggestions, but will take steps towards understanding which intervention elements contribute to successful outcomes. The purpose of my study was to unpack the KSDPP intervention program and examine the implementation of each intervention model component over the course of one year. This process evaluation consisted of three main objectives: 1) to assess the degree of integration of the ecological approach, 2) to assess the adherence to principles and/or theoretical constructs underpinning social cognitive theory, the precede-proceed model, and the Ottawa Charter for Health Promotion and, 3) to determine the use of strategies to enhance the cultural relevancy of interventions.

Chapter Two LITERATURE REVIEW

Type 2 Diabetes and Aboriginal Populations

Type 2 diabetes has emerged as an epidemic among Aboriginal nations (Young et al., 2000). Data from the Aboriginal Peoples Survey (2001) revealed that the prevalence of type 2 diabetes among Aboriginal populations was nearly three times higher than the national average. Not only are Aboriginal nations disproportionately affected by the disease, but they appear to have earlier disease onset rates and suffer from a greater number of disease associated complications than other populations (Diabetes Among Aboriginal People in Canada, 2000). Results from one study conducted in Kahnawake, a Mohawk community in Québec, revealed that over 60% of people with diabetes had at least one major complication (Macaulay, Montour, Adelson, 1988). Common complications related to type 2 diabetes include cardiovascular disease (Bennett & Knowler, 1984), nephropathy (West et al., 1983), retinopathy (Ross & Flick, 1990), and neuropathy (Young & Sevenhuysen, 1989) which can result in decreased quality of life, disability and premature death (Young et al., 2000). More recently Horn and colleagues have demonstrated that from 1986-88 to 2001-03 prevalence rates of type 2 diabetes in Kahnawake have increased from 6.4% to 7.1% in women and increased from 6.0% to 8.4% in men (Horn et al., unpublished manuscript).

Type 2 Diabetes and Primary Prevention

The etiology of type 2 diabetes recognizes genetic factors and lifestyle as contributors, however rapidly increasing incidence rates suggest that lifestyle choices have a greater impact (FAO/WHO, 2003). Lifestyle choices have also been used to

explain the substantial increase in obesity. This particular disease has consistently demonstrated a strong positive association with type 2 diabetes (Astrup & Finer, 2000). In fact, development of type 2 diabetes in both children and adults is more strongly associated with obesity than with any other clinical condition (Ludwig & Ebbeling, 2001). In a review conducted by Fagot-Campagna (2000) nearly all studies found children with type 2 diabetes to have a body mass index (BMI) score above the 95th percentile. According to the Centers for Disease Control (CDC), children with BMI scores equal or greater than the 95th percentile are considered overweight while those between the 85th and 95th percentile are classified as being at risk for overweight. Tremblay and Willms (2000) examined secular BMI changes among Canadian children and found a progressive increase in BMI, meaning that the prevalence of children at risk for overweight has increased considerably between 1981 and 1996 (i.e., from 15% to 28.8% for boys and 15% to 23.6% for girls) and the prevalence of overweight children has doubled over the same time period (i.e., from 5% to 13.5% for boys and 11.8% for girls). Percentages of overweight and at risk for overweight Aboriginal children, when compared to non-Aboriginal children, are considerably higher (Willows, 2005). Results from studies conducted in two Cree communities on James Bay revealed 38% of children were classified as overweight (Bernard, Lavalle, Gray-Donald, & Delisle, 1995). One study conducted in Kahnawake concluded that 29.5% of boys and 32.8% were classified as overweight (Trifonopoulos, 1995). Researchers tracked changes in children's BMI scores in Kahnawake from 1994 to 2002 and demonstrated that the average BMI score, adjusted for age and gender, was 18.86 in 1994 and 19.46 in 2002. These results showed

that the risk of children having a BMI over baseline levels increased by 37% in 2002 (Paradis et al., 2005).

Due to these increasing overweight trends among children and the association between obesity and type 2 diabetes, effective prevention methods are urgently needed to target modifiable diabetes risk factors in early life. Researchers have suggested that interventions should focus on children since the severity of complications associated with type 2 diabetes increases proportionately to number of years someone deals with the disease (Satterfield et al., 2003). Scientific evidence suggests that lifestyle changes can prevent or at least delay the occurrence of type 2 diabetes since physical activity and nutrition have been linked with a decreased risk of developing the disease (Williamson et al., 2004). Three independent randomized controlled trials conducted in three countries provide compelling evidence that sustained lifestyle interventions can prevent the development of type 2 diabetes in adults (Pan et al., 1997; Tuomilehto, Lindstorm, Eriksson, Valle, & Ilanne-Parikka, 2001; Knowler et al., 2002). By targeting diet and physical activity, participants at high-risk of developing type 2 diabetes were able reduce their impaired glucose tolerance by 40% to 60% over 3 to 4 years through the maintenance of modest weight loss (i.e., 7 to 10 pounds; Williamson et al., 2004). Although these types of lifestyle interventions typically achieve positive results, they are often efficacy trials conducted in resource intensive settings (Satterfield et al., 2003). In addition, no random controlled trials demonstrating the impact of physical activity and diet on incidence rates of type 2 diabetes have been conducted with children.

Community-based Lifestyle Interventions

Population approaches implemented in real-world settings are believed to be more challenging to implement as they attempt to reduce risk factors for disease across entire communities (Satterfield et al., 2003). Although community-based approaches offer smaller benefits to specific individuals, they are believed to provide greater benefit to the population as a whole (Rose, 1992). Several preventative community-based lifestyle interventions targeting children and youth have been implemented (Satterfield et al., 2003); however, these interventions vary greatly with regards to what segment of the population they are attempting to target and what health behaviour they are trying to influence. Therefore, this review will be limited to examining interventions that targeted children or adolescents and focused on diabetes awareness, nutrition, and physical activity.

Teufel and Ritenbaugh (1998) implemented a four-year diabetes education program targeting North American Indian adolescents from grades 9 to 12. By modifying the schools' food supply they were able to decrease sugar beverage consumption. In addition, by implementing a physical activity component, researchers observed that children, upon completion of the program, had decreased heart rates. This particular finding suggests an increase in cardiovascular fitness (Teufel & Ritenbaugh, 1998).

The Binestar Health Program was a school-based diabetes prevention project implemented for fourth grade Mexican-American children in low income school districts. This program included parent health education, school classroom education in addition to a school cafeteria nutrition component and an after-school physical activity component.

Based on social cognitive theory, Binestar aimed to increase fruit and vegetable intake, health knowledge, self-efficacy, self-esteem, and levels of physical activity. Evaluation variables were measured before and after intervention implementation occurred (i.e., in September 1996 and in May 1997). Paired t-tests were performed and revealed significant decreases in dietary fat servings and significant increases in fruit and vegetable servings and diabetes health knowledge. Differences between baseline and post-intervention measures of self-efficacy, self-esteem, and locus of control constructs were not analyzed (Trevino et al., 1998).

Jump Into Action was a school-based type 2 diabetes prevention program designed to encourage healthy lifestyles among fifth-grade students. Holcomb and colleagues (1998) conducted a three month intervention that focused on increasing self-efficacy and knowledge relating to diet, physical activity, and diabetes awareness. The study involved two groups of fifth-grade teachers and their students, only one of which received the diabetes training program. Paired t-tests were used to compare scores of students from both groups at pretest (January 1997), posttest (March 1997), and follow-up (April to May 1997) for each measure (i.e., knowledge, self-efficacy, and dietary and exercise behaviours). Significant effects were found for knowledge, self-efficacy, and changes in healthy dietary- and exercise-related behaviours. Frequency of unhealthy dietary-related behaviours was not significantly different. Changes in knowledge of diabetes causes and self-efficacy retained significance from posttest to follow-up however all other changes had returned to baseline (Holcomb, et al., 1998).

Although the following interventions did not specifically intend to prevent type 2 diabetes, their aim was to increase physical activity levels and improve dietary habits among children therefore they deserve to be mentioned given their relationship with the development of type 2 diabetes. The Healthy Youth Places Project was designed to get middle school children to eat five servings of fruit and vegetables and be physically active on a daily basis. This program was informed by an ecological approach and used social cognitive theory to guide intervention activities. The intervention program intended to provide children with skills and healthy norms in addition to providing them with a sense of connection and autonomy. All of these elements were hypothesized to influence individual psychosocial processes believed to promote healthy behaviours. Each spring (i.e., in Grade 6, 7, and 8), researchers measured children's behaviour and determinants of physical activity and healthy eating. Follow-up data will be collected to determine if improvement in skills, efficacy and behaviour are maintained during high school years. Although project results have yet to be reported, this study intends to provide information about what mediators impact the health behaviour of middle school children (Dzewaltowski, Estabrooks, & Johnston, 2002).

The National Heart, Lung and Blood Institute (NHLBI) funded several school-based intervention programs that focused on healthy eating and physical activity (Steckler et al., 2003). The first was the Child and Adolescent Trial for Cardiovascular Health (CATCH), a 3 year intervention targeting children from the third to fifth grades. CATCH was based on social cognitive theory whereby psychosocial variables hypothesized to reduce fat and sodium intake and increase participation in moderate to vigorous physical

activity were targeted for change. For example, the CATCH intervention model intended to target cognitive and behavioral processes and influence the physical and social environment, by teaching skill-based classroom curricula and by modifying the school and home environments (Edmundson et al., 1996). A repeated-measures multivariate analysis of variance was used to determine whether these variables differed between intervention and control schools over time. Measures were taken during the spring semester of grade 3 and again with children once they reached grade 5. Dietary intention, usual food choice, and knowledge improved significantly among children who took part in the intervention when compared to those who did not. This effect was sustained over three years; however the improvements that occurred at the start of the program either decreased or reached a plateau in subsequent years. Diet-related perceived social reinforcement and self-efficacy scores also increased significantly at the start of the intervention for those who participated in the intervention however only improvements in perceived diet-related social reinforcement were maintained throughout subsequent years. Although self-efficacy for physical activity significantly improved at the start of the program, this effect was lost in subsequent years. No statistically significant effect was found for perceived positive or negative support for physical activity (Edmundson et al., 1996).

The second NHLBI funded project was Pathways, a 3 year school-based intervention program intended to promote healthy eating and physical activity among students in grades three, four, and five. This particular study was unique in the sense that it targeted Native Americans as opposed to children from other ethnicities. Since

Pathways was theoretically grounded in social cognitive theory, interventions attempted to increase student knowledge and efficacy surrounding food choices and physical activity. Interventions also intended to change the school environment to provide more opportunities to be physically active and to make healthy food choices (Steckler et al., 2003). Pathways used several instruments to collect process evaluation data (Helitzer et al., 1999). Researchers assessed the quality of program delivery and dose (i.e., the amount of units delivered or provided). The classroom curriculum implementation was given high dose ratings since students received an average of 93% of lessons over 3 years. Physical education curriculum received moderate dose scores when compared to the program goal of teaching five times per week (i.e. physical education for 150 minutes a week) but received high scores when compared to the minimum requirements (i.e., physical education for 90 minutes a week). Adherence to the food services guidelines increased from 51% to 87% therefore this aspect of the intervention received a high dose rating. Despite these positive findings average adult attendance during family events was lower than anticipated reach (i.e., 47%; Helitzer et al., 1999).

In 2005, a Cochrane Review on interventions for preventing obesity in children examined studies that attempted to prevent childhood obesity through diet and physical activity. A total of twenty-two intervention studies to change dietary habits and physical activity levels were examined, six of which were long-term (Summerbell, et al., 2005). Only one of these six studies demonstrated a positive effect on weight status for girls in the intervention group (Gortmaker et al., 1999). All of the other studies showed no significant difference in overweight status between intervention and control groups

(Caballero et al., 2003; Donelly Russo, Burdick, & Jenkins, 1996; Mueller, Asbeck, Mast, Lagnaese, & Grund, 2001; Sahota et al., 2001; Warren, Henry, Lightowler, Bradshaw, & Perwaiz, 2003).

Taken together, these findings demonstrate that despite some positive changes in behaviour (e.g., enhanced physical activity involvement), very few interventions have been able to produce changes in BMI. In addition, while many of these studies reported outcome evaluations, few included process evaluations to examine intervention implementation. This represents a gap in knowledge as process evaluation is essential to help us understand what elements are necessary to increase physical activity levels and improve healthy eating habits in children.

The Kahnawake Schools Diabetes Prevention Project (KSDPP)

When the community of Kahnawake was deciding how best to prevent diabetes in their community they, like other intervention teams, wanted success. Community members wanted a future without diabetes for the Seventh Generation (i.e., those not yet born). What follows is the story of the Kahnawake Schools Diabetes Prevention Project (KSDPP).

Kahnawake is a Kanien'keha:ka (Mohawk) community located on the south shore of the St. Lawrence River 15 kilometers outside Montréal, Québec. In 1988 community physicians reported that 12% of adults 45-64 years suffered from diabetes, a rate two times that of the Canadian population of the same age (Macaulay et al., 1988). When these results were returned to the community, concerned members actively sought out

academic researchers to aid in the development of a community-based participatory research endeavor known as the Kahnawake Schools Diabetes Prevention Project (KSDPP). The Kahnawake community, represented by the project's Community Advisory Board (CAB), helps guide each aspect of the research process in collaboration with community and academic researchers. The long-term goal of the project has been to prevent type 2 diabetes among future generations by promoting regular physical activity, encouraging healthy eating, and raising diabetes awareness. KSDPP conducts interventions in school and community settings to reach schoolchildren and members of the Kahnawake community (Macaulay et al., 1997).

KSDPP has operated under four funding cycles since it began in 1994. The initial funding cycle, which lasted from August 1994 to July 1997, was awarded by Health Canada through a National Aboriginal Diabetes research competition. From August 1997 to July 1998 absence of outside funding prevented evaluation activities to continue although local community funding allowed KSDPP interventions to be pursued. A newly created National Aboriginal Diabetes Strategy by Health Canada along with support from private foundations provided KSDPP with their third cycle of funding from August 1998 to July 2001 to continue the interventions and reinstate the evaluation component. During this phase project staff changed roles. They moved away from being intervention facilitators and moved towards helping people from other communities address diabetes prevention. In phase four, KSDPP received funds to create a research and training centre to disseminate their model for diabetes prevention in other Aboriginal communities (Potvin, Cargo, McComber, Delormier, Macaulay, 2003).

KSDPP Code of Research Ethics

When KSDPP began, a Code of Research Ethics was developed to help ensure that all research conducted in Kahnawake occurred as part of a partnership between people of Kahnawake, community researchers, and academic researchers. It stipulated that all three partners must adhere to the KSDPP Code of Research Ethics which outlines principles and procedures to guide partners in achieving the goals and objectives of KSDPP. For all research projects conducted in the Kahnawake community, partners were to work collaboratively in all aspects of the research process including design, implementation, analysis, interpretation, reporting, and publication (Macaulay et al., 1998).

KSDPP Intervention Model

Since KSDPP interventions intend to prevent type 2 diabetes, staff intervene in three domains: physical activity, nutrition, and diabetes awareness. When the research project began, KSDPP researchers and intervention staff developed an intervention model founded on traditional values and beliefs of the Kahnawake community to help guide on-going intervention planning. Through a unique type of collaboration, this KSDPP intervention model integrated Western theories with the traditional knowledge of the Kahnawake community.

Culturally Relevant Interventions

Intervention models that help guide intervention efforts often lead to more sustainable health promotion interventions since they help to match the needs and

resources of the community (Boston et al., 1997). Growing evidence now suggests that health promotion programs and materials are also more effective if they are culturally appropriate (Resnicow et al., 1999). Several strategies can be applied to help enhance cultural appropriateness including using relevant colours, images, fonts, and pictures on printed materials to increase acceptance of intended messages by enhancing a group's receptivity (Resnicow et al., 1999).

Health promotion research conducted from mid-1960s to mid-1980s assumed homogeneity across groups, focused on White middle-class populations and was insensitive to culture (Marin, Burhansstipanov, & Connell, 1995). However, recent studies suggest that tailoring or targeting programs to specific individuals or homogeneous groups may be more effective than generic programs that do not account for cultural diversity (Devos-Comby & Salovey, 2002). There is no mutually agreed upon definition of targeting however, it has been defined by Kreuter and Skinner (2000), as an taking an intervention approach that considers shared characteristics of the population subgroup. This type of intervention has proven effective in helping to promote behaviour change in some studies (Kreuter, Farrell, Olevitch, & Brennan, 1999). Although targeting is considered a financially feasible intervention approach, it assumes homogeneity within the target population (Kreuter, Lukwago, Bucholtz, Clark, & Sanders-Thompson, 2003). In contrast, intervention tailoring is directed towards specific individuals (as opposed to groups) and is adjusted to their specific characteristics. Tailoring is defined as "any combination of information or change strategies intended to reach one specific person, based on characteristics that are unique to that person, related

to the outcome of interest, and have been derived from an individual assignment" (Kreuter et al., 1999). Although questions remain as to whether targeting is more effective than tailoring, (Kreuter et al., 2003), both shift the intervention focus away from provider to the client population. This particular progression towards client centeredness is considered essential to intervention success (Kumanyika, 2003). In Kahnawake, KSDPP takes a targeted approach when they design interventions for the community.

Yancey and colleagues (2004) conducted a review of all population-based lifestyle interventions that targeted ethnically diverse communities from 1970 to 2003. Most common methods used to target intended groups included involving members of the community in all aspects of program planning, employing community health workers or promoters, and using culturally targeted messages. Although these programs reported engaging and retaining ethnically diverse populations using these methods, they were unable to determine what program elements were able to create and sustain behaviour change (Yancey et al., 2004).

KSDPP seeks to integrate culture by involving members of the community in all aspects of program development and implementation. In addition, KSDPP intervention staff attempt to incorporate traditional learning styles into the activities they implement (Macaulay et al., 1997).

Precede-Proceed model

For KSDPP, precede-proceed model (Green & Kreuter, 1991) provides a planning framework to apply theories to guide the development and implementation of appropriate

intervention strategies. Gielen and McDonald (2002) describe precede-proceed model as a road map and theories of health behaviour as directions intended to help guide intervention planners to their destination of choice. The PRECEDE framework developed by Green and colleagues in 1980 stands for Predisposing, Reinforcing, and Enabling Constructs in Educational/Environmental Diagnosis and Evaluation (Green & Kreuter, 1991), while the PROCEED framework, added in 1991 by Green and colleagues, stands for Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development (Green & Kreuter, 1991). Before intervention implementation occurs, social, epidemiological, behavioral and environmental, educational and ecological, and administrative and policy assessments are performed during the PRECEDE phase. To ensure interventions are accomplishing intended goals, health professionals conduct process, impact, and outcome evaluations throughout the PROCEED phase (Green & Kreuter, 1991).

During the social assessment, health professionals explore perceptions of what people believe is affecting their quality of life. At this stage, issues the population considers to be problematic are brought forward. For example, community members from Kahnawake expressed concern when results from a study conducted by local physicians revealed high rates of type 2 diabetes (Montour, Macaulay, & Adelson, 1989). By understanding population concerns, it enables planners to develop a relevant program that is more likely to be well received (Gielen & McDonald, 2002).

Indicators of population morbidity and mortality are examined during the epidemiological phase which helps identify segments of the population at high risk. For

example, since research demonstrated strong positive association between obesity and type 2 diabetes, a disease influencing morbidity and mortality rates in Kahnawake, community members decided to focus their interventions on preventing obesity. Community members specifically did not want future generations to suffer from type 2 diabetes, which allowed program planners to focus their efforts on this segment of the population. Once the target population has been established, program planners are able to set priorities and develop program goals and objectives with the community. Measurable program objectives are believed to be essential to evaluate program success and properly allocate resources (Green & Kreuter, 1991).

Behavioral and environmental assessments are conducted next to determine what factors are likely to influence population health concerns. This type of assessment is often done through an examination of the literature or by surveying the target population. Behavioral factors are behaviours that can affect the occurrence of health behaviours and in turn influence the severity of a health problem. Examinable behavioral factors may include compliance, consumption patterns, coping mechanisms, protective action, self-care and utilization (Green & Kreuter, 1999). Environmental factors are social and physical factors beyond an individual's control that can support or hinder the engagement in health behaviours. These factors include economic and physical resources, services, and social support. In Kahnawake, community members examined several interpersonal theories since they recognize that the social environment impacts a persons' behaviour. They were particularly interested in understanding what influenced healthy eating

behaviour and physical activity levels since nutrition and physical activity had been linked with obesity and the development of type 2 diabetes.

Once a behavioral and environmental assessment is complete, an educational and ecological assessment should identify specific elements necessary to initiate and sustain health behaviour change. Behaviour influences are broken down into three interdependent factors: predisposing, enabling and reinforcing.

Predisposing factors provide motivation for an individual to act and are categorized into psychological or social domains. The psychological domain includes cognitive and affective dimensions of knowledge, attitudes, beliefs, values, perceived needs and abilities. For example, giving children a handout with information about the health benefits associated with daily physical activity helps to increase their knowledge which in turn predisposes them to being physically active. The social domain encompasses socio-demographic variables such as age, gender, social status, family size and history. Many program planners use this type of information to target or tailor the health program to a specific segment of the population (Green & Kreuter, 1991). For example, knowing that teenagers are more influenced by their peers than their parents, program planners would design an intervention for teenagers only.

Enabling factors allow motivation to be realized and include environmental conditions such as availability, accessibility, and affordability of resources or opportunities. Conducting learn to ride clinics, for example, provide children with an opportunity to gain skills necessary to engage in a new behaviour. It is important to distinguish that while new skills enable someone to carry out a desired behaviour, skills

an individual already possesses predisposes them to engage in a behaviour (Green & Kreuter 1991).

Reinforcing factors (i.e., those given when people engage in behaviours) provide reward or incentive for a person to repeat or continue engaging in that behaviour. Reinforcements are given in a variety of different forms including advice, feedback, and physical consequences (Green & Kreuter, 1991). For example, having friends and family members encourage someone participating in a run can help increase the likelihood of them repeating that behaviour.

Since predisposing, enabling, and reinforcing factors are interdependent rather than independent, they need to be applied appropriately for behaviour to occur and persist. Research indicates that for behaviour to occur and persist, all three factors need to be aligned (Green & Kreuter, 1999). Predisposing and enabling factors lead to someone engaging in a behaviour that is then reinforced. If the appropriate type of reinforcement is given at the right time, it can lead to someone putting more time and effort into searching for additional resources. These additional resources can in turn help someone continue engaging in a behaviour that influences their future motivation (Green & Kreuter, 1991). For example, having family and friends come out and cheer someone on during their first bike race can encourage that person to seek out additional races in which they can participate.

In order to determine what influences each of these different types of factors, researchers believe that individual-level theories are the most appropriate for predisposing

factors, community-level theories for enabling factors, and interpersonal-level theories are best suited for reinforcing factors (Green & Kreuter, 1991).

Once intervention planners determine how factors are influenced to help someone engage in health behaviours, specific intervention strategies are planned during the administrative and policy assessment phase. Before an intervention is implemented, health program planners must examine organizational and administrative capabilities including availability of necessary resources (i.e., time, money, and staff). Since these potential barriers to implementation may hinder interventions, plans to address these issues should be discussed in advance (Green & Kreuter, 1991).

Once all assessments in the PRECEDE framework are complete, we move into the PROCEED framework where implementation of the health promotion program occurs. The final three phases of this planning model includes distinct types of evaluations: process, impact, and outcome. Process evaluation is used to examine the implementation process and determine whether the program was delivered as planned (i.e., fidelity) while impact evaluation measures how effective the program has been in achieving intermediate objectives. Outcome evaluation examines changes in the overarching program objective and consequently measures positive changes in quality of life among program participants (Green & Kreuter, 1999).

An Ecological Approach

When using the precede-proceed planning framework, KSDPP decided to emphasize the importance of taking a wholistic approach and acknowledging the

influence of the environment on health behaviour. In health promotion, recognizing the interconnectedness between the environment and a person and how this relationship impacts health, is known as taking an ecological approach. In Kahnawake, this is known as taking a wholistic approach (Delormier et al., 2003). An ecological approach recognizes multiple determinants of health behaviors in comparison to other approaches that are limited to intrapersonal determinants (e.g., a person's beliefs and attitudes). The ecological approach to health mirrors the wholistic approach taken by Aboriginal peoples as represented by the four-quadrant Medicine Wheel (Cargo, Lévesque, Peterson, & Macaulay, unpublished manuscript). These four inter-related aspects of self include physical and social domains in additional to spirituality and emotionality (Montour, 2000). Health promotion intervention programs are considered ecological or wholistic when they take into account that health behaviors are influence by factors that reside outside of the individual in addition to those factors that are within. These external factors, found in the social, cultural, physical, and political environments, can be leveraged to influence behavior. The following section will provide a detailed explanation of how these multi-level influences can be operationalized within the context of a health promotion intervention program.

According to Brofenbrenner (1977), to understand human development we need to examine the environment beyond the immediate situation in which a person is situated. Brofenbrenner stratifies what he terms the environment into various levels of influence: micro-systems, meso-systems, exo-systems, and macro-systems. Micro-systems are the immediate settings that contain people and include the relationships between a person and

their environment. A setting, defined by Brofenbrenner, is a place with specific physical features where people in defined roles engage in particular activities for a set period of time. A meso-system is an assembly of micro-systems and includes the relationships between these systems that contain people at a specific point in their life. Exo-systems are considered an extension of meso-systems since they are social structures that influence the immediate setting which contains the person intended for change. Finally, macro-systems are the institutional patterns of culture that outline structures and activities occurring at more concrete levels (i.e. at micro-, meso-, and exo-system levels) which ultimately influence people (Bronfenbrenner, 1977).

Although Bronfenbrenner provided an ecological lens to investigate human development, he did not offer the necessary conceptualization to guide health behaviour interventions (McLeroy et al., 1988). Work done by McLeroy and colleagues (1988) provides further clarification about what levels can specifically influence health behaviour: intrapersonal, interpersonal, institutional, community, and policy.

Intrapersonal factors are characteristics or attributes of the individual such as their knowledge, attitudes, and skills. Interpersonal factors are primary groups (i.e., friends, family members, work colleagues, neighbors, and acquaintances) and interpersonal relationships. These social networks can influence a person's access to and acceptability of information. People within someone's social network can provide the support or be the role-models necessary to influence health behaviour. Organizational characteristics, such as management structure, use of incentives, rules and regulations, may support or hinder health behaviours. Health behaviour is also hypothesized to be affected by

community factors. Community can be conceptualized to include mediating structures that connect someone to their social environment, relationships between organizations or groups in a defined geographical or political region, and can be populations characterized by one or more power structures (McLeroy et al., 1988). Finally, public policy can influence health by restricting or indirectly affecting behaviours, by providing positive or negative behavioural incentives, or by allocating program resources (McLeroy et al., 1988).

To help facilitate the use of ecological approaches in health promotion planning, Richard and colleagues (1996) integrated the work from Bronfenbrenner (1977) and McLeroy et al. (1988) to identify five intervention targets: individual, interpersonal, organizational, community, and political. Targets are defined as those identified for change in health promotion programs. Although priority population is the preferred term used in health promotion, target will be used to be consistent with the work done by those who developed the ecological coding method that will be used in this project.

Richard et al. (1996) also borrowed from work by Miller (1978; 1992) to identify intervention settings, defined as where the priority population can be reached. Using the five most macro categories of Miller's hierarchical theory of living systems (1978), Richard et al. (1996) identify five intervention settings: organizations, communities, societies and supranational systems. Organizations are systems with a formal decision making process that operate to achieve set objectives (for example, a school or community health center). Communities have a restricted geographical area and are composed of people and organizations (for example, the Kahnawake community).

Societies are larger systems able to control multiple components and the development of subsequent systems (for example, Canada or the United States). Finally, supranational systems are comprised of two or more societies (for example, the European Union; Richard et al., 1996).

In addition to defining intervention targets and settings, Richard and colleagues (1996) identify intervention strategies which represent the type of the exchange between the program and its targets. The first type of exchange is where resources and/or information are directly transferred from the health promoter (i.e., KSDPP intervention staff) to the intended or priority population while the second type involves a networking two or more targets.

To determine what elements lead to successful behavior change and to help guide health behaviour research, program planners rely on theory. Since individual, interpersonal, and community theories are deemed useful at the educational and ecological planning phase of precede-proceed model, social cognitive theory (Bandura, 1986), an interpersonal theory that recognizes the triadic reciprocity between behaviour, personal factors, and the environment, was chosen to identify appropriate intervention strategies for KSDPP.

Social Cognitive Theory

According to Bandura's social cognitive theory (SCT), behaviour is influenced by personal factors (i.e., an individual's thoughts, attitudes, and beliefs) and environmental factors (i.e., both objective and subjective). The relationships between an individual's

behaviour, thoughts, attitudes, beliefs, and environment are believed to be reciprocal whereby components are constantly influencing each other and changes in one component can impact another. Bandura has coined this element of SCT as reciprocal determinism (Bandura, 1986).

Two critical elements are needed to engage in a given behaviour. People must know what to do (i.e., have knowledge about the behaviour), and how to do it (i.e., have skills necessary to perform the behaviour). This "behavioural capability" makes an important distinction between learning and performance since some tasks, although they may be learned, may not actually be performed.

Reinforcement, another SCT construct, describes ways to increase the reoccurrence of a preferred behaviour and to decrease the reoccurrence of an undesired behaviour. There are three categories of reinforcement that include: positive reinforcement, negative reinforcement, and punishment developed from operant conditioning principles (Skinner, 1947). Positive reinforcement, a term more commonly known as reward, is given to increase the likelihood of someone repeating that particular behaviour. Negative reinforcement, which occurs when a negative stimulus is removed, also helps increase the likelihood of someone repeating a desired behaviour. In comparison punishment, or the expectation of receiving it, decreases the likelihood of someone repeating an undesired behaviour.

The most widely known construct of SCT, self-efficacy, is defined as the belief a person has in their ability to perform a task successfully (Bandura, 1986). A person's level of self-efficacy influences the amount of effort they invest in a task. Self-efficacy is

task specific and can be enhanced by simplifying a task into steps and allowing someone to perform the task repeatedly, enabling them to achieve successful outcomes. People may perform a task themselves using operant conditioning methods. Observational learning is believed to be more efficient for learning complex behaviours. Observational learning, also known as vicarious learning or modeling, occurs when someone watches another person perform a task. This type of learning is believed to be more efficient since it eliminates the time-consuming trial and error processes. Observational learning is considered more effective when the model performing the task is powerful, respected, and considered to be like the observer.

Ottawa Charter for Health Promotion

The core elements of the Ottawa Charter for Health Promotion resemble the traditional values and beliefs of the Kahnawake community, therefore their principles were incorporated into the KSDPP intervention model. The charter, presented at the first International Conference on health promotion in Ottawa, was developed in response to increasing expectations for a new public health movement occurring around the world. The charter begins by defining health promotion before outlining strategies to help everyone achieve good health. Health promotion is defined as:

> ...the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy life-styles to well-being. ("Ottawa Charter for Health Promotion", 1986, 1)

In order to promote health, the charter provides program planners with five action means or strategies that include: building healthy public policy, strengthening community actions, developing personal skills, reorienting health services, and creating supportive environments ("Ottawa Charter for Health Promotion", 1986). The following section will describe each action mean and provide an example of how it could be used to improve health.

Putting health on the agenda for policy makers in all areas and on all levels helps build healthy public policy. This can be achieved through various methods including legislation, taxation, fiscal measures, and organizational change. By implementing a school nutrition policy, for example, promoting healthy eating among schoolchildren makes the healthy choice the easy choice. Strengthening community actions, the second action mean outlined by the Ottawa charter, is achieved by involving the community when setting priorities, making decisions, planning and implementing health strategies. Enabling communities, allowing them to take ownership and control over their destiny, leads to greater community empowerment ("Ottawa Charter for Health Promotion", 1986). This type of empowerment is achieved by providing communities with funding support, learning opportunities, and access to information. Having community members take a leadership role and implement health promoting activities in their community, for example, helps further empowerment. By providing information, health education, and enhancing life skills, people can develop personal skills, the third action mean. Giving children a recipe and the opportunity to make healthy yogurt sundaes, for example, provides them with the skills necessary to prepare future healthy snacks. The fourth

action mean outlined in the charter is reorienting health services by recognizing health research advancements and providing professionals with education and training. Giving local community members the opportunity to engage in formal diabetes prevention training, for example, allows them to work in the local hospital as a diabetes prevention educator. This endeavor reorients health services to focus on health promotion as opposed to disease treatment. The charter identifies creating supportive environments as the fifth action mean. Changing patterns of life, work, and leisure is believed to significantly impact health. Health promotion strategies should therefore aim to create living and working conditions that are safe, stimulating, satisfying, and enjoyable. By creating a well lit community walking path, for example, a safe environment is available for people to engage in daily physical activity ("Ottawa Charter for Health Promotion", 1986).

Once the KSDPP intervention model was developed, intervention staff began implementing interventions in school and community settings. In 2005, Paradis and colleagues examined the impact of nutrition, physical activity and diabetes awareness interventions on body size, physical activity, and diet among children aged 6 to 11 years. Longitudinal analysis compared children from Kahnawake (i.e., the intervention community) and children from another Mohawk community (i.e., the comparison community) located 200 miles from Kahnawake. Measurements were taken from 1994 to 1996 and indicated no significant difference in body mass index (BMI) between groups even though children in the intervention group showed significantly less increases in subscapular and triceps skinfolds. Children in the comparison group showed an average

8% improvement in run/walk test scores while children in the intervention group showed an average 22% deterioration. When examining dietary habits, no significant differences existed between groups for indices of sugar, fat, or fruit and vegetable consumption. Cross-sectional measurements were conducted with Kahnawake school children in 1994, 1996, 1998, 1999, and 2002. Results revealed that in 2002, students had significantly higher body mass index (BMI) scores and skinfold thickness when compared to baseline measures. Although the mean number of 15 minute physical activity segments increased significantly in 1998 and 1999, they plummeted back to baseline values in 2002. Consumption of television and video games decreased from 1994 to 1999, but improvements were lost in 2002. Fortunately, children demonstrated a significant decrease in high-sugar and high-fat food consumption from 1996 to 2002 however fruit and vegetable consumption also decreased over the same time period (Paradis et al., 2005). These mixed results suggest that some interventions may have been more successful than others however we are unable to speak to which ones had an impact. To determine what program elements may have led to behaviour change and to understand why an intervention did or did not achieve its objectives, we need process evaluation (Linnan & Steckler, 2002).

Process Evaluation

Three distinct types of evaluations can be performed when examining interventions: process, impact, and outcome. Although many health behavior interventions have included outcome evaluations and reported successful outcomes, a

limited number have performed process or impact evaluations and identified what elements influence positive health behaviour change (Linnan & Steckler, 2002). Impact evaluation focuses on the immediate observable effects of a program including awareness, knowledge, attitudes, skills, and behaviour while process evaluation involves taking measurements during implementation to control, assure, or improve the quality of delivery (McKenzie, Neiger, & Smeltzer, 2005). Process evaluation enables researchers to examine intervention implementation and provides a great deal of information pertaining to the types of activities being delivered, how these activities are being delivered, why they are being delivered, and to whom they are being delivered (Platt et al., 2004). Focusing on intervention implementation enables researchers to determine how program elements are impacting mediating variables hypothesized to influence behaviour according to theoretical intervention models (Baranowski et al., 1998). Since health behavior interventions have become increasingly more complex and include a greater number of components, it is critical to determine the extent to which each specific component is being implemented thereby allowing us to understand what elements are influencing behaviour change (Linnan & Steckler, 2002).

Despite an increasing number of intervention programs featuring variables that are influence physical activity and nutrition behaviour by performing process and impact evaluations, little is known about what intervention mix is appropriate for a given population. As such, the overarching purpose of this study was to unpack the type 2 diabetes program implemented in Kahnawake by the KSDPP. In order to provide a context to my evaluation, a first step was to describe the program by reporting such

information as participation rates, costs associated with implementation, and frequency of intervention domains implemented. In addition, since intervention staff's perception of success may have influenced how interventions were implemented, I examined what intervention elements influenced these perceptions. Finally, to determine to what extent intervention model components were implemented, I assessed 1) the degree of integration of the ecological approach, 2) the adherence to principles and/or theoretical constructs underpinning social cognitive theory, the precede-proceed model, and the Ottawa Charter for Health Promotion and 3) the use of strategies to enhance the cultural relevancy of interventions.

Once the purpose and objectives of this project were established, several hypotheses, informed by health intervention literature and based on previous KSDPP functioning, were developed. Given that the same intervention staff implement interventions each year it is expected that some activities will be repeated. Since KSDPP was developed to help prevent type 2 diabetes among future generations, it was expected that children would make up the greatest number of intervention participants (Macaulay et al., 1997). Given that KSDPP receives a great deal of in-kind support, it was expected that intervention costs per person would be relatively low. Since intervention staff confer with a local nutritionist on a regular basis, it was expected that nutrition would be the domain targeted most often. It was also hypothesized that interventions given high ratings of success by intervention staff would be associated with high participation rates, high objective fulfillment, and low evolution ratings (i.e., the intervention did not change much between planning and implementation). When examining the degree of ecological

integration it was expected that the KSDPP program would be highly ecological (i.e., implementing interventions in multiple settings, targeting multiple levels, and collaborating with other organizations when planning and implementing interventions) (Lévesque et al., 2005). When examining the use of theoretical construct/principles it was expected that they would be different for each intervention domain and that they would target the individual level more often (Stokols, 1992; McLeroy et al., 1993). \

Chapter Three METHODS

Implementation Mode

The KSDPP intervention model provides a "map" for KSDPP intervention staff who plan and implement KSDPP interventions. These staff are three women from the Kahnawake community each of whom hold a Bachelor of Arts degree, have experience in education, and are passionate about preventing type 2 diabetes in their community. One member of the KSDPP intervention staff is the Intervention Coordinator who has been with the project since it began and oversees all interventions. The other two staff are Intervention Facilitators one of whom is designated to lead school-based interventions while the other leads community-based interventions.

Each year KSDPP intervention staff create an annual intervention plan to guide their interventions for the upcoming year. This plan is influenced by community events, the school calendar, community feedback and requests, situational circumstances, and intervention staff experiences (Delormier et al., 2003). During their annual planning session, intervention staff identify past activities that were deemed successful so they can be repeated. Members of the intervention staff also consider age groups that could benefit from additional interventions and identify potential organizations with whom they could partner. Intervention brainstorming sessions sometimes occur formally, like this annual planning meeting, but they also happen informally through impromptu discussions throughout the year (Delormier et al., 2003).

Process Measures

For each intervention intended to be implemented, intervention staff complete an Activity Report Form (see Appendix A) and Intervention Implementation Form (see Appendix B). These forms were developed through collaborative efforts between intervention staff and project researchers.

Intervention Characteristics

Activity Report Forms are used to assess intervention participation and contain logistical information such as event name, date, location, duration, and intervention domain (i.e., nutrition, physical activity, and/or diabetes awareness). These forms are used to document the intervention outlining its goals and objectives, noting all of the individuals involved in planning and implementation and specifying their roles and tasks. In addition, all of the items necessary to carry out the intervention are listed on the Activity Report Form expense report. This section provides valuable information about the costs associated with carrying out each intervention. While the intervention is being implemented, intervention staff record observations, intervention strengths, and weaknesses on the Activity Report Form. In addition, throughout the intervention, the lead intervention staff counts event participants and notes their age (i.e., child, youth, adult, and senior) and gender (i.e., male and female) to provide information about intervention reach.

Once an intervention is implemented, intervention staff complete a one-page Intervention Implementation Form. On this form, intervention staff record brand of intervention (i.e., new or repeated), type of participation (i.e., voluntary, directed, or

mandated), and category of intervention (i.e., one-time, part of a series, on-going continuous, or intermittent ongoing). "One-time interventions" are those that are implemented in only one location (for example, a community walk intended to promote physical activity and raise diabetes awareness). Interventions characterized as "part of a series" are those that are implemented in different locations within a defined period of time (for example, an information booth containing healthy snack ideas implemented at each school within the community). When an intervention is characterized as "on-going continuous" it signifies a combination of related lessons or components implemented over a defined period of time (for example, a six-week cooking class where participants meet once a week to learn how to prepare healthy meals). "Intermittent on-going" interventions are those that are continually enforced or available (for example, a walking group that meets once a week for people who want to be physically active on a regular basis).

Intervention Staff Ratings

In addition to characterizing interventions, the Intervention Implementation Form includes intervention staff ratings indicating categories of success (i.e., very successful, successful, or somewhat successful), likelihood of implementing interventions again (i.e., sure thing, very likely, somewhat likely, or not likely), changes in the intervention between planning and implementation (i.e., did not change at all, underwent minor modifications, underwent major modifications, or changed completely), degree to which the intervention fulfilled its planned objectives (i.e., all, many, a few, or none of the

planned objectives), and amount of participation (i.e., less than, what, or greater than expected).

Principles and/or Theoretical Constructs

The Intervention Implementation Form also contains an Intention Checklist which compiles KSDPP intervention model principles and/or theories into a 25 item user-friendly checklist. Checklist items are divided among three factors outlined by the precede-proceed model: predisposing, enabling, and reinforcing. These same checklist items are categorized into four constructs outlined by social cognitive theory; reciprocal determinism, behavioral capability, reinforcement, and self-efficacy. Finally, items contained on the checklist are separated into five action means described in the Ottawa Charter for Health Promotion; developing personal skills, creating supportive environments, building healthy public policy, reorienting health services, and strengthening community action.

This checklist can be used to examine which mediators were targeted by each intervention. Intervention staff read each checklist item and checks whether a component of the intervention was included to influence behaviour change. This checklist used a presence or absence scale. For example, intervention staff would check the checklist item "use or promote role-modeling" under the physical activity domain for an intervention that encourages parents and children to participate in a community walk. The intervention staff complete this 25 item list for each intervention domain (i.e., for physical activity, nutrition, and diabetes awareness) since some interventions contain two or more domains.

Data Collection

Since KSDPP interventions are implemented continually and change from year to year, the intention was to report on the most recent interventions implemented to provide useful feedback to the intervention staff. In addition, a full year of interventions were examined since intervention staff plan their activities on a yearly basis. Based on these two criteria, data collection occurred from June 2003 to June 2004. Seventy-four Activity Report Forms were initially examined. Four reports were unable to be coded due to missing data and upon application of inclusion criteria described below, an additional 11 were excluded yielding a total of fifty-nine for coding and analysis. The first inclusion criterion was that interventions had to be implemented in only one location given that the intention was to code planning efforts as opposed to implementation efforts. The second inclusion criteria was that interventions needed to be within the most recent programming year (i.e., between June 2003 to June 2004).

Although Activity Report Forms completed by the KSDPP intervention staff contained many details about the activities they implemented, I conducted cleaning and screening meetings with KSDPP intervention staff to help clarify some information. These cleaning and screening meetings were scheduled at their convenience at the KSDPP research center. To facilitate this process I examined each Activity Report Form and recorded specific questions to which clarification was required before the meetings occurred.

Coding and Analysis

Ecological Integration

The Intervention Analysis Procedure (IAP) developed by Richard and colleagues (1996) and further described by Gauvin et al. (2001) and Lévesque et al. (2005), was used to extract intervention targets, setting, intervention strategy(ies) and programming approach from Activity Report Form. Descriptions of interventions contained on the Activity Report Forms were examined to extract this information, a process referred to as ecological coding. Before analysis of the Activity Report Forms began, the secondary investigator, who has had previous experience applying the Intervention Analysis Procedure, and I coded six Activity Report Forms to determine the integration of the ecological approach. When disagreement arose, discussion occurred between both parties until consensus was met thereby aiding coding consistency.

Intervention targets are entities designated for change and include individuals (IND), interpersonal environments (INT; i.e. friends, family and/or colleagues), organizations (ORG; i.e. schools and/or school personnel, the workplace and/or workplace employer), the community (COM), and political entities (POL; i.e. policies or politicians; McLeroy et al., 1988). Interventions having more than one target require designation of a proximal and ultimate target. Ultimate targets are those for whom the intervention program was ultimately designed while proximal targets those used to change the ultimate target (Richard et al., 1996). For example, an intervention designed to teach parents how to prepare a healthy snack for their children would code parents as

the proximal and children as the ultimate targets. Elementary schoolchildren have been designated the ultimate target for all KSDPP interventions.

Intervention settings are defined as the physical locations where the ultimate target is reached. Possible intervention settings include organizations (ORG), defined as places characterized by a formal hierarchy (e.g. schools), communities (COM), specified as a collection of persons and/or organizations within a designated geographical area (e.g. neighbourhoods) societies (SOC), are defined as larger systems exerting control over people living in a specified area (e.g. provinces) and the supranational (SUPRA), which includes the combination of two or more societies (e.g. United Nations; Miller, 1978; Miller & Miller, 1992; Richard et al., 1996).

Intervention strategies refer to the type of exchange between the intervention program and its target(s). The first type of exchange is where resources and/or information are directly transferred from the health promoter (i.e., KSDPP intervention staff) to the intended or priority population. An example of a direct strategy would be when a health promotion worker shows children how to make a healthy yogurt sundae. The second type of strategy involves a networking two or more targets. An example of a networking strategy would be when a health promotion worker organizes a dragon boat team who meet once a week to prepare for a local race. Interventions are only coded as networking if the activity was not possible without both targets (Richard et al., 1996).

Finally, the intervention programming approach provides information about the people and/or organizations involved in planning and/or implementing the intervention.

The intervention programming approach may involve only one organization or may include partnerships between two or more organizations (Richard et al., 1996).

The IAP enables intervention staff and researchers to examine program strengths and weaknesses by carefully unpacking complex interventions (Richard et al., 1996). This tool evaluates intervention implementation and takes the first step towards understanding what intervention participants receive in terms of fidelity and dose (Gauvin, Lévesque, & Richard, 2001). This information is critical since it can greatly impact whether or not intervention participants engage in healthy behaviour change (Linnan & Steckler, 2002).

Although the IAP can be used to unpack intervention programs, this type of analysis procedure is somewhat complex to use and requires training (Lévesque et al., 2005). Despite having a clear coding protocol, caution should be exercised when using this tool since results may be influenced by the level of detail included in activity reports and since investigators may interpret intervention descriptions differently depending on their experience using this tool.

Use of Principles and/or Theoretical Constructs

Once Activity Report Forms were ecologically coded using the Intervention Analysis Procedure, Intervention Implementation Checklists were examined to determine the use of theoretical constructs and/or principles. When the Intervention Implementation Checklist was developed, researchers created a coding manual that stipulated which theoretical principle and/or construct from the KSDPP intervention model was reflected in each checklist item (see Appendix C). Given the overlapping nature of the three

principles and/or theories of the KSDPP intervention model (i.e., social cognitive theory, precede-proceed model, and the Ottawa Charter for Health Promotion), one checklist item could reflect more than one principle or theory.

Scoring

A principle/theory score was created for each *factor* from the precede-proceed model, each *construct* from social cognitive theory, and each *action mean* outlined by the Ottawa Charter for Health Promotion. A domain score was created by separating principle/theory scores by intervention activity domain (i.e., for physical activity, nutrition, and diabetes awareness) to determine what factors, constructs, and action means were used most often to change specific behaviour related to active living, healthy eating, and diabetes awareness.

Principle/Theory scores were calculated by the following formula:

$$\textbf{Principle/Theory Score} = \frac{\textbf{no. of checks}}{\textbf{(no. of checklist items } x \textbf{ total no. of intervention activities)}}$$

The number of checks made by intervention staff under all checklist items deemed to reflect a specific theoretical construct and/or principle was divided by the total number of checklist items reflecting each construct and/or principle multiplied by the total number of interventions. Principle/theory scores were multiplied by 100 to indicate the percentage of theoretical constructs and/or principles that were used relative to the total amount that could have been used to change overall behaviour.

Domain scores were calculated by the following formula:

$$\textbf{Domain Score} = \frac{\textbf{no. of domain checks}}{\textbf{(no. of checklist items } x \textbf{ total no. of domain intervention activities)}}$$

The number of checks made by intervention staff under all checklist items deemed to reflect a specific theoretical construct and/or principle for each intervention domain was divided by the number of checklist items reflecting each construct and/or principle multiplied by the number of interventions which contained that intervention domain. Domain scores were multiplied by 100 to indicate the percentage theoretical constructs and/or principles that were used relative to the amount that could have been used to change specific behaviour (i.e., to change physical activity, nutrition, and diabetes awareness).

Cultural Integration

To determine the use of traditional Kanien'kehá:ka values and learning styles, a categorical system developed by Kreuter and colleagues (2003) was applied to Activity Report Forms. Five categories are used to reflect strategies that are meant to enhance the cultural relevance of an intervention: peripheral, evidential, linguistic, constituent-involving, and sociocultural (Kreuter, Lukwago, Bucholtz, Clark, & Sanders-Thompson, 2003). Each category was given a score based on the number of times it was employed in relation to the total number of interventions.

Peripheral strategies include those that present programs or program materials in a fashion that appeal to the intended population while *evidential strategies* present the impact of health related issues to those involved in the intervention. *Linguistic strategies* involve providing people with health program materials in their native language. *Constituent-involving strategies* include using the experience of members from the target

group. This may include hiring people who are members of the intended population to deliver messages or identifying roles and responsibilities for community members during the planning and decision making stages. This unique type of inclusion can provide insights into non-observable cultural characteristics. Since KSDPP staff are members of the Kahnawake community and plan all of the interventions, they were not counted under the constituent-involving category. Finally, *sociocultural strategies* involve more in-depth use of culturally relevant approaches to health promotion by recognizing the intervention population's core values, beliefs, and behaviours (Kreuter et al., 2003).

Data Analysis

Windows Version 13.0 of the Statistical Package for the Social Science (SPSS®) was used for statistical analysis. Descriptive statistics (frequencies and percentages) were calculated to provide an overview about the types of intervention activities implemented by KSDPP, the people who participated in these activities, and the costs associated with implementing activities. Variables used to examine these areas included: intervention characteristics (i.e., one-time, series, intermittent on-going, and ongoing continuous), intervention domains (i.e., physical activity, nutrition, or diabetes awareness), intervention participation rates, intervention audience (i.e., children, youth, adults and/or seniors), mean intervention cost, and average intervention cost per person.

To determine what influenced the KSDPP intervention staff ratings of success, chi-square analyses ($p<.05$) examined the bivariate relationships between intervention staff rating scores (i.e., success, implement again, goal fulfillment, participation) and

intervention variables (i.e., intervention characteristic, new or repeated activities, type of activity, number of activities). Specific questions examined included whether KSDPP intervention staff were more likely to implement an activity again and regard it as more successful if it: a) fulfilled a greater amount of planned objectives, b) had a higher participation rate, c) was one-time, ongoing continuous, intermittent ongoing, or in a series, d) was new or repeated, e) had a physical activity, nutrition, or diabetes awareness component, and f) included one, two, or three intervention domains.

Upon completion of Intervention Analysis Procedure coding, descriptive statistics were calculated for settings, targets, intervention strategies, and programming approaches to determine the integration of the ecological approach. These statistics also enabled me to determine whether the interventions being implemented had diversity with respect to where they were being implemented, who they were targeting, how they were reaching participants, and who was involved in planning and implementing activities. The KSDPP program was given an ecological rating based on an algorithm created by Richard and colleagues (1996). According to the algorithm, programs receive a score of 0 when they have only one intervention strategy regardless of the number of settings and type of intervention. A score of 1 is given to programs with two or more different intervention strategies that do not directly target the ultimate entity. Scores of 2, 3, or 4 are given to programs with one, two, or three settings respectively. These programs must also have implemented at least two different strategies, one of which directly targets the ultimate entity (Richard et al., 1996).

I wanted to examine the overall use of the Intervention Implementation Checklist. Firstly, in order to examine what proportion of the overall checklist KSDPP intervention staff used to influence behaviour, the following formula was applied:

$$\frac{\text{Total no. of checks}}{[(\text{no. PA interventions} \times \text{no. checklist items}) + (\text{no. NUT interventions} \times \text{no. checklist items}) + (\text{no. DA interventions} \times \text{no. checklist items})]}$$

NOTE: PA = physical activity, NUT = nutrition, DA = diabetes awareness, no. = number

Secondly, a one-way independent analysis of variance (ANOVA) was conducted to determine whether the amount of the checklist used varied by intervention domain (i.e., by physical activity, nutrition, and diabetes awareness). Thirdly, all 25 checklist items were ranked to examine which ones were used more often than others to influence any type of behaviour. The same 25 checklist items were then ranked by domain to determine which ones were used more often to influence physical activity, nutrition, and diabetes awareness.

Next, in order to examine whether there were differences between the use of factors from precede-proceed model, constructs from social cognitive theory, and principles from the Ottawa Charter for Health Promotion, Wilcoxon Matched-Pairs Signed-Rank Tests (i.e., nonparametric paired sample t-tests) were used. These tests were first conducted to examine the differences between the use of factors, constructs, and action means to influence overall behaviour. Next, Wilcoxon Matched-Pairs Signed-Ranked Tests were conducted to examine the differences between the use of factors, constructs, and actions means to influence specific domains (i.e., to influence physical

activity, nutrition, and diabetes awareness). A nonparametric test was used because none of the variables were normally distributed.

Finally, descriptive statistics (i.e., frequencies and percentages) were calculated to determine which cultural strategies were used most often to enhance cultural relevance.

Chapter Four RESULTS

Intervention Characteristics

Among the 59 interventions examined, 64.4% (n=38) were categorized as one-time, 15.3% (n=9) as ongoing continuous while 13.6% (n=8) were considered to be in a series, and 3.4% (n=2) were classified as intermittent ongoing. Nearly fifty percent of the interventions were new while 47.5% were repeated. Nutrition activities were included in 79.7% (n=47) of the interventions while physical activity was included in 44.1% (n=26) and diabetes awareness in 32.2% (n=19). Although some interventions addressed only one domain, others addressed two or three. Results displayed in Table 1 show that the most common types of interventions were those that only had a nutrition component and interventions with a physical activity, nutrition, and diabetes awareness component. For the 25 interventions with two or more domains, the primary focus was examined. Among these interventions 52% (n=13) had physical activity as the primary focus, 32% (n=8) indicated that diabetes awareness was the primary focus, while 16% (n=4) had nutrition as the primary focus.

Table 1: Frequency and Percentage of Intervention Types

Types of Interventions	*Frequency*	*Percentage (%)*
NUT only	23	39.0
PA, NUT & DA	12	20.3
NUT & PA	9	15.3
PA only	6	10.2
NUT & DA	5	8.5
DA only	3	5.1
PA & DA	1	1.7

NOTE: PA=physical activity, NUT=nutrition, DA=diabetes awareness

Over one year, the attendance for 53 of the KSDPP interventions totaled 7030. Age information was not available for 32% (n=2250) of attendees however of the 4780 for whom this information was available, 39.8% (n=2792) were children, 25.6% (n=1803) were adults, and 2.6% (n=180) were youth. Adults attended 86.4% (i.e., 51 of 59) of the interventions implemented by KSDPP while children attended 57.6% (i.e., 34 of 59), and youth attended 33.9% (i.e., 20 of 57).

Forty-four Activity Report Forms had completed expense reports that enabled costs associated with implementing the intervention to be calculated. Results revealed that the average cost per intervention was $316.30. Forty-two Activity Report Forms contained information about the total number of participants and the total intervention. These allowed me to calculate the average intervention cost per person. KSDPP spent an average of $5.00 per person for the interventions implemented from 2003 to 2004.

Intervention Staff Ratings

Bivariate analyses were used to examine which intervention variables were associated with intervention staff ratings of success. Interventions deemed more successful by intervention staff were significantly more likely to be implemented again (χ^2 *(1,53)=14.364, p=.000)*. Repeated interventions (i.e., those implemented in previous years) were also significantly more likely to be implemented again (χ^2 *(2,53)=14.788, p=.001)*, as were interventions that fulfilled a greater number of planned objectives (χ^2 *(2,52)=9.305, p=.010)*. Despite these associations, no other intervention variables were significantly associated with success ratings *(p>.05)*.

KSDPP Intervention Model

Ecological Integration

The Intervention Analysis Procedure (IAP) was applied to 59 interventions. When the KSDPP intervention program was examined as a whole, it received a score of 3 based on the ecological algorithm. Interventions were examined according to who was involved in planning and implementing the intervention (i.e., programming approach). Results displayed in Table 2 reveal that 37.3% were initiated by a community partner (i.e., Partner-KSDPP), 33.9% were initiated by KSDPP and involved a community partner (i.e., KSDPP-Partner), while 28.8% were designed and implemented by KSDPP alone (i.e., KSDPP). Table 2 also shows that of the 59.3% of interventions implemented in a community setting, 40% were implemented by KSDPP alone, 40% used a Partner-KSDPP strategy, and 20% used a KSDPP-Partner strategy. Finally table 2 reveals that of the 40.7% of interventions implemented in an organizational setting, 54.2% used a KSDPP-Partner strategy, 33.3% used a Partner-KSDPP strategy, while 12.5% were implemented by KSDPP alone.

Table 2: Frequency of Programming Approach by Setting

	Setting		
Programming Approach	Organization	Community	TOTAL
KSDPP	14	3	17
KSDPP-Partner	7	13	20
Partner-KSDPP	14	8	22
TOTAL	35	24	59

NOTE: KSDPP = Kahnawake Schools Diabetes Prevention Project.

The IAP was also was applied to KSDPP interventions to examine intervention targets (i.e., those intended for change) and intervention strategies (i.e., type of exchange

between the program and its' targets). One intervention strategy was used in 66.1% (n=39) of the interventions while 33.9% (n=20) had two or more strategies (i.e., 19 interventions had two strategies and one intervention had three strategies). Therefore, of the 59 interventions examined a total of 80 intervention strategies emerged.

Table 3 reveals that a total of nine different types of intervention strategies were represented among the 80 intervention strategies. Examples of KSDPP intervention strategies are listed in Table 4. Direct strategies were used for 83.8% of interventions while 16.3% employed networking strategies.

Table 3: Frequency of Intervention Strategies by Programming Approach

	Programming Approach			
Intervention Strategy	KSDPP	KSDPP-Partner	Partner-KSDPP	TOTAL
IND	11	13	13	37
INT→IND	7	8	6	21
ORG→IND	3	2	2	7
COM→IND	1	0	0	1
ORG→INT→IND	1	0	0	1
[IND-IND]	0	0	1	1
[INT-INT]→IND	0	0	5	5
[ORG-ORG]→IND	0	3	0	4
[INT-ORG]→IND	1	2	0	3
TOTAL	24	28	28	80

Note: IND = individuals, INT = interpersonal environment, ORG = organizations, COM = community

Among the interventions that used direct strategies, individuals were the most frequent proximal target (i.e., 46.3% of interventions) while 26.3% of interventions targeted the interpersonal environment. Community entities and organizations were directly targeted for change in 8.8% and 2.5% of interventions respectively. Of the interventions aiming to network two or more targets, 6.3% networked the interpersonal environment and 5% networked organizations. All interpersonal environment networking

strategies used a Partner-KSDPP programming approach while the majority of organizational networking strategies used a KSDPP-Partner approach.

Table 4: Examples of KSDPP Intervention Strategies

Intervention Strategy	Example
IND	Elementary schoolchildren learn how to make healthy English muffin pizzas.
INT→IND	Parents attend an information booth on report card night which contains handouts on how to be physically active with their children during winter.
ORG→IND	Teachers are invited to a luncheon to discuss healthy snack ideas for their classroom.
COM→IND	KSDPP coordinates a meeting where Community Advisory Board members discuss strategic planning.
ORG→INT→IND	KSDPP suggests healthy food choices for arena canteen to see to parents and children during a girl's hockey tournament.
[IND-IND]	Children are awarded prizes for participating in a walk to promote diabetes awareness.
[INT-INT]→IND	KSDPP awards a prize to the family with the most members participating in Mohawk Miles.
[ORG-ORG]→IND	KSDPP organizes Racers for Health which invites schools from other communities to participate.
[INT-ORG]→IND	KSDPP organizes a team to participate in the JDRF Walk for a Cure which is comprised of staff members and their families.

Note: IND = individuals, INT = interpersonal environment, ORG = organizations, COM = community

Principles and/or Theoretical Constructs

Results reveal that KSDPP intervention staff used 46.1% of the Intervention Implementation Checklist to influence behaviour. Physical activity, nutrition, and diabetes awareness activities did not differ significantly with regards to the number of checklist item methods they employed $F(2,72)=0.308$. Checklist items were ranked according to amount they were used to influence any type of behaviour and are displayed in Table 5. These same checklist items were ranked for each intervention domain and

displayed in Table 6 for physical activity, in Table 7 for nutrition, and in Table 8 for diabetes awareness.

Table 5: Checklist items ranked according to proportion used to influence behaviour

CHECKLIST ITEMS	%
Use or promote role-modeling	75.6
Influence attitudes	74.4
Use verbal encouragement	73.3
Reinforce positive changes in participants	69.8
Build on specific participant strengths or skills	68.6
Provide "why, when or where" information about	65.1
Provide participants the opportunity for sharing	65.1
Correct misconceptions	64.0
Provide information on "how to"	64.0
Create a caring environment for the participant to engage in	64.0
Give participants the opportunity to provide input	60.5
Provide opportunity to learn or practice a skill	60.5
Teachings are passed on by sharing knowledge and experiences	59.3
Provide participation incentives	53.5
Promote the message of living in balance	53.5
Influence availability of products or services	31.3
Influence accessibility of products or services	27.9
Influence changes in the physical environment	26.7
Reinforce an existing practice or message	20.9
Promote a traditional aspect of health	17.4
Reinforce an existing policy	17.4
Influence an existing practice or message	12.8
Provide in-service for professionals	12.8
Influence an existing policy	10.5
Reflect cultural practice through ceremonies, prayers or legends	3.5

Table 6: Checklist items ranked according to proportion used to influence physical activity

CHECKLIST ITEMS	%
Influence attitudes	76.0
Reinforce positive changes in participants	76.0
Use verbal encouragement	76.0
Use or promote role-modeling	76.0
Build on specific participant strengths or skills	72.0
Provide opportunity to learn or practice a skill	68.0
Correct misconceptions	64.0
Provide participants the opportunity for sharing	64.0
Create a caring environment for the participant to engage in	64.0
Provide "why, when or where" information about	56.0
Provide information on "how to"	56.0
Give participants the opportunity to provide input	56.0
Provide participation incentives	52.0
Teachings are passed on by sharing knowledge and experiences	52.0
Promote the message of living in balance	40.0
Influence changes in the physical environment	40.0
Influence availability of products or services	32.0
Influence accessibility of products or services	32.0
Influence an existing practice or message	16.0
Reinforce an existing practice or message	12.0
Provide in-service for professionals	8.0
Promote a traditional aspect of health	4.0
Reflect cultural practice through ceremonies, prayers or legends	0
Influence an existing policy	0
Reinforce an existing policy	0

Table 7: Checklist items ranked according to proportion used to influence nutrition

CHECKLIST ITEMS	%
Use or promote role-modeling	73.3
Influence attitudes	71.1
Use verbal encouragement	68.9
Provide "why, when or where" information about	66.7
Provide information on "how to"	66.7
Provide participation incentives	64.4
Create a caring environment for the participant to engage in	64.4
Correct misconceptions	62.2
Build on specific participant strengths or skills	62.2
Reinforce positive changes in participants	60.0
Provide participants the opportunity for sharing	60.0
Give participants the opportunity to provide input	60.0
Provide opportunity to learn or practice a skill	57.8
Teachings are passed on by sharing knowledge and experiences	55.6
Promote the message of living in balance	51.1
Influence availability of products or services	35.6
Reinforce an existing policy	33.3
Influence accessibility of products or services	31.1
Reinforce an existing practice or message	26.7
Influence changes in the physical environment	22.2
Influence an existing policy	20.0
Influence an existing practice or message	13.3
Promote a traditional aspect of health	11.1
Provide in-service for professionals	8.9
Reflect cultural practice through ceremonies, prayers or legends	6.7

Table 8: Checklist items ranked according to proportion used to influence diabetes awareness

CHECKLIST ITEMS	%
Reinforce positive changes in participants	87.5
Influence attitudes	81.0
Build on specific participant strengths or skills	81.0
Use verbal encouragement	81.0
Promote the message of living in balance	81.0
Provide participants the opportunity for sharing	81.0
Teachings are passed on by sharing knowledge and experiences	81.0
Use or promote role-modeling	81.0
Provide "why, when or where" information about	75.0
Correct misconceptions	68.8
Provide information on "how to"	68.8
Give participants the opportunity to provide input	68.8
Promote a traditional aspect of health	56.3
Provide opportunity to learn or practice a skill	56.3
Provide in-service for professionals	31.3
Provide participation incentives	25.0
Create a caring environment for the participant to engage in	22.2
Reinforce an existing practice or message	18.8
Influence availability of products or services	18.8
Influence changes in the physical environment	18.8
Influence accessibility of products or services	12.5
Influence an existing practice or message	6.3
Reflect cultural practice through ceremonies, prayers or legends	0
Influence an existing policy	0
Reinforce an existing policy	0

Overall, using or promoting role-modeling, influencing attitudes and using verbal encouragement were the methods intervention staff used the most to change physical activity, nutrition, and diabetes awareness behaviour (i.e., in 75.6%, 74.4%, and in 73.3% of interventions respectively). Very few interventions reflected cultural practice through ceremonies, prayers or legends (i.e., in 3.5% of interventions), influenced an existing policy (i.e., in 10.5% of interventions), or provided in-service for professionals (i.e., in

12.8% of interventions). Similar checklist items were used the most and least when they were separated according to intervention domain.

Individual checklist item scores enabled me to examine factors from precede-proceed model, constructs from social cognitive theory, and action means from the Ottawa Charter for Health Promotion that were used most often to influence behaviour. The following sections will present descriptive statistics and inference of proportion results for each KSDPP intervention model theory and/or principle to reveal what factors, constructs, and action means were used more often than others to change behaviour.

Precede-Proceed model

Table 9 demonstrates that predisposing factors were targeted in the greatest percentage of activities (i.e., 64.0%) followed by enabling factors (i.e., in 44.9% of activities) and reinforcing factors (i.e., in 28.9% of activities).

Table 9: Frequency of Precede-Proceed Model Factors Targeted by Activity Domain

	PA (n=25)		NUT (n=45)		DA (n=16)		**TOTAL (n=86)**	
TYPES OF FACTORS	F	Score	F	Score	F	Score	**F**	**Score**
Predisposing Factors (3 items)	45	75	83	135	37	48	**165**	**258**
Enabling Factors (14 items)	154	350	281	630	106	224	**541**	**1204**
Reinforcing Factors (8 items)	37	200	106	360	56	128	**199**	**688**

NOTE: F=total number of checks per factor across by intervention domain, score=number of checklist items reflective of each factor *x* number of intervention activities

Using Wilxocon tests to examine the difference between the use of factors, a Bonferroni correction was applied so all effects are reported at a .0167 significance.

Results demonstrated that the use of enabling and reinforcing factors did not differ significantly *(p=.169)*. However, predisposing factors were used significantly more than enabling factors, *T=7, p<.001, r=-.488*, and reinforcing factors, *T=10, p<.001, r=-.433*. These results remained consistent when factors were separated by activity domain.

Social Cognitive Theory

Table 10 reports the overall use of SCT constructs and demonstrates that strategies used to enhance behavioral capability were used in the greatest percentage of activities (i.e., in 64.2%) followed by self-efficacy (i.e., in 49.8% of activities). Reinforcement, another SCT construct, was targeted in 44.4% of activities while reciprocal determinism was targeted in 32.6% of activities.

Table 10: Frequency of Social Cognitive Theory Constructs Targeted by Activity Domain

	PA (n=25)		NUT (n=45)		DA (n=16)		**TOTAL (n=86)**	
CONSTRUCTS	F	Score	F	Score	F	Score	**F**	**Score**
Reciprocal Determinism (8 items)	67	200	120	360	37	128	**224**	**688**
Reinforcement (5 items)	49	125	110	225	32	80	**191**	**430**
Behavioural Capability (5 items)	75	125	141	225	60	80	**276**	**430**
Self-efficacy (7 items)	82	175	148	315	70	112	**300**	**602**

NOTE: F=total number of checks per each category, score=number of checklist items reflective of each construct *x* number of intervention activities

Wilxocon Tests assessed the difference between the use of social cognitive theory constructs. A Bonferroni correction was applied so all effects are reported at a .0125 significance. Results show that behavioral capability was used significantly more often than reciprocal determinism, *T=11, p<.001, r=-.522*, reinforcement, *T=16, p<.001, r=-*

.408, and self-efficacy, *T=11, p<.001, r=-.388*, to change behaviour. Reciprocal determinism was used significantly more often that self-efficacy, *T=13, p<.001, r=-.445*, and reinforcement, *T=8, p<.001, r=-.386*. However, the use of self-efficacy and reinforcement constructs did not differ significantly *(p=.030)*. When the use of constructs was separated according to activity domain these results remained consistent for nutrition activities however, differed for physical activity and diabetes awareness activities. The significant difference between the use of self-efficacy and behavioral capability for diabetes awareness activities was abolished *(p=.029)* as was the significant difference between the use of reinforcement and reciprocal determinism for diabetes awareness *(p=.014)* and physical activity *(p=.134)*.

Ottawa Charter for Health Promotion

As illustrated in Table 11, strengthening community action and developing personal skills were the action means used in the greatest percentage of activities (i.e., in 65.3% and 64.4%). Creating supportive environments was the next most commonly targeted action mean (i.e. in 34.9% of activities) while reorienting health services and building healthy public policy were least commonly targeted (i.e., in 12.8% and 11.6% of activities).

Table 11: Frequency of Ottawa Charter for Health Promotion Action Means Targeted by Activity Domain

	PA (n=25)		NUT (n=45)		DA (n=16)		**TOTAL (n=86)**	
ACTION MEANS	F	Score	F	Score	F	Score	**F**	**Score**
Developing Personal Skills (5 items)	79	125	142	225	56	80	**277**	**430**
Creating Supportive Environments (4 items)	39	180	69	180	12	64	**120**	**344**
Building Healthy Public Policy (2 items)	4	50	15	90	1	32	**20**	**172**
Reorienting Health Services (1 items)	2	25	4	45	5	16	**11**	**86**
Strengthening Community Action (5 items)	83	125	142	225	56	80	**281**	**430**

NOTE: F=total number of checks per each action mean, score=number of checklist items reflective of each action mean *x* number of intervention activities

Wilcoxon tests were used to assess the utilization difference between principles. A Bonferroni correction was applied so all effects are reported at a .01 significance. Developing personal skills was used significantly more often than reorienting health services, $T=24$, $p<.001$, $r=-.524$, creating supportive environments, $T=11$, $p<.001$, $r=-.405$, and building healthy public policy, $T=17$, $p<.001$, $r=-.522$, to change behaviour. Strengthening community action was used significantly more often than reorienting health services, $T=22$, $p<.001$, $r=-.514$, as was creating supportive environments, $T=22$, $p<.001$, $r=-.327$. Building healthy public policy was used significantly less than strengthening community action, $T=15$, $p<.001$, $r=-.534$, and creating supportive

environments, *T=26, p<.001, r=-.414*. Finally, strengthening community action was used significantly more than creating supportive environments, *T=10, p<.001, r=-.473*, to change behaviour. Despite these significant findings, the use of building healthy public policy and reorienting health services did not differ significantly, *(p=.604)*, nor were there significant differences between strengthening community action and developing personal skills, *(p=.289)*.

When the use of constructs was separated by activity domain these results remained consistent for physical activity and nutrition activities however, differed for diabetes awareness activities. The difference between creating supportive environments and reorienting health services did not remain significant *(p=.378)*, nor did the difference between creating supportive environments and building healthy public policy *(p=.058)*.

Cultural Integration

Many KSDPP interventions used different strategies to enhance cultural relevance. Peripheral strategies were the superficial strategies used most often to enhance cultural relevance (i.e., in 25.4% of activities). Examples of peripheral strategies included handouts, brochures, pamphlets, bulletin boards, and information booths displaying the KSDPP logo. This logo was designed by a local artist therefore the colours, symbols, and pictures are representative of some aspect of the Kahnawake culture (see Appendix D). One intervention, in addition to displaying to KSDPP logo, used pictures of a local community member to demonstrate the canning process.

Evidential and constituent-involving strategies were both used in 10.2% of the interventions to enhance cultural relevance. Examples of evidential strategies included holding information sessions describing the health risks associated with type 2 diabetes and stating current rates of diabetes among Kahnawake community members. One intervention involved collaborating with the local radio station to offer a diabetes trivia contest. Callers were asked to answer type 2 diabetes related questions developed by KSDPP intervention staff. Examples of constituent-involving strategies included involving volunteers from the community. The Community Advisory Board (CAB) often prepared and donated healthy foods to KSDPP interventions. One intervention, which taught attendees how to can traditional foods gathered during the harvest, was led by a community member considered to be an expert in the canning process.

Linguistic strategies were least frequently used to enhance cultural relevance (i.e., in 3.4% of activities). Examples included conducting a Food Bingo activity in Mohawk for schoolchildren. Instead of conducting an intervention in Mohawk, the native language of Kahnawake, some interventions used culturally relevant names to promote the activity. For example, an intervention intended to promote physical activity among elders and children was referred to as Strolling with Doda. Intervention staff used the term Doda, a traditional name children use to refer to their grandparents, to encourage participation among both groups.

While superficial strategies were used by KSDPP intervention staff to enhance cultural relevance, 33.9% of the interventions used socio-cultural strategies (i.e., more in-depth approaches) to promote health. For example, interventions that included healthy

food samples for participants often used recipes from the Three Sisters cookbook. This cookbook was created by KSDPP and includes recipes that use corns, beans, and squash; traditional staple foods known as the three sisters. Some interventions focused on gathering and cooking with traditional foods. In addition to encouraging people to try traditional foods, a large portion of interventions encouraged family participation. Family is deeply valued in Kahnawake therefore KSDPP intervention staff organized a free skate during the Christmas holidays that encouraged families to participate. Respecting community elders is another deeply held value among Aboriginal peoples. Therefore one intervention taught community members how to make healthy holiday gift baskets for elders.

Chapter Five DISCUSSION

The purpose of this study was to unpack the type 2 diabetes prevention program implemented in Kahnawake by KSDPP. Three objectives were pursued: 1) to examine intervention characteristics to identify gaps and provide program improvement suggestions, 2) to determine what intervention characteristics influenced whether intervention staff would implement interventions again, and 3) to examine the implementation of the KSDPP intervention model by a) assessing the integration of the ecological approach, b) assessing the adherence to principles and/or theoretical constructs underpinning social cognitive theory, the precede-proceed model, and the Ottawa Charter for Health Promotion, and c) determining what types of strategies were used to enhance cultural relevance.

Intervention Characteristics

Although the majority of KSDPP interventions were one-time events, many were implemented in multiple locations or had multiple components. Since multi-component interventions (i.e., those with more than one domain) require additional time and effort and rely on additional resources, the impact of one-time and multi-component interventions should be examined differently.

The finding of a nearly equal mix of new and repeated interventions supports our hypothesis that some interventions are repeated. It is not surprising that many interventions are repeated given that KSDPP intervention staff have been implementing interventions for over ten years and often rely on community feedback to determine what interventions they implement (Delormier et al., 2003). While repeated interventions

require less planning time, they may not have as much of an impact on helping people maintain healthy behaviours since different strategies are needed to initiate and to maintain health behaviours (Rothman, 2000). Therefore, intervention staff should exercise caution when deciding how many interventions to repeat each year.

Findings indicating that a majority of interventions addressed nutrition support our initial hypothesis. The large percentage of nutrition only interventions raises concern since recent research has demonstrated that a large portion of the prevalence of overweight and obesity in children is likely explained by physical activity patterns rather than by nutrition habits (Janssen et al., 2005). The high number of nutrition interventions may be the result of KSDPP intervention staff planning interventions in consultation with nutritionists. In contrast, the low number of physical activity interventions may be indicative of not having access to equivalent expertise in the area of physical activity.

For many interventions with multiple domains (i.e., two or more) the primary focus was not nutrition which suggests that intervention staff may be using healthy food as a participation incentive. While the idea of using a physical activity intervention to also promote healthy eating is good, intervention staff should be cautious when using food as an extrinsic reward for physical activity. Ideally, engaging in physical activity should be intrinsically motivating since it is more strongly associated with adherence (Carron, Hausenblas, & Estabrooks, 2003).

Given that children have been designated the ultimate target for all KSDPP interventions (Macaulay et al., 1997), it is not surprising that they accounted for the largest group of participants. This supports our initial hypothesis. Although adults were

the second largest group to attend the interventions, we do not know whether adults accompanied their children or participated in the intervention. Some research has shown that parents significantly influence their children's health behaviour practices and weight status over the long-term by being positive role-models and engaging in healthy behaviours (Golan & Crow, 2004) therefore determining whether parents were active or passive participants deserves further examination. Findings revealed that very few youth (i.e., people 14 to 18 years old) attended KSDPP interventions, therefore this group could be a potential target for future interventions.

The average intervention cost per person appears reasonable however it does not allow us to stipulate whether interventions were cost-effective. This type of assessment requires additional information about whether the intervention itself was effective (i.e., whether it resulted in participants engaging in health behaviours). Should those implementing interventions use the average intervention cost per person reported as a benchmark, it is important to realize that expense reports used to conduct this assessment did not include staff salary or travel expenses. These low cost interventions were also made possible thanks to the time and food donated by Kahnawake community members. Those intending to plan and implement interventions should consider these additional costs before attempting to design similar interventions.

Intervention Staff Ratings

Staff perceptions of "success" revealed very little about what influenced whether intervention staff would implement an intervention again which does not support our initial hypothesis. The only significant influence on this rating was whether the

intervention achieved its planned objectives. These findings suggest that intervention staff appear to be designing interventions they feel comfortable implementing. Since intervention staff may have expertise in one specific area such as health education, this could potentially influence the types of interventions they implement. Given that KSDPP intervention staff do not have expertise in policy development, this finding could also explain why no interventions focused on this level. In addition, although interventions deemed successful were more likely to be implemented again, no other intervention characteristics were associated with these success ratings. In order to investigate this area further, intervention staff should provide criteria by which they measure success.

Ecological Integration

Based on the ecological algorithm developed by Richard and colleagues (1996) the KSDPP program received a high ecological score of 3 out of 4. Despite implementing nine different strategies, this score is suboptimal because these intervention strategies were implemented in only two different types of settings. For a program to receive a score of 4 out of 4, a minimum of three different intervention strategies would need to be implemented in at least three different types of settings. Since it is unknown whether implementing multiple types of strategies (i.e., nine) in only two types of settings is more effective than implementing less different types of strategies (e.g., three) in at least three different types of settings, caution should be used when applying this algorithm.

Given the number of years KSDPP has been implementing interventions in the community, it is not surprising that more than half of KSDPP interventions were initiated by or involved a community partner. This finding supports our initial hypothesis and

suggests that KSDPP has developed a strong reputation in the Kahnawake community as a valuable resource and is subsequently sought out as a partner. These results are consistent with similar work by Lévesque and colleagues (2005) examining physical activity interventions implemented in Kahnawake from 1996 to 1997. KSDPP also appears to receive a great deal of support from local organizations to help them implement interventions they have initiated. It would be useful to examine how these partnerships evolve over time and track whether interventions continued once KSDPP dissolved since building capacity through partnerships has been positively associated with sustainable programs (Lansang & Dennis, 2004).

Findings revealed that all KSDPP interventions were implemented in organizational and community settings. Slightly more interventions occurred in an organizational setting which could be due to the number of collaborative partnerships between KSDPP and other community organizations. This result could also be explained by the fact that KSDPP originated as a school-based program and this setting remains the main focus of intervention staff. While no interventions occurred in societal or supranational settings, KSDPP should be considered an ecological program as they intervened in more than one setting and obtained a top score (i.e., 3 of 4) on the ecological algorithm (Richard et al., 1996).

A common criticism faced by most health promotion professionals is that they only focus on intrapersonal determinants (McLeroy et al., 1993; Stokols, 1992). By using nine different types of intervention strategies and implementing interventions in multiple settings, KSDPP intervention staff took an ecological approach (Richard et al., 1996).

Although intervention staff appeared to favor targeting the individual level, which supports our initial hypothesis, they did also target the social and physical environments. KSDPP intervention staff appeared to focus on the social environment more often that the physical. Some research has indicated that individual and social environment determinants may be more important than the physical environment to influence physical activity behaviour (Giles-Corti & Donovan, 2002). However, more research is needed to determine whether the social environment should be targeted more often than the physical environment.

Given that policy change can greatly influence health behaviour (Sallis, Bauman, & Pratt, 1998), some interventions should target this level. Although no KSDPP interventions targeted this level it is important to recognize that this type exchange is not part of the KSDPP intervention staff mandate. KSDPP researchers were expected to be involved in this type of exchange which explains why no interventions examined targeted public policy or politicians.

Use of Principles and/or Theoretical Constructs

The most common methods used by intervention staff to change behaviour were promoting role-modeling, influencing attitudes, and using verbal encouragement, all of which focused on individual and interpersonal levels. These results are consistent with results obtained from the ecological assessment. Although the use of factors from precede-proceed model, constructs from social cognitive theory, and principles from the Ottawa Charter for Health Promotion were examined together and separately (i.e. by

activity domain), findings revealed that for the most part, the use of factors, constructs, and principles remained consistent regardless of activity domain. Since we can only speculate that different strategies should be used for different behaviours, we do not know what specific determinants influence whether someone engages in regular physical activity or makes healthy food choices. Multiple behaviour interventions are believed to be more effective than those which focus on one behaviour (Nigg, Allegrante, & Ory, 2002), therefore intervention staff should continue to implement these types of interventions, however to determine the optimal mix of strategies to influence physical activity and eating, future research in needed.

Precede-Proceed Model

Of the three precede-proceed factors, KSDPP intervention staff targeted predisposing factors the most. Not targeting enabling and reinforcing factors to the same degree could have influenced whether people continued to be physically active and make healthy food choices after engaging in KSDPP interventions. The inter-dependence of precede-proceed factors (Green & Kreuter, 1999) suggests that intervention staff should strive for a more equal mix.

Social Cognitive Theory

Behavioural capability was targeted the most while reciprocal determinism was targeted the least. These findings are not surprising given that most interventions targeted the individual level and focused less on the environment. The non-significant difference between the use of strategies to enhance self-efficacy and reinforcement could be explained by the similarities between these two constructs since verbal persuasion is a

type of reinforcement and also one of the sources of self-efficacy (Bandura, 1997). Despite few differences between the use of factors, constructs, and principles when stratified by activity domain, many of the significant findings identified between the constructs were abolished when physical activity was examined separately from the other intervention domains. Although self-efficacy has had inconsistent associations with children's physical activity in recent reviews (Sallis, Prochaska, & Taylor, 2000), it has had the most consistent positive association with physical activity in adults (Trost, Owen, Bauman, Sallis, & Brown, 2002).

Ottawa Charter for Health Promotion

Findings indicate that developing personal skills was the strategy targeted most by intervention staff; a finding that allows us to accept our initial hypothesis. An interesting finding was that strengthening community action was targeted almost as frequently as developing personal skills. This could be explained by the fact that from 1997 to 1998 KSDPP interventions operated without external funding. After this occurrence, intervention staff may have begun to invest more in strategies intended to help build community capacity. Research has demonstrated that increasing community capacity is the key to helping create sustainable diabetes prevention programs once external funding is no longer available (Crisp, Swerissen, & Duckett, 2000), therefore intervention staff should continue to implement strategies intended to strengthen community action.

Since reorienting health services and building healthy public policy requires more time and effort, the finding showing that these principles were used the least to influence behaviour is not surprising. It seems as though intervention staff must make a choice.

They can decide to implement fewer interventions and target higher entities such as policy, or they can implement more interventions that target lower levels. While interventions targeting the policy level require more time, intervention staff should set aside time to implement these types of interventions during their yearly planning session given that they can influence population-wide change (Sallis et al., 1998).

Cultural Integration

Results indicate that peripheral strategies were in the greatest percentage of interventions to enhance cultural relevance which is consistent with previous research (Kreuter et al., 2003). Many socio-cultural strategies were also used to enhance cultural relevance. This is likely due to all members of the intervention staff being members of the Kahnawake community and being familiar with Mohawk culture. Since health behaviours are intricately bound with culture (Davis et al., 2000) it suggests that more deep strategies should be used by intervention staff to enhance the cultural relevance of their activities.

Since the KSDPP logo is present on all written material (i.e., on handouts, on bulletin boards, etc.), this could have overshadowed how much other strategies were used to enhance cultural relevance. This highlights a methodological issue with this type of categorical system to tease out cultural strategies employed by intervention staff.

Limitations and Future Directions

There are several limitations to this study that deserve mention. Firstly, it is important to recognize that the inclusion criteria used for coding Activity Report Forms could have influenced dose and reach. Although interventions that contained multiple components were recognized as being different than one-time events, it was assumed that the same participants returned for all of the components and therefore these participants were only counted once.

Secondly, despite the cleaning and screening meetings conducted with intervention staff to help ensure deeply held cultural beliefs of this Kahnawake community were understood before the analysis, not being a member of the community could have influenced what strategies were teased out. In addition, this was the first time Intervention Implementation Checklists were completed by intervention staff and they mentioned that parts of this form were confusing. Having this element of confusion could have influenced how these forms were filled out. Results from this study can help inform revisions to this checklist. Finally, Intervention Implementation Checklists were not always completed right after interventions were implemented therefore this time delay may have affected recall of intervention details. A recommendation made after using these checklists for the first time is that they should be completed by KSDPP intervention staff in a timely matter (i.e., two to three days after interventions are implemented).

Despite these limitations, this study provides KSDPP intervention staff with an overview of the diabetes prevention program implemented in Kahnawake from June 2003 to June 2004. Findings from this study can be useful for intervention program planners

attempting to integrate theoretical constructs compatible with an ecological approach. The IAP identifies who was involved in implementing interventions by examining programming approach and provides insight into who were the intended proximal and ultimate targets by reporting intervention strategies. Examining the use of theoretical constructs and/or principles and strategies used to enhance cultural relevance extends the usefulness of the IAP by shedding light into what occurs between the programming approach and intended targets.

Unfortunately, this process evaluation was unable to establish exactly what combination of intervention components constitutes an optimal mix for the Kahnawake community to influence healthy behaviour change. Outcome evaluation results showing an increase in BMI and skinfold thickness, no increases in physical activity levels or fruit and vegetable intake, and no decreases in screen time (Paradis et al., 2005), suggest that the current mix of components is not optimal. Fortunately, these findings do establish baseline measures to provide program improvement suggestions that allow us to take the first step towards determining the best intervention mix. Future research is needed to link findings from this study with intervention effects to provide much needed insight into what influences whether members of the Kahnawake community maintain healthy lifestyles.

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APPENDIX A

KAHNAWAKE SCHOOLS
DIABETES PREVENTION PROJECT

P.O. Box 989, Kahnawake Education Center (2nd floor)
Kahnawake Territory, Kanien'keh (Mohawk Nation)
via Quebec, Canada J0L 1B0
Tel.: (450) 635-4374 Fax: (450) 635-7279 / 632-8042
ksdpp@cyberglobe.net / ksdpp2@cyberglobe.net

2003

ACTIVITY REPORT

EVENT	
DATE	
LOCATION	
DURATION	
RECORDER	

TYPE OF ACTIVITY

NUTRITION	PHYSICAL ACTIVITY	WELL BEING

ACTIVITY DESCRIPTION

PARTICIPANTS (MALE)

Child	Youth	Teens	Adults	Seniors

PARTICIPANTS (FEMALE)

Child	Youth	Teens	Adults	Seniors

ACTIVITY PLANNING SUMMARY
GOALS & OBJECTIVES
PLANNING
PREPARATION
TASKS – PERSON
IMPLEMENTATION

WRAP-UP

PLANNING IMPLEMENTATION & ROLE			
Organization/Person	Implementation	Role	Total Hours

VOLUNTEERS & ROLE	
Person	Role

EXPENSE REPORT		
ITEM	BUDGET	EXPENSE
TOTAL		

ACTIVITY EVALUATION
OBSERVATIONS
STRENGTHS

ACTIVITY EVALUATION
WEAKNESSES
TRIGGERS
FOLLOW-UP

APPENDIX B

Activity Name:

Sponsoring Organisation(s):

Please list all organizations involved in activity planning and implementation

1. _____
2. _____
3. _____

List more on back if necessary

Where was the activity implemented?

Which of the following best characterizes the activity / event (check ONE only)?

- ☐ one-time
- ☐ in a series? # of times ____
- ☐ ongoing/ continuous
- ☐ intermittent ongoing
- ☐ other → _____

Activity Date: _____

Is this a new or repeated activity?

- ☐ new activity
- ☐ repeated activity → please specify years implemented

If this is a repeated activity, is it an annual event?

☐ Yes ☐ No

Goal & Brief description of activity:

Primary focus: _____

Who did the activity primarily intend to benefit?

Where were these participants recruited?

Form of participation for these participants:

☐Voluntary ☐Directed ☐Mandated

Which most accurately describes how the activity evolved between planning and implementation?

- ☐ activity did not change at all
- ☐ activity underwent minor modification
- ☐ activity underwent major modification
- ☐ activity changed completely

This activity fulfilled ...

- ☐ none of the objectives that were planned
- ☐ a few of the objectives that were planned
- ☐ many of the objectives that were planned
- ☐ all of the objectives that were planned

I would rate this activity as ...

- ☐ Very successful
- ☐ Successful
- ☐ Somewhat successful

How likely is it that (KSDPP/ SLHDP) would implement this activity again?

☐ Sure thing ☐ Very likely
☐ Somewhat likely ☐ Not likely

Participation in / utilization of this activity was:

- ☐ less than expected
- ☐ what we expected
- ☐ greater than we expected

DID THE ACTIVITY IN ITS IMPLEMENTATION...
Put a check mark in the appropriate column. Italicised actions refer to cultural elements. *PA = Physical Activity; NUT = Nutrition; WB = Well-being

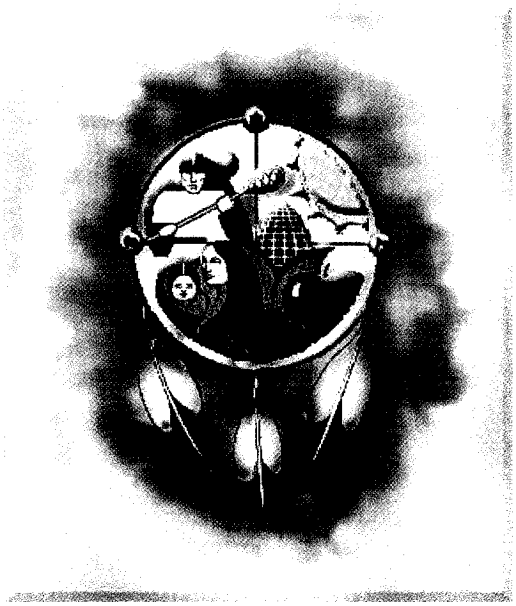
	Support Individual Change	PA	NUT	WB
1.	Correct misconceptions...			
2.	Influence attitudes ...			
3.	*Build on specific participant strengths or skills ...*			
4.	*Reinforce positive changes in participants ...*			
5.	Use verbal encouragement ...			
6.	Provide 'why, when or where" information about ...			
7.	Provide participation incentives ...			
8.	*Provide information on "how to" ...*			
	Traditional Ways			
9.	*Promote a traditional aspect of health ...*			
10.	*Reflects cultural practice through ceremonies, prayers or legends.*			
11.	*Promote the message of living in balance ...*			
12.	*Provide participants the opportunity for sharing ...*			
13.	*Teachings are passed on by sharing knowledge and experiences*			
14.	*Give participants the opportunity to provide input ...*			
15.	*Provide opportunity to learn or practice a skill ...*			
16.	*Create a caring environment for the participant to engage in ...*			
	Organisational and Community Ways			
17.	Influence an existing policy			
18.	Influence an existing practice or message			
19.	Reinforce an existing policy			
20.	Reinforce an existing practice or message			
21.	*Influence availability of products or services*			
22.	*Influence accessibility to products or services*			
23.	Influence changes in the physical environment ...			
24.	*Use or promote role-modelling ...*			
25.	Provide in-service for professionals ...			

APPENDIX C

CHECKLIST ITEMS	P-P	SCT	OCHP
1. Correct misconceptions	P	BC	DPS
2. Influence attitudes	P	RD	
3. Build on specific participant strengths or skills	E	BC	DPS
4. Reinforce positive changes in participants	R	R	
5. Use verbal encouragement	R	SE	SCA
6. Provide "why, when or where" information about	E	BC	DPS
7. Provide participation incentives	R	R	CSE
8. Provide information on "how to"	E	BC	DPS
9. Promote a traditional aspect of health	R	SE	
10. Reflect cultural practice through ceremonies, prayers or legends	R	SE	
11. Promote the message of living in balance	P	SE	
12. Provide participants the opportunity for sharing	E	SE	SCA
13. Teachings are passed on by sharing knowledge and experiences	E	BC	SCA
14. Give participants the opportunity to provide input	E	R	
15. Provide opportunity to learn or practice a skill	E	SE	DPS
16. Create a caring environment for the participant to engage in	E	RD	SCA
17. Influence an existing policy	E	RD	BHPP
18. Influence an existing practice or message	E	RD	BHPP
19. Reinforce an existing policy	R	R	
20. Reinforce an existing practice or message	R	R	
21. Influence availability of products or services	E	RD	CSE
22. Influence accessibility of products or services	E	RD	CSE
23. Influence changes in the physical environment	E	RD	CSE
24. Use or promote role-modeling	R	SE	SCA
25. Provide in-service for professionals	E	RD	RHS

NOTE: (P)=predisposing factors (E)=enabling factors (R)=reinforcing factors (RD)=reciprocal determinism (BC)=behavioural capability (SE)=self-efficacy (R)=reinforcement (DPS)=developing personal skills (CSE)=creating supportive environments (SCA)=strengthen community action (RHS)=reorient health services (BHPP)=build healthy public policy

APPENDIX D



- ***The circle*** is the main symbol found in Onkwehon:we cultures. It represents life: the past, present and future, no beginning or end. There is strength and unity in the circle.
- ***The three clans*** of the Mohawks of Kahnawake sit on the circle. The Bear, Wolf and Turtle represent the unity of the people in preventing diabetes in the future generations.
- ***The lacrosse player*** symbolizes in importance of daily physical activity through the traditional Iroquois game of lacrosse.
- ***The sun***, our elder brother with his life giving energy and strength reminds us that we all possess this energy and strength in the wellness journey for ourselves, families and community.
- ***The food*** represents the importance of healthy eating. The corn is one of the Iroquoian lifegivers or "Three Sisters", the strawberries are the first fruit of the season in the Northeast while the apples last the longest on the trees into the fall.
- ***The elder and child*** reminds us that the wellness of our future generations is everyone's responsibility as Onkwehon:we.
- ***The eagle feathers*** represent the gifts of the eagle, the brother who flies highest and closest to the Creator. His vision, wisdom and courage are gifts that we each possess.
- ***The colour purple*** is known to us as a healing colour.

NOTE: Kahnawake Schools Diabetes Prevention Project Logo was done by Kahnawake artist Kim Delormier.

Kahnawake Schools Diabetes Prevention Project. (2006). Retrieved April 13, 2006, from http://ksdpp.org/aboutlogo.html

APPENDIX E

Chi-Square Analysis

Intervention Characteristics

implement_again * success_rating Crosstabulation

			success_rating		
			hi success	low success	Total
implement_again	high implement again	Count	27	7	34
		Expected Count	20.5	13.5	34.0
		% within implement_ again	79.4%	20.6%	100.0%
		% within success_rating	84.4%	33.3%	64.2%
		% of Total	50.9%	13.2%	64.2%
	low implement again	Count	5	14	19
		Expected Count	11.5	7.5	19.0
		% within implement_ again	26.3%	73.7%	100.0%
		% within success_rating	15.6%	66.7%	35.8%
		% of Total	9.4%	26.4%	35.8%
Total		Count	32	21	53
		Expected Count	32.0	21.0	53.0
		% within implement_ again	60.4%	39.6%	100.0%
		% within success_rating	100.0%	100.0%	100.0%
		% of Total	60.4%	39.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14.364[b]	1	.000		
Continuity Correction[a]	12.230	1	.000		
Likelihood Ratio	14.699	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	14.093	1	.000		
N of Valid Cases	53				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7. 53.

new or repeated activity? * would do this activity again? Crosstabulation

			would do this activity again?			
			sure thing	very likely	somewhat likely	Total
new or repeated activity?	new	Count	1	14	12	27
		Expected Count	7.1	10.2	9.7	27.0
		% within new or repeated activity?	3.7%	51.9%	44.4%	100.0%
		% within would do this activity again?	7.1%	70.0%	63.2%	50.9%
		% of Total	1.9%	26.4%	22.6%	50.9%
	repeat	Count	13	6	7	26
		Expected Count	6.9	9.8	9.3	26.0
		% within new or repeated activity?	50.0%	23.1%	26.9%	100.0%
		% within would do this activity again?	92.9%	30.0%	36.8%	49.1%
		% of Total	24.5%	11.3%	13.2%	49.1%
Total		Count	14	20	19	53
		Expected Count	14.0	20.0	19.0	53.0
		% within new or repeated activity?	26.4%	37.7%	35.8%	100.0%
		% within would do this activity again?	100.0%	100.0%	100.0%	100.0%
		% of Total	26.4%	37.7%	35.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.788[a]	2	.001
Likelihood Ratio	16.807	2	.000
Linear-by-Linear Association	8.624	1	.003
N of Valid Cases	53		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.87.

success_rating * would do this activity again? Crosstabulation

			would do this activity again?			
			sure thing	very likely	somewhat likely	Total
success_rating	hi success	Count	14	13	5	32
		Expected Count	8.5	12.1	11.5	32.0
		% within success_rating	43.8%	40.6%	15.6%	100.0%
		% within would do this activity again?	100.0%	65.0%	26.3%	60.4%
		% of Total	26.4%	24.5%	9.4%	60.4%
	low success	Count	0	7	14	21
		Expected Count	5.5	7.9	7.5	21.0
		% within success_rating	.0%	33.3%	66.7%	100.0%
		% within would do this activity again?	.0%	35.0%	73.7%	39.6%
		% of Total	.0%	13.2%	26.4%	39.6%
Total		Count	14	20	19	53
		Expected Count	14.0	20.0	19.0	53.0
		% within success_rating	26.4%	37.7%	35.8%	100.0%
		% within would do this activity again?	100.0%	100.0%	100.0%	100.0%
		% of Total	26.4%	37.7%	35.8%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.581[a]	2	.000
Likelihood Ratio	23.375	2	.000
Linear-by-Linear Association	18.213	1	.000
N of Valid Cases	53		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.55.

Average Use of Checklist Items by Intervention Domain

ANOVA

ScoreAve

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	471.735	2	235.868	.308	.736
Within Groups	55058.508	72	764.702		
Total	55530.243	74			

Wilcoxon Signed-Ranked Tests

Overall Behaviour

Precede-Proceed Model

Test Statistics[b]

	enabling_ave - reinforcing_ ave	predisposi ng_ave - reinforcing _ave	predisposing _ave - enabling_ave
Z	-1.375[a]	-6.400[a]	-5.674[a]
Asymp. Sig. (2-tailed)	.169	.000	.000

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

Social Cognitive Theory

Test Statistics[c]

	reciprocalde terminism_ ave - behavioralca pability_ave	reinforceme nt_ave - behavioralca pability_ave	selfefficacy_ ave - behavioralca pability_ave	reinforcem ent_ave - reciprocal determinis m_ave	selfeffica cy_ave - reciprocal determini sm_ave	selfefficac y_ave - reinforcem ent_ave
Z	-6.844[a]	-5.349[a]	-5.092[a]	-5.056[b]	-5.836[b]	-2.168[b]
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.030

a. Based on positive ranks.

b. Based on negative ranks.

c. Wilcoxon Signed Ranks Test

Ottawa Charter for Health Promotion

Test Statistics[c]

	DPS_ave - RHS	SCA_ave - RHS	CSE_ave - RHS	BHPP_ave - RHS	SCA_ave - DPS_ave	CSE_ave - DPS_ave	BHPP_ave - DPS_ave	CSE_ave - SCA_ave	BHPP_ave - SCA_ave	BHPP_ave - CSE_ave
Z	-6.735[a]	-6.871[a]	-4.295[a]	-.519[b]	-1.061[a]	-5.315[b]	-6.843[b]	-6.201[b]	-7.009[b]	-5.433[b]
Asymp. Sig. (2-tailed)	.000	.000	.000	.604	.289	.000	.000	.000	.000	.000

a. Based on negative ranks.

b. Based on positive ranks.

c. Wilcoxon Signed Ranks Test

Intervention Domain

Precede-Proceed Model

Test Statistics[b]

activity_type		enabling_ave - reinforcing_ave	predisposing_ave - reinforcing_ave	predisposing_ave - enabling_ave
WB	Z	-.597[a]	-3.348[a]	-2.768[a]
	Asymp. Sig. (2-tailed)	.550	.001	.006
NUT	Z	-.205[a]	-3.957[a]	-3.927[a]
	Asymp. Sig. (2-tailed)	.837	.000	.000
PA	Z	-1.911[a]	-3.576[a]	-3.007[a]
	Asymp. Sig. (2-tailed)	.056	.000	.003

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

Social Cognitive Theory

Test Statistics[c]

activity_type		reciprocaldeterminism_ave - behavioralcapability_ave	reinforcement_ave - behavioralcapability_ave	selfefficacy_ave - behavioralcapability_ave	reinforcement_ave - reciprocaldeterminism_ave	selfefficacy_ave - reciprocaldeterminism_ave	selfefficacy_ave - reinforcement_ave
WB	Z	-3.521[a]	-3.159[a]	-2.178[a]	-2.446[b]	-3.269[b]	-2.478[b]
	Asymp. Sig. (2-tailed)	.000	.002	.029	.014	.001	.013
NUT	Z	-4.721[a]	-2.922[a]	-3.924[a]	-4.311[b]	-4.035[b]	-.520[a]
	Asymp. Sig. (2-tailed)	.000	.003	.000	.000	.000	.603
PA	Z	-3.476[a]	-3.185[a]	-2.680[a]	-1.497[b]	-2.578[b]	-1.926[b]
	Asymp. Sig. (2-tailed)	.001	.001	.007	.134	.010	.054

a. Based on positive ranks.

b. Based on negative ranks.

c. Wilcoxon Signed Ranks Test

Test Statistics[d]

activity_type		DPS_ave - RHS	SCA_ave - RHS	CSE_ave - RHS	BHPP_ave - RHS	SCA_ave - DPS_ave	CSE_ave - DPS_ave	BHPP_ave - DPS_ave	CSE_ave - SCA_ave	BHPP_ave - SCA_ave	BHPP_ave - CSE_ave
WB	Z	-2.495[a]	-2.926[a]	-.881[b]	-2.121[b]	-1.047[a]	-3.136[b]	-3.431[b]	-3.419[b]	-3.546[b]	-1.897[b]
	Asymp. Sig. (2-tailed)	.013	.003	.378	.034	.295	.002	.001	.001	.000	.058
NUT	Z	-4.991[a]	-5.009[a]	-4.378[a]	-1.213[a]	-.280[a]	-3.466[b]	-4.531[b]	-3.962[b]	-4.677[b]	-3.740[b]
	Asymp. Sig. (2-tailed)	.000	.000	.000	.225	.779	.001	.000	.000	.000	.000
PA	Z	-3.814[a]	-3.776[a]	-2.919[a]	.000[c]	-.849[a]	-2.539[b]	-3.915[b]	-3.306[b]	-3.947[b]	-3.593[b]
	Asymp. Sig. (2-tailed)	.000	.000	.004	1.000	.396	.011	.000	.001	.000	.000

a. Based on negative ranks.

b. Based on positive ranks.

c. The sum of negative ranks equals the sum of positive ranks.

d. Wilcoxon Signed Ranks Test