Relationship of Sedentary Behaviour and Physical Activity Patterns to Certain Aspects of the Family Food Environment with the Risk for Overweight in 3- to 5-Year-Old Children in a Rural Environment.

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ABSTRACT

The primary objective of this study was to assess for a relationship between sedentary and physical activity patterns to certain aspects of the family food environment with child body mass index (BMI) in children ages 3 to 5. A secondary aim was to assess for relationships between parental obesity and family socioeconomic status to parental perceptions of childhood weight with child BMI. A nonprobability, exploratory, and descriptive cross-sectional study design was used. A total of 85 children ages 3 to 5 (44 boys, 41 girls) and their primary caregivers participated in the study. At risk for becoming overweight was determined using the BMI-for-age and sex-specific 85th to 94th percentile from CDC Growth Charts. Overweight was determined using the BMI-for-age and sex-specific 95th percentile and greater from CDC Growth Charts. The primary caregivers completed a self-administered survey assessing sociodemographic information, parental height and weight, frequency of organized sports, physical activity patterns, sedentary activities, and certain aspects of the family food environment. Height and weight measurement data revealed that 18.8% (16/85) of the child participants had a BMI in the "at risk for becoming overweight" range, while 9.4% (8/85) of the child participants had a BMI in the overweight range. In summary, television viewing on usual weekdays in early childhood is significantly related to child BMI. The results from this study also suggested that failure to recognize that a child may be overweight is an issue that needs to be investigated further to understand how a parent's description of childhood overweight differs from perception of excess weight in his/her own child. More qualitative research in regard to parental perception of childhood weights and sedentary behaviour is recommended.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1: INTRODUCTION TO THE STUDY

Introduction

Across Canada, the rising trend in childhood overweight and obesity rates over the past quarter of a century has evolved into a public health challenge. Shields (2006), who cited data from the 2004 Canadian Community Health Survey (CCHS), reported that obesity rates among children ages 2 to 17 almost tripled from 3% in 1978/1979 to 8% in 2004. Combined rates for overweight and obesity levels among children ages 2 to 5 remained unchanged at 21% between 1978/1979 and 2004, whereas the combined rates for elementary school-aged children (6-11 years) and adolescents (12-17 years) at least doubled from 13% to 26% and 14% to 29% over the same period, respectively.

Numerous studies have associated excess adiposity tissue with an increased risk of developing a chronic health condition (Freedman, Dietz, Srinivasan, & Berenson, 1999; Hillier & Pedula, 2003; Taylor et al., 2006). Childhood obesity was reported by the World Health Organization (WHO, 2004) as a risk factor for such chronic health conditions as Type 2 diabetes, cardiovascular disease (CVD), and specific types of cancer. Contributing factors such as low socioeconomic status (SES), sedentary lifestyle, and an increase in the consumption of high energy-dense foods have been linked to unhealthy weight gain in youth (Campbell, Crawford, & Ball, 2006; Lamerz et al., 2005; Moore et al., 2003).

In response to the growing trend in childhood and adult obesity and its negative health consequences, Romanow (2002) targeted prevention and promotion strategies to decrease obesity, along with increasing physical activity and lowering tobacco use, as a key directive for positive change in the overall health of Canadians. Provincial

governments have addressed the childhood obesity challenge with initiatives such as mandatory daily physical activity in elementary and secondary schools across Alberta; the banning of junk foods in vending machines in Ontario schools; and the introduction of nutrition labels on food products (*Food and Drink Weekly*, 2004; Government of Alberta, 2006a; Health Canada, 2006).

In addition to provincial actions to increase daily physical activity in schools across Alberta, Alberta Health and Wellness (2006) developed and distributed a new healthy eating and physical activity toolkit called Snacktivity. The Snacktivity toolkit was distributed in 2006 to 1,800 day care and day home providers across Alberta to help the child care providers engage children ages 3 to 5 in fun and easy activities to promote physical activity and healthy eating (Alberta Health and Wellness).

Thus, the dramatic increase in obesity and overweight levels among Canadian youth over the past 25 years, along with the associated risk for negative health consequences, is precipitating action from many societal levels to expand and implement strategies to reduce and/or prevent the development of childhood obesity. However, there is still much work to be done in the community and home environments to provide supportive programs and empower families to make healthy lifestyle choices in order to turn this upward trend around.

Purpose of the Study

The purpose of this study was to explore the relationship of sedentary and physical activity patterns to certain aspects of the family food environment with risk for overweight in children ages 3 to 5 in a rural environment.

Objectives of the Study

1. To examine research-based literature on childhood obesity.
2. To develop and distribute a questionnaire to parents on physical activity, screen time, and the family food environment.
3. To assess parental perceptions of adult and child weight with actual Body Mass Index (BMI) status.

Theoretical Framework of the Study

Pender's (1996) revised health promotion model (HPM; see Appendix A) was appropriate to use in this research because it examines not only the complex interaction between the environment and the individual but also the impact of biopsychosocial factors to help understand, predict, and explain negative or positive health behaviour. The theoretical structure of the revised HPM (Pender) was developed by combining numerous constructs taken from the expectancy-value and social-cognitive theories within a holistic nursing approach. The expectancy-value theory's main objective in the revised HPM is to understand whether a client perceives a specific health behaviour goal as both valuable and achievable, whereas the social-cognitive theory attempts to unveil sources to determine motivating health factors by exploring relationships among "environmental events, personal factors, and behaviour" (Pender, p. 53).

Overall, the revised HPM framework (Pender, 1996) attempts to describe and predict positive and/or negative behaviours that impact health. The revised framework consists of three headings that influence each other and affect the outcome, namely, the achievement of positive health by engaging in health-promoting behaviour. These headings are "individual characteristics and experiences, behaviour-specific cognitions

and affect, and behavioural outcome" (Pender, p. 67). This model consists of 10 determinants to explain or predict health-promoting behaviour: "prior related behavior, personal factors, perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, situational influences, immediate competing demands, and commitment to a plan of action" (Pender, p. 67).

Prior related behaviour is considered to have an impact on current health-promoting behaviour due to the development of habitual patterns. Personal factors that include biological, psychological, and sociocultural elements may predict or explain certain behaviours. For example, Lamerz et al. (2005) suggested that low maternal education levels increase the risk for childhood obesity. The perceived benefits and barriers to action are identified through positive and negative reinforcement of behavioural consequences. Benefits to action may motivate an individual to engage in a plan of action, whereas barriers often are perceived as "the blocks, hurdles, and personal costs of undertaking a given behaviour" (Pender, 1996, p. 69).

Perceived self-efficacy is defined as "a judgment of one's abilities to accomplish a certain level of performance" (Pender, 1996, p. 69), whereas activity-related affect explores the negative and positive feelings associated with a specific behaviour. Interpersonal and situational influences may also affect one's desire to engage in health-promoting behaviour. These may include norms (social pressures), social support, and role modelling. For example, cultural interpersonal influences may associate excessive adiposity tissue in a child with good health. In this instance, it may be difficult for a health care professional to promote changes in eating and exercise behaviour in a family whose cultural norms identify excessive adiposity tissue with good health. Situational

influences explore the impact of the environment, available options perceived by the individual, and demand characteristics on health-promoting behaviours (Pender). Immediate and competing demands may affect the likelihood that an individual will carry through with a positive health action. For instance, work and family commitments that are competing for one's time may deter the individual from accomplishing the goal of starting or maintaining a health-promoting behaviour. Lastly, commitment to a plan of action is the culmination of all of the determinants and the impetus for behavioural change (Pender, 1996).

Currently, the growing childhood obesity problem has resulted in the proliferation of studies that have attempted to explain and predict behaviour that promotes obesity. The revised HPM framework (Pender, 1996) may be used to explain and/or predict the likelihood that families will adopt health-promoting behaviour in an effort to prevent overweight and obesity in their children

CHAPTER 2: LITERATURE REVIEW

Introduction

The following literature review provides an overview of various factors associated with the complex issue of childhood obesity. Current studies are reviewed that examined the efficacy of child obesity measurement tools as well as the current childhood obesity prevalence rates in Canada. In addition, current studies are reviewed that examined the influence of familial risk factors; media; and dietary, sedentary, and physical activity patterns on the development of childhood obesity. Last, current studies are reviewed that examined parental perceptions of excess childhood weight and community-based strategies to foster healthy weights in the early years.

Definitions of Anthropometric Tools Used to Detect Body Fatness in Children

A variety of anthropometric tools assess nutritional status by measuring body fatness in children and adults. Dual-Energy X-Ray Absorptiometry, Rohrer Index, Subcutaneous Fat Measurement, Weight-for-Height Measurement, and the Deuterium Dilution Technique are a few of the methods used to assess adiposity tissue levels in children. A full description of these methods is located in Appendix B. In this chapter, the term BMI and its cut-off points to detect overweight status are defined.

BMI and Cut-Off Points to Detect Overweight Status

In 1997, an expert panel on the assessment and treatment of childhood obesity recommended that the BMI be used to screen children and adolescents for overweight. The sex-specific Centers for Disease Control and Prevention (CDC, 2000) BMI-for-age growth chart was developed to replace the 1977 weight-for-height charts (as cited in CDC, 2007b). The CDC (2007a) described the BMI as "a reliable indicator of body

fatness in children and teens," and it is calculated by dividing the weight in kilograms by the height in meters squared (p. 1). Once the BMI is calculated, its numeric value is plotted on a chart that depicts the size and growth patterns of a U.S. reference population to determine the individual's rank or positioning in that population. The rank or positioning point is converted into a percentile. The CDC's (2000) percentile cutoff points on the BMI-for-age and sex-specific charts are defined as follows: < 5^{th} percentile is considered underweight, at/or > 5^{th} percentile and < 85^{th} percentile is considered a healthy weight, at/or > 85^{th} percentile and < 95^{th} percentile is considered at risk for overweight, and > 95^{th} percentile is considered overweight (as cited in CDC, 2007a). In Canada, the CDC BMI-for-age sex-specific charts are used for people ages 2 to 20. Age- and sex-specific BMI charts are necessary because the rate of growth and the deposit of adipose tissue differ in boys and girls as they mature (CDC, 2007a).

Prevalence of Obesity in Canadian Children

In the past, it was difficult to estimate obesity and overweight rates among preschool-aged children across Canada. Many surveys used to rely on parent-reported data over the telephone. Parental report of a child's weight and height measurement runs the risk of over- or underestimating the true extent of obesity among youth. However, BMI data from the CCHS (2004, as cited in Shields, 2006) reflected a more accurate picture of childhood obesity across Canada because the investigative team actually measured and weighed a nationally representative sample. The findings from this survey revealed that 26% of the national population of children ages 2 to 17 are classified with a BMI as either overweight or obese. In this survey, measurement criteria from the International Obesity Task Force were used to define BMI cut-off points to determine

overweight and obesity prevalence rates in children and adolescents. The task force method utilized the adult BMI overweight and obese cut-off points of 25 and 30 to develop corresponding age- and sex-specific BMI cut-off points in children and youth. For example, the overweight and obese BMI cut-off points for a 2-year-old male are 18.41 and 20.09, respectively. By age 18 years, a male with a BMI between 25 and 29.9 is defined as overweight and obese with a BMI of 30 or greater (Shields, 2006).

Over the past 25 years, although the combined overweight and obesity rates among Canadian children ages 2 to 5 have remained unchanged at 21%, the rising obesity and overweight rates among school-aged children and adolescents are alarming. Data from the CCHS (2004) estimated that obesity on its own has tripled in the 12-to-17 age group, reaching 9%, whereas the overweight prevalence rate has increased by almost twofold from 11% to 20% (as cited Shields, 2006). Combined obesity and overweight prevalence rates for Canadian school-aged children ages 6 to 11 also have doubled from 13% to 26% in the same period (CCHS, as cited in Shields). In Alberta, the combined childhood obesity and overweight rates in children are the lowest in the country. Overall, 22% of children ages 2 to 17 in Alberta are considered either overweight or obese (Shields & Tjepkema, 2006). Although childhood obesity is not a new problem, the alarming increase in prevalence rates and the negative health effects associated with excess weight have turned this trend into a major population health issue.

Comparison of Measurement Tools Used in Childhood Obesity

Although there is support for the use of the CDC (2000) BMI-for-age sex-specific charts for children (as cited in 2007b), debate continues over the validity of the BMI tool to measure obesity and overweight in youth (Flegal, Wei, & Ogden, 2002; Mei et al.,

2002). In this section, studies that have compared the effectiveness of various anthropometry measures to detect adiposity tissue levels in children are reviewed.

Mei et al. (2002) compared the BMI-for-age measurement tool, the Rohrer Index, and the weight-for-height screening tools against the gold standards known as the dual-energy X-ray absorptiometry and measurements of subcutaneous fat. Data on height, weight, and measures of subcutaneous fat were collected from the third National Health and Nutrition Health and Nutrition Examination Survey between 1988 and 1994 in 11,096 American children ages 2 to 19. A comparison sample of 920 children ages 2 to 19, in which the dual-energy X-ray absorptiometry was used to measure body fat, was pooled from three studies conducted in New Zealand, the United States, and Italy. The results of this study supported the use of the BMI-for-age, the Rohrer Index, and the weight-for-height measurement tools as effective predictors of underweight and overweight children and adolescents. However, the BMI-for-age measurement tool had a higher sensitivity rating than the Rohrer Index in predicting overweight and underweight children, whereas the sensitivity to predict overweight and underweight in BMI versus the weight-for-height measurement tool was comparable.

Consequently, Flegal et al. (2002) compared the weight-for-height tool with the BMI to ascertain which measurement tool was more accurate in the detection of body fatness in 4,348 children ages 2 to 5. Data were collected on height and weight measurements from the third National Health and Nutrition Examination Survey. The results found the BMI tool to be more sensitive in its ability to classify children ages 4 to 5 as being overweight than the weight-for-height measurement tool. In this sample, 30% of the 4-year-old boys who were classified as below the 85th percentile in the weight-for-

height chart were recorded as equal to or above the 85th percentile in the BMI calculation. In addition to its increased sensitivity to detect overweight children, when compared to the weight-for-height tool, another advantage noted in Flegal et al.'s study was the fact that the BMI tool can be used to track weight relative to height continuously between ages 2 to 20.

Even though the CDC (2000) BMI-for-age-and-sex chart has been shown to be more sensitive in the detection of obesity compared to the weight-for-height tool and is comparable to the dual-energy X-ray absorptiometry measurement, concern remains over the accuracy of diagnosing obesity in children with this simple tool. Wickramasinghe et al. (2005) measured true fat mass by collecting urine samples in 96 Australian Caucasian and 42 Australian Sri Lankan children ages 5 to 14.99 to calculate total body water and free fat mass composition. The researchers calculated total body water and free fat mass by administering a dose of deuterium in a water-based form to the participants following the collection of the urine samples. A second urine sample was collected from each participant 4 to 6 hours after ingestion of the deuterium solution.

Obesity diagnosis using the deuterium dilution technique was compared to the obesity diagnosis using the BMI with the International Obesity Task Force, CDC (2000), and British growth standard BMI-Z cut-off values for obesity (as cited in Wickramasinghe et al., 2005). The ability of the BMI indicators to detect truly obese participants was defined as its sensitivity. In this study, the deuterium dilution technique identified obesity in the Caucasian and Sri Lankan samples as follows: 36% girls, and 66% boys; 46% girls, and 63% boys. However, the task force method failed to detect one case of obesity, whereas the CDC (2000) and BMI-Z scores did detect obesity in both

groups, even though sensitivity was considered low compared to the deuterium dilution technique. Although the CDC (2000) and BMI-Z cut-offs for obesity were not as accurate in the detection of obesity as the deuterium dilution technique, both cut-off values currently are more practical for daily clinical use, considering that the deuterium dilution technique requires two urine samples within 4 to 6 hours of each other, as well as the consent of participants to ingest a dose of deuterium solution.

Obesity-Related Health Conditions

The WHO (2004) considered obesity to be a well-known risk factor for chronic health conditions such as CVD, stroke, Type 2 diabetes, and certain forms of cancer. In this section, the prevalence and impact of obesity on the development of CVD, Type 2 diabetes, and orthopedic complications during childhood and adolescence are explored.

Risk Factors for CVD

Freedman et al. (1999) investigated the relationship between overweight and risk factors for CVD during childhood in a 20-year cross-sectional study known as the Bogalusa Heart Study. In the United States, measurements for weight, height, blood pressure, total cholesterol, and insulin levels were recorded between 1973 and 1994 for 9,167 children ages 5 to 17. In this study, CVD risk factors were defined as triglycerides, low- and high-density lipoprotein cholesterol, and systolic or diastolic blood pressure levels. Subsequent analysis of the blood samples and blood pressure readings revealed that more than half of the overweight participants had at least one or more risk factors for CVD. Only 11% of the children in this study were categorized as being overweight. Given that the period for this study was between 1973 and 1994, and given that overweight and obesity rates have doubled or tripled in North American children since

1981, the current prevalence of CVD risk factors among youth may be much higher (Shields, 2006).

Li et al. (2003) later explored the relationship between current carotid artery intima-media thickness and CVD risk factors, including blood pressure, BMI, and lipoprotein levels in 486 adults, between 25 and 37 years of age, who had participated in Freedman et al.'s (1999) Bogalusa Heart Study. Carotid IMT is "recognized as an important predictive measure for clinical coronary atherosclerosis events in middle-aged and elderly populations" (Li et al., p. 2271). The results revealed that the participants who were in the top quartile for intima-media thickness measurement had above normal levels for lipoprotein and BMI measurements during childhood. The results suggested that lipoprotein and BMI levels are predictive of carotid intima-media thickness measures in early adulthood. If these findings continue in present and future generations, we may see negative health consequences related to coronary atherosclerosis appear more often in early adulthood.

Blood Pressure and Adiposity Tissue

A recent study by Paradis et al. (2004) assessed the relationship between blood pressure and adiposity tissue in 3,589 Quebec children and adolescents of specific ages, namely, 9, 13, and 16 years, in 1999. Height and weight were measured in the schools and converted to BMI scores; obesity was classified with a BMI greater than or equal to the 95th percentile, as per the CDC (2000) growth charts. In addition to BMI and blood pressure measurements, fasting blood was drawn to measure insulin concentration, resting heart rate was recorded, subscapular and triceps skin fold thickness was measured, and age-appropriate questionnaires were given. The results of this study identified

elevated and high-normal systolic blood pressure readings for males aged 9, 13, and 16 years at 12%, 22%, and 30%, respectively, whereas the results were 14%, 19%, and 17%, respectively, for the females in the corresponding age groups. Multiple linear regression analyses consistently revealed a positive association between BMI and systolic blood pressure.

Risk of Type 2 Diabetes

In addition to the increasing risk for the development of CVD risk factors as the result of obesity is the risk of developing Type 2 diabetes during childhood. The usual age of onset for Type 2 diabetes is considered at or above 45 years of age (Hillier & Pedula, 2003). However, because obesity is a known causal link to the development of Type 2 diabetes, the rising trend in obesity among children and adolescents is resulting in the emergence of Type 2 diabetes at levels not seen for most of the 20th century (International Diabetes Federation, 2005). Of particular concern, is the emergence of Type 2 diabetes in First Nations children as young as 5 years of age (Health Canada, 2005).

Young, Dean, Flett, and Wood-Steiman (2000) conducted a study to determine the prevalence rate of obesity in a remote northern Manitoba Ojibwa-Cree community among children between 4 and 19 years of age. They explored its link to insulin and fasting glucose levels. A total of 719 participants consented to have their height and weight measured and to provide fasting blood samples for the study. Participants with a BMI between the 85th and 94th percentiles were rated as having a moderate level of obesity, whereas those at or above the 95th percentile were rated as having a high level of obesity. Those who were recorded with a BMI below the 85th percentile had the lowest

levels of fasting glucose and insulin. In this sample, the results revealed that the insulin levels in female participants in each BMI stratum significantly surpassed the levels observed in their male counterparts, and Type 2 diabetes was diagnosed in some of the female participants. Based on the evidence examined in this study, the researchers concluded that children in this population with a BMI above the 85th percentile are 5.1 times more likely to have diabetes or impaired fasting glucose than those below the 85th percentile.

The recent emergence of Type 2 diabetes in children and adolescents is certainly not exclusive to northern Aboriginal communities in Canada. Pinhas-Hamiel and Zeitler (2005) conducted a global review of studies on Type 2 diabetes in children and adolescents between 1978 and 2004. In their review, the researchers found that places like New York were observing startling increases in pediatric Type 2 diabetes between 1990 and 2000. New cases of Type 2 diabetes in the pediatric population climbed from 12% of all new diabetes cases in 1990 to nearly 50% of all new cases in 2000 (Grinstein et al., 2003, as cited in Pinhas-Hamiel & Zeitler). In Canada, documentation of Type 2 diabetes among the First Nations people identified the first documented case of this condition in a child in 1984. Between 1984 and 1998, it was estimated that 75 First Nations children between 5 and 17 years of age were diagnosed with Type 2 diabetes, accounting for 10% to 20% of all new cases of diabetes in this population (Dean, 1998, as cited in Pinhas-Hamiel & Zeitler).

Medical complications related to an early diagnosis of Type 2 diabetes are being investigated to ascertain the level of risk for early and middle-aged adult populations. Hillier and Pedula (2003) compared the risk for the development of complications due to

a diagnosis of Type 2 diabetes in those diagnosed before and after 45 years of age. In their study, those who were diagnosed with Type 2 diabetes before age 45 were classified as early onset, and those who were diagnosed at or above age 45 were classified as usual onset. A total sample of 7,844 adults consisted of 1,600 participants with early onset and 6,244 participants with usual onset of Type 2 diabetes. Their findings revealed that the early onset group was 14 times more likely to have a myocardial infarction than their control group, whereas the usual onset group was less than 4 times more likely to have a myocardial infarction than their control group.

Another health challenge that is only beginning to be addressed is the effect of childhood obesity on orthopedic complications. Taylor et al. (2006) conducted a comparison study to assess orthopedic complications among children and adolescents who participated in clinical studies between 1996 and 2004 at the National Institutes of Health in the United States. Medical charts were reviewed from a sample of 227 overweight and 128 normal weight children and adolescents to determine the prevalence of fractures and reporting of musculoskeletal pain. The results indicated a greater prevalence for fractures, reports of musculoskeletal pain, and poorly aligned lower extremities among the overweight children and adolescents in this sample compared to those who were not overweight. The most common joint to be associated with pain in these reports was the knee.

Future health consequences associated with Type 2 diabetes, CVD, and musculoskeletal problems as the result of childhood obesity warrant comprehensive and widespread initiatives to educate and promote healthy eating and physical activity patterns to reverse the current trend. Kranz, Siega-Riz, and Herring (2004) suggested that

changes in dietary patterns among preschool-aged children over the past 2 decades may be one of the contributing factors to the development of childhood obesity. In the next section, the researcher examines studies that have analyzed changes in dietary patterns among children.

Changes in Diet Patterns Among Preschool-Aged Children

Total energy intake in preschool-aged children has risen considerably over the past 2 decades. Kranz et al. (2004) examined daily food intake records from a nationwide sample of 8,555 nonbreastfed children between 2 and 5 years of age in the United States. One adult in the child's household was asked to recall all of the foods ingested by the child within a 24-hour period over 2 nonconsecutive days. The data were extrapolated from the U.S. Department of Agriculture National Food Consumption Survey between 1977 and 1979 (NFCS77); the USDA Continuing Survey of Food Intake by Individuals between 1989 and 1991 (CSFII89); and the CSFII94, which included data from a survey taken between 1994 and 1996, as well as a supplemental survey in 1998.

Kranz et al. (2004) found that the average number of calories consumed by children between 2 and 5 years of age in this sample increased from "1389 kcal per day in NFCS77 to 1558 kcal per day in CSFII94" (p. 1526). Over the past 2 decades, the findings from the surveys indicated that total fat intake as a percentage of overall energy consumption in children ages 2 to 5 decreased from "36.2%" in 1977 to "32.3%" in 1998 and total dairy consumption in servings per day increased from "1.90" in 1977 to "2.00" in 1998" (Kranz et al., p. 9). However, the survey findings also indicated that added sugar as a percentage of total energy increased from "14.3%" in 1977 to "15.7%" in 1998, total grains rose from "4.1%" to "6.3%", and fruit servings increased from "1.1%" to "2.4%"

(p. 9). Overall changes in diet quality in preschoolers over the past 2 decades may have improved marginally, but the movement to decrease consumption of dietary fats and increase fruit and dairy servings may be offset by an increased consumption of other nonfat macronutrients. Hence, the overall increase in energy consumption over the past 2 decades in this study may be a contributing factor in the rise of childhood obesity levels.

Paeratakul, Ferdinand, Champagne, Ryan, and Bray (2003) compared data from one day of diet recall against fast food consumption data from a second nonconsecutive day in 16,103 U.S. adults and children. The data were taken from the 1998 CSFII (as cited in Kranz et al., 2004). Demographic factors linked to the data included age, ethnicity, sex, income, education, and household size. On the survey days when fast food was consumed, the consumption of vegetables (excluding fried potatoes), milk, fruits, and juice among children was lower compared to days when fast food was not consumed. In addition, the days when fast food was consumed resulted in a significantly higher soft drink and total energy intake. Incidentally, the data from this study showed that fast food consumption was higher in individuals ages 10 to 39, as well as those with higher incomes. However, education level at or exceeding 4 years of college was associated with a significant decrease in fast food consumption compared to those with high school or some college education. Researchers have suggested that the convenience of fast food restaurants, all-you-can-eat buffets, and societal pressures to provide quantity versus quality of food items are driving forces in the rising consumption of energy dense foods (Kranz et al., 2004; Prentice, 2003).

Media Influence on Dietary Habits

Changes in eating patterns among children may be partially driven by the way some organizations market high energy-dense foods. Borzekowski and Robinson (2001) explored the impact of television commercials on food preferences of 46 preschool-aged children who attended a Head Start Program in California. Children ages 2 to 6 were randomly assigned to either an experimental or a control group. The experimental group viewed a 30-minute cartoon video with commercials, and the control group watched the same cartoon without commercials. The commercials presented well-known breakfast cereals, doughnuts, sandwich bread, toy cars, snack cakes, fast-food chicken, and juice. Two commercials for donuts and a candy bar that were never broadcast in the participants' geographical area were included. The children were shown pictures of food products on a board and asked to point to the foods that they preferred after viewing the videos. Similar products were placed beside the advertised food items on the boards. The findings from this study revealed that the children exposed to the commercials were more likely to choose the items in the commercials compared to the children who watched the cartoon without commercials. In addition, the food products that were advertised twice within the half hour achieved the highest odds ratio for short-term preference among those who viewed the cartoon with commercials.

Campbell et al. (2006) investigated the association between the family food environment and outcomes in dietary behaviours that may promote excess weight among children ages 5 to 6. The researchers used the Australian Bureau of Statistics Socio-Economic Index for Areas to recruit a representative sample of families in low, medium, and high SES areas. A total of 560 families, representing one third of the initial random

sample, participated in the study. Parents completed surveys that asked questions in regard to the following family food environment predictors for fatness among children:

> Perceptions of adequacy of child's diet, parental modeling of eating, restriction of eating, monitoring of eating, food availability, pressure to eat, confidence in cooking, high cost/low preference for fruits and vegetables, mealtime interruptions, and TV viewing (minutes per day x 10). (Campbell et al., p. 1276)

The dietary outcome variables were developed from the 1995 Australian National Nutrition Survey. The researchers developed a 56-item food frequency questionnaire (FFQ) from the survey and included it in their survey. The family food environment predictor variables were evaluated to assess their impact on the following dietary outcome measures: vegetable and total energy intake per day, high-energy fluid intake, and savory and sweet snack food consumption. In the analysis, Campbell et al. asserted, "Parental perception of dietary adequacy, parental pressure to eat, and high cost of/low preference for fruits and vegetables were all positively associated with savory snack food consumption" (pp. 1276-1277). They also concluded that the amount of time spent watching television was positively associated with high-energy fluid intake and negatively associated with vegetable consumption.

An earlier study by Matheson, Killen, Wang, Varady, and Robinson (2004) examined the relationship between television viewing and the amount and type of foods consumed by older children in the United States. In this sample, 91 children in Grade 3 and 129 children in Grade 5 participated by reporting the amount and type of foods they consumed over 3 nonconsecutive days while engaging in sedentary activities. The average age was 8.6 years in the Grade 3 sample and 9.6 years in the Grade 5 sample. The results of both samples were analyzed separately because of differences in age and ethnicity. The Grade 5 sample consisted primarily of children living in low-income

families of Mexican American origin. The Grade 3 sample represented an ethnically diverse population. The researchers asked the children in both samples to report over the telephone the foods that they consumed over a 24-hour period and the activities that they engaged in while eating. Sedentary activities were described by the participants as watching television, playing video games, viewing videotapes, spending time on the computer, doing homework, being in a car, or spending time at the theatre. Information on 24-hour recall of food intake and sedentary activities while eating was reported by each child participant over the telephone for 2 nonconsecutive weekdays and 1 weekend day. The parents of the children were asked by the researchers to clarify any cooking methods or brand names that the children had difficulty recalling. The researchers also weighed and measured each child in order to calculate the BMI

In both samples, analysis revealed that foods consumed on a weekend day accounted for more than 25% of daily caloric intake while watching television. Caloric intake while watching television decreased to 20% during the 2 weekday recalls. It is interesting to note that in the Grade 3 sample, the types of foods consumed while watching television were associated with weight status rather than the actual amount consumed. Thus, those who consumed a greater proportion of fat from foods while watching television had a higher BMI than those who ate lower fat food items (Matheson et al., 2004).

In summary, the persuasive power of short-term viewing of advertisements for high energy-dense foods on preschool-aged children's food preferences, as well as the types of foods consumed during sedentary activities such as television viewing, may influence poor eating habits for this and future generations.

Environmental Influences and Physical Activity Patterns in Children

Physical activity and sedentary behaviour need to be considered when reviewing the factors that contribute to obesity among preschool-aged children. Trost, Sirard, Dowda, Pfeiffer, and Pate (2003) compared the activity levels of 245 overweight and nonoverweight children ages 3 to 5 who were attending a preschool program. Moderate to vigorous physical activity levels were measured objectively and subjectively by using an accelerometer to quantify movement and via direct observation with an instrument called the Observation System for Recording Activity in Preschools (OSRAP). The accelerometers were worn by the children for 1 to 11 days during preschool class time, and data were analyzed only for those who wore the device for at least 3 days. The OSRAP instrument was used to measure physical activity levels over a 3-day period.

The parents were asked to complete a brief survey to assess relationships between parental determinants and child physical activity patterns. A total of 415 parents completed a questionnaire that assessed the following: SES, parental role modelling, height and weight, park use patterns, television viewing habits of the children, and access to sports equipment and active toys in the home. Comparisons between the overweight and nonoverweight groups in regard to the relationship between parental determinants and child physical activity indicated no significant differences, with the exception of parental height and weight. The analysis of parental height and weight with child weight status revealed that overweight "boys and girls were 6.1 (95% CI:2.3-16.0) and 3.8 (95% CI:1.7-8.7) times more likely to have at least one obese parent or adult caregiver at home" (Trost et al., 2003, p. 837). The results from the accelerometer and OSRAP instrument to measure physical activity patterns in the child participants indicated no

significant differences in activity patterns between normal weight and overweight girls. However, the findings did show that the overweight boys were significantly more sedentary than the normal weight boys. One of the limitations of this study was that the physical activity measurements were only done during preschool class time. More research needs to include physical activity levels in the home environment (Trost et al.).

Vandewater, Shim, and Caplovitz (2004) investigated the possible link between television and video game use and physical activity patterns with obesity in a nationally representative sample of 2,831 children ages 1 to 12 (average age of 6) in the United States. The parents who participated in this study were asked to record their children's physical and sedentary activities over a 2-hour period on 1 weekday and 1 weekend day. Each child's weight was reported by the parent; the height was measured by an interviewer in the family home. Television viewing, computer use, electronic games, moderately and highly active activities, sedentary activities, and print use (reading or being read to) were assessed for their impact on weight status.

The results of the overall regression model revealed "no relation between children's weight status and television viewing [and] a positive linear relationship between electronic game use and weight status" (Vandewater et al., 2004, p. 79). Subsequently, the overall regression model found no relationships "between children's weight status and either highly active or moderately active activities" (Vandewater et al., p. 81). In addition, overall regression analysis indicated that children with a higher BMI in this study were likely to spend more time engaging in sedentary activities than those with a lower BMI and that the positive correlation between electronic game use and weight status was strongest in those under 8 years of age (Vandewater et al.).

A recent study by Viner and Cole (2005) examined the impact of television viewing habits during childhood on the BMI of an adult. Outcome measures included types of programs, duration, and timing of television viewing on weekdays and over the weekend. Maternal attitude toward television viewing was also assessed. Longitudinal data were collected from a 1970 British birth cohort at 5 (N = 13,135), 10 (N = 14,875), and 30 (N = 11,261) years of age. The mothers of children at 5 years of age completed a 43-item questionnaire to assess for television viewing habits and maternal beliefs toward child rearing. Television viewing habits of 5-year-old children included the following: average number of hours per day a 5-year-old child spent watching television, types of programs viewed, average number of days per week that a 5-year-old child watched television, and the average number of evenings (after 6 p.m.) per week that a 5-year-old child watched television. Height was measured at 5 years of age, whereas both height and weight measurements to calculate BMI were taken by a nurse at 10 years of age. At 30 years of age, each participant's height and weight was self-reported.

The results revealed that the "mean hours of TV viewed at 5 years was 1.42 (SD 1.30) on weekdays and 1.57 (SD1.54) on weekends" (Viner & Cole, 2005, p. 431). Over the 25-year study period, linear regression indicated a strong positive association between "higher duration of TV watching during weekdays and at weekends...with higher BMI z-scores at 10 and 30 years of age" (Viner & Cole, p. 431). The results also showed that each additional hour of television viewed over the weekend at the age of 5 years resulted in a 7% increase in risk for adult obesity. In this cohort, it is important to note that in the 1970s, in the United Kingdom, there were only three television channels and broadcast times were between noon and midnight. The relatively recent emergence of cable and

satellite television, both of which offer a wide variety of programs at any time of the day or night, could not be factored into these results (Viner & Cole).

Proctor et al. (2003) also studied the impact of television viewing on changes in adiposity tissue from preschool years to early adolescence. In this longitudinal study, 106 children ages 3 to 5 participated over an 8-year period. The mean age of the children at the start of the study was 4 years, and the mean age at completion was 11 years. Changes in the yearly BMI and five skinfold measurements, including the triceps, were charted over the course of the study, and data on television viewing habits, activity levels, and dietary behaviours were collected using a questionnaire format. Caltrac accelerometers were worn by each child participant for 3 to 5 consecutive days for each study year to measure physical activity levels.

In the first year of the study, 3-day diet recall diaries were completed in four different time periods. Subsequent years called for completion of one or two 3-day diet recall diaries. Parents and children were asked to attend a clinic examination for each of the 8 study years to have their BMIs and five skinfolds measured. During the clinic examination, parents were also asked to complete a questionnaire to assess for the children's average amount of time spent watching television or playing video games (Proctor et al., 2003).

The results revealed an independent association between television viewing behaviour and increases in adiposity tissue over time. The baseline data showed that the average amount of time spent watching television in the lowest tertile (one third of the sample, $n = 34$) was 1.0 hours per day, whereas those in the upper tertile (one third of the sample, $n = 35$) watched an average of 2.4 hours per day. The baseline data analysis also

indicated that the children in the highest category for average hours of daily television viewing consumed the highest number of calories per day (Proctor et al., 2003).

By the end of the 8-year follow-up, data on the impact of television viewing and changes in body fat indicated that television viewing for 3 or more hours per day was significantly associated with higher triceps, BMI, and total measurement of five skinfolds compared to those who watched less than 1.75 hours per day. In addition, the children ages 4 to 11 who watched the most hours of television showed the highest increases in their mean BMI measurement. The combined effects of television viewing and physical activity patterns revealed that those who were the least active and watched the most hours of television resulted in the greatest increases in the sum of five skinfold measurements were ages 4 to 11. The smallest gains in skinfold thickness was measured in the children who watched the least amount of television and were the most physically active. The results from this study identified a need to implement television/videogame use reduction messages that target families of preschool-aged children in an effort to reduce the risk for overweight in later years.

Moore et al. (2003) investigated the relationship between early physical activity and changes in adiposity tissue throughout childhood in a longitudinal study. This study used the same data collected in the Framingham Children's Study (Proctor et al., 2003). Out of 106 families, 103 families with children ages 3 to 5 completed the 8-year study. Each year, the families attended a clinic to have their height and weight measured to calculate the BMIs and measure thickness of skinfolds. The triceps, abdominal, thigh, subscapular, and suprailiac skinfolds were measured for each child. The families also participated in interviews and filled out questionnaires to assess dietary and physical

activity behaviour, as well as their attitudes and beliefs. In this study, actual activity levels for each child were recorded with a Caltrac accelerometer twice a year over 3 to 5 consecutive days. Each child wore the accelerometer around the waist in a pouch to deter him or her from altering the device. The Caltrac accelerometer is a sensitive device that measures movement by providing activity counts to present an overall account of total activity. Over the 8-year period, the study revealed that "the most active children had much lower gains in body fat than did children in either the low or the middle activity tertile" (Moore et al., p. 13).

Incidentally, the most active children reached the adiposity rebound period in this study (Moore et al., 2003) at roughly age 6, whereas those who were the least active reached this critical period earlier and steadily showed increases in BMI after age 5. Also, the children who were classified in this study as being in the top tertile ($n = 35$) for physical activity levels by age 11 had "lower BMIs and much less subcutaneous fat, as measured by skinfold thicknesses, than did children in the lower two activity categories" (Moore et al., p. 14). The results from this study suggested that physical activity may have a strong protective effect on body fat changes during childhood.

Jago, Baranowski, Baranowski, Thompson, and Greaves (2005) examined the relationship of BMI to television, physical activity, and dietary habits in preschool-aged children. Data for this study were extrapolated from part of the Studies of Child Activity and Nutrition Program in Texas. One of the objectives of the program was to assess for CVD risk factors in young children. Television viewing and physical activity behaviours, as well as dietary habits of a cohort of children ages 3 and 4, were followed for 3 years between 1986 and 1989. Trained teams observed the child participants' TV viewing and

physical activity habits for 6 to 12 hours per day, recorded dietary intake, and measured heart rate over a 4-day period in each of the study years. Activity habits were assessed via a "five-level observational rating system designed to record minute-by-minute physical activity" (Jago et al., p. 558). The actual time in minutes spent watching television also was recorded. Heart rate monitoring was another measure used to assess physical activity level. A Quantum XL telemetry heart rate monitor was attached to each child for 24 hours at a time to assess physical activity levels. Dietary intake was also observed by trained observers on the same day that sedentary behaviours were observed. Food ingested by the child participants was recorded on a 24-hour recall form. Each child participant's BMI was measured at the start of the study and at the end of each study year.

Repeated measures analysis of variance indicated a strong positive correlation between television viewing and BMI where "in year 3...increased TV viewing is clearly associated with increased BMI" (Jago et al., 2005, p. 561). Heart monitor measurements to assess physical activity levels resulted in a positive association with BMI in Year 1 of the study, followed by a negative association in Years 2 and 3. In addition, the strength of the negative relation between physical activity and BMI in Years 2 and 3 were shown to be stronger in Year 3. Thus, the results from this study suggested that only television and physical activity habits were significant predictors for increases in BMI among children ages 6 to 7 in this sample (Jago et al.). Because the data collection for this study was done almost 2 decades ago, and because the recent proliferation of electronic learning products that are aimed at the preschool-aged population are sedentary in nature, it would be

interesting to replicate this study to ascertain if this age group has become more sedentary.

An imbalance between screen time and physical activity patterns in young children was identified in the reviewed studies as contributing risk factors to the development of childhood obesity (Jago et al., 2005; Moore et al., 2003). In addition to these lifestyle patterns, familial risk factors also were identified as strong risk factors associated with childhood obesity (Danielzik, Czerwinski-Mast, Langnase, Dilba, & Muller, 2004; Lamerz et al., 2005).

Familial Risk Factors for Childhood Obesity

Danielzik et al. (2004) conducted a study to determine the risk factors for obesity and overweight in children ages 5 to 7. The researchers recruited 2,631 parents of children in this age group through the elementary schools in Kiel, Germany. The parents completed a questionnaire that addressed the following risk factors: SES (defined as parental education level), birth weight, breast feeding, physical activity levels, sedentary behaviours (television viewing or computer game use), nationality, marital status, family nutrition status, reported BMI for parents and siblings, and parental tobacco use. The height and weight of each child ages 5 to 7, as well as triceps, subscapular, biceps, and suprailiacal skinfolds, were measured to calculate fat mass and BMI. In this study, low SES, high birth weight (using the 90^{th} percentile as its cutoff point from German percentiles) and parental overweight status were identified as independent risk factors for overweight status in the 5- to 7-year-old children. The highest risk for overweight in this age group was determined when parental overweight status, low SES, and high birth weight variables were combined. Other risk factors such as nutrition, physical activity,

and sedentary behaviours played a small part in the development of overweight in this sample of children ages 5 to 7.

A recent study by Lamerz et al. (2005) also assessed the relationship between SES and childhood obesity in a sample of children ages 5 to 7. A total of 1,979 parents of children in this age group completed a survey to determine their children's weight patterns and SES. In this cross-sectional survey, the researchers assessed the following indicators for SES: level of education of the parent participating in the study, as well as that of the spouse; parental occupation; amount of measured living space per person; and the number of persons living in the residence. A subsample was taken from the original sample to conduct a case-control study to obtain more detailed information using an interview format. The control sample in this study consisted of children with a BMI between the 40^{th} and 60^{th} percentiles, whereas the case sample included children with a BMI greater than or equal to the 85^{th} percentile. The parents of the children in the case-control group were asked to comment on their marital status, number of hours each parent worked during the weekdays and on weekends, household net income, specific type of education attained, and the location of their residence. The results of this study revealed a strong inverse relationship between maternal education level and childhood obesity. Low maternal education attainment was defined as 9 years of school or less. The collection of variables used to define SES were given a score, and the children with the lowest scores for overall SES were 3.3 times more likely to be obese than the children with the highest SES scores.

Magarey, Daniels, Boulton, and Cockington (2003) conducted a longitudinal observational study to determine the value of tracking childhood BMIs into adulthood as

well as to establish an association between overweight status in early adulthood with childhood and parental overweight risk factors. A total of 155 Australian boys and girls and their parents participated in this study. The heights and weights of the children were measured either annually or biannually between ages 2 to 20. The heights and weights of the parents were tracked once their children reached age 8. The results from this study sample revealed that tracking of BMI as early as age 6 is a valuable predictor of BMI at a later age, parental overweight increases the risk of a child being overweight by age 20, and the most important indicator of overweight in early adulthood is the child's BMI at an early age.

Although the results of many studies identified associated familial risk factors such as parental obesity, low SES, and overweight or obesity status in children early in life as significant predictors of overweight status into adulthood, reversal of the current childhood obesity trend is fraught with obstacles if parents are unable or unwilling to recognize that a weight problem exists (Carnell, Edwards, Croker, Boniface, & Wardle, 2005; Danielzik et al., 2004; Lamerz et al., 2005; Magarey et al., 2003).

Parental Perceptions of Childhood Obesity

Over the years, parental perception of childhood obesity has been a growing interest among researchers. Etelson, Brand, Patrick, and Shirali (2003) assessed parental level of concern over the effect of specific health risks on overall childhood health, as well as perceptions of childhood weight. The health risks included sedentary activities, secondhand tobacco smoke, and excess childhood weight. Surveys were distributed at a private pediatric clinic to parents of children between 4 and 8 years of age in New York over a 3-month period. A total of 83 parents completed the questionnaire. In this study

sample, 23% of the children were classified as overweight. A visual analog scale was used for parents to plot their children's weights. The beginning of the scale was marked as extremely underweight, and the end point was designated as extremely overweight.

The results revealed that only 1 in 10 parents of overweight children accurately plotted their children's weights along the analog scale. Etelson et al. (2003) also found that the level of concern reported by parents in this study over the effect of excess weight on their children's overall health was similar to sunburns or excessive television viewing - "78% of parents would be quite or extremely concerned about excess weight vs. 76% about sunburns and 67% about too much television", whereas parental concern over the health effects of passive smoke was higher - "83% would be quite or extremely concerned" (Etelson et al., p. 1364).

Carnell et al. (2005) conducted a survey to explore parental perceptions of weights in a preschool-aged population (3 to 5 years) in the United Kingdom. A total of 564 parents (94.5% were mothers) from diverse socioeconomic backgrounds in urban areas completed a questionnaire. The results indicated that one quarter of the children in this sample were classified as either obese or overweight. However, only 6% of the parents of overweight or obese children in this study accurately perceived their children as being overweight. Concern and worry over future weight problems in these children was expressed by at least two thirds of the parents. This study demonstrated that even though many parents are aware of and concerned over the negative health consequences associated with childhood obesity, they are unable to recognize excess weight in their preschool-aged children.

Jain et al. (2001) conducted a qualitative study to gain a better understanding of maternal perceptions and attitudes toward excess weight in preschool-aged children. Eighteen low-income mothers, mostly African-American, in an urban area of the United States participated in this study. One of the objectives of this study was to determine how mothers conclude that excess weight exists in preschool-aged children. The focus group interviews revealed the following common themes: Weight and height measurements plotted on a growth chart were not recognized by the mothers as indicators of excess weight, and excess weight was perceived to be a problem only if the children had difficulty participating with peers in physical activities or were bullied as a result of excess weight. When asked if these mothers were concerned over their children's current weight, these mothers commented that "they would not worry about a child's weight if the child had a good appetite and ate healthy foods" (Jain et al., p. 1140). However, the researchers asserted that "social and emotional consequences of being overweight and the potential damage to a child's self-esteem" was often discussed (p. 1140). It is also interesting to note that most of the mothers in this study believed that "a child's size and growth pattern was fixed or predestined and was attributable to an inherited metabolism or body type" (Jain et al., p. 1140). The rich data collected in this qualitative study illustrated the need to provide culturally sensitive education to this population on the true effects of genetics on weight status, as well as the impact that physical activity and healthy eating behaviours have on children's current and future health status (Jain et al.).

A visual analog scale is another method that has been used to assess parental perceptions of healthy preschool weights. Musher-Eizenman, Holub, Edwards-Leeper, Persson, and Goldstein (2003) used a visual analog scale to assess for acceptability of a

range of body shapes among preschoolers and their mothers. A total of 42 children ages 4 to 6.2 and 28 mothers from a White, middle-class background participated. The analog scale consists of 7 preschool-aged children (sex specific) and 7 adult female figures to reflect images along a continuum from the undernourished to the obese. The middle figure on each scale represented an average healthy weight. Maternal participants were asked to comment on acceptable body shapes for themselves and their children, whereas the children were only asked to comment on their own body shape as well as body shapes for other children their age.

The results revealed that the children were not very accurate when asked to identify their own body shape and that most were satisfied with their current body shape. Perception of and actual childhood weight were also mismatched among the maternal participants. On average, the mothers reported that their child's body shape matched the figure that was thinner than the average figure in the middle of the seven drawings, and yet a majority of the children's BMI measurements exceeded national norms, placing them in a heavier category. When the mothers were asked to rate their level of satisfaction with their own weight as well as their children's weight, "mothers rated significantly fewer bodies as acceptable for themselves than for their children" (Musher-Eizenman et al., 2003, p. 267). Coincidentally, when the mothers were asked to indicate what their children's ideal weight should be, the results revealed that "69% want their child to stay the same, and 31% of the mothers would like their child to be heavier" (Musher-Eizenman et al., p. 265). These findings identified a mismatch between perceptions among the mothers of their children's weight with the reality of where the

children's body shape fits along the analog scale, as well as a gap in knowledge of what a healthy weight looks like in the preschool years (Musher-Eizenman et al.).

The preceding studies indicated that many parents are aware of and are concerned about the negative health effects associated with excess weight. However, because many parents do not recognize the existence of excess weight in their own children, perhaps social marketing campaigns need to be developed to create more awareness of what a healthy childhood weight looks like in order to change current parental perceptions.

Parental Perceptions of Obesity Prevention Strategies in Early Childhood

A limited number of studies have used qualitative methodology to explore strategies used by parents to promote healthy weights in children. Jackson, Mannix, Faga, and MacDonald (2005) conducted in-depth interviews with 11 Australian mothers of at least one overweight child to gain insight into the strategies used to restore healthy weights in their offspring. The focus children in this study were between 14 months and 15 years of age. The interviews revealed that all of the participants were very concerned about their focus child's weight and highly motivated to help their families adopt healthy lifestyle and eating behaviours. In addition, all of the mothers demonstrated a sound understanding of the social, psychological, and physical consequences of obesity.

One of the most promising outcomes was that the participants tried to engage the entire family in strategies to adopt positive changes to eating and physical activity behaviour rather than single out the child. The main strategies used by the mothers in this study were to reduce junk food intake, increase physical activity levels, and promote healthy lifestyle and eating behaviours through role modelling. However, some of the mothers felt limited in their efforts to role model healthy eating and lifestyle behaviours

when other family members had conflicting opinions as to what constitutes a healthy lifestyle. This was especially evident in single-parent families, where these women commented that their ex- partners "had different lifestyles to their own, and were inclined to use junk food rather than cook meals" (Jackson et al., 2005, p. 11). Although this study was limited in that the sample size was small and all of the participants were White, middle-class women, this study demonstrated the motivation and willingness of these participants to act as change agents to promote healthy weights in their families.

Tucker, Irwin, Sangster Bouck, He, and Pollett (2006) used a qualitative design to explore with parents of preschoolers the different types of community-based strategies that could be employed to prevent pediatric obesity. A total of 71 parents attended 1 of 10 semistructured focus groups where the researchers asked them about their preschoolers' screen time and physical activity habits as well as their input on strategies in the community that could help families foster healthy habits in preschoolers to prevent the development of obesity. Programming suggestions provided by the parents in this study to increase physical activity habits in preschoolers included the following: (a) Include parents in program planning stages, (b) provide resources for families to use at home, (c) increase the number of facilities and accessibility to programs that promote physical activity for preschoolers, and (d) use television commercials to promote programs. Input from parents on ideas to reduce screen time in preschoolers was inadequately discussed to come up with community-based strategies in these sessions.

Summary

Studies reviewed in the literature on the negative health consequences associated with childhood obesity demonstrated a great need to implement obesity prevention

strategies to reduce the risk early in life of developing chronic health conditions. However, changes in the way that society interacts with the environment, as seen in the reviewed studies on physical activity and sedentary behaviours in youth, as well as the influence of familial risk factors and media advertising, presents a childhood obesity challenge that is multifaceted and complex. Studies on the impact of lifestyle and eating patterns on risk for overweight in the preschool years have been published, but their numbers are few. In this study, the relationship of screen time and physical activity patterns to certain aspects of the family food environment with child BMI were examined in a rural preschool population in Hinton, Alberta. A secondary aim of this study was to identify relationships among parental obesity, parental perceptions of childhood weight, and family SES with child BMI.

CHAPTER 3: COMMUNITY NEEDS ASSESSMENT

Introduction

In this section, the political and environmental forces, as well as the demographic data that may impact current trends in childhood obesity in Hinton, Alberta, are discussed. Hinton, Alberta, is a rural town located along Highway 16 and nestled in the foothills of the Rockies, approximately 25 kilometres east of Jasper National Park's east gates and 280 kilometres west of the city of Edmonton, Alberta (see Appendix C for a map of Hinton). With a population of just under 10,000, Hinton is primarily a resource town and is economically driven by the forestry, coal mining, and oil and gas sectors. More than one third of its workforce is employed in the resource and construction sectors (Statistics Canada, 2002; Town of Hinton, 2007).

Political Forces

A recent report by the Canadian Institute of Health Information (CIHI, 2002) suggested that the rapid rise in childhood obesity rates is a serious public health challenge that demands prompt action from both national and regional decision makers to halt and reverse this preventable condition. The CIHI report estimated that Canada's health care system spent approximately $3.5 billion in 1997 as the result of obesity. An earlier report by Romanow (2002) also recognized obesity and sedentary lifestyles as major health threats to the Canadian public health system. The federal, provincial, and territorial ministers accountable for the sport, recreation, and fitness portfolios responded to this problem with the following suggestions to help Canadians engage in more active lifestyles. Romanow summarized their statements in his report:

> Increasing the time devoted to physical education and sport in schools; more systematically educating all Canadians on the value of physical exercise; Encouraging more active forms of recreation through community-based programs; and Supporting healthier workplaces that encourage less sedentary lifestyles. (p. 132)

Direction from the province of Alberta resulted in the introduction of mandatory physical activity sessions on each school day for 30 minutes in duration, as well as the implementation of wellness programs that focus on healthy eating pattern education for children between Kindergarten and Grade 9. This initiative was put into place in the 2005-2006 school year and is ongoing (Government of Alberta, 2006a).

A broader approach to improve eating and lifestyle behaviours in families and children of all ages was addressed by the Alberta legislature in the fall of 2006. The previous health minister, Iris Evans, announced funding of more than $30 million for seven new programs across Alberta to improve the health of children and youth. The seven new programs will target the following areas: preschool development screening, expansion of newborn metabolic screening, development of child and youth nutrition guidelines, social marketing campaign to target healthy weights, creation of positions for regional healthy weights promotion coordinators to implement innovative community-based approaches, wellness funding for healthy school initiatives, and funding for a healthy school communities award (Government of Alberta, 2006b).

Opportunities for Recreation and Physical Activity in Hinton, Alberta

Hinton, Alberta, boasts many walking trails that are only a short distance from residential areas, as well as a recreation centre that offers two ice rinks, one swimming pool, and squash courts. There are also four fitness centres and a world-class cross-country ski centre (Town of Hinton, 2007; see Appendix D for a full description of

recreational opportunities). However, the lack of public transportation and the cost for these activities may act as a barrier for low-income families. The municipal leaders in Hinton recently hired Stantec to conduct a Hinton Transit Feasibility Study to advise the town on various pilot public transportation systems (Stantec Consulting Ltd., 2006).

Hinton Demographics

According to Statistics Canada (2002), the (2001) census reported a total of 670 children ages birth to 4 and 1,585 children ages 5 to 14 living in Hinton, Alberta. Based on the same data, the Aboriginal population of 1,020 people represented approximately 10% of the total Hinton population. Children of Aboriginal origin represented approximately 21% of the total population of children between the ages of birth and 4 and 15% of those between the ages of 5 and 14 years. Visible minorities, namely, those of Latin American, Southeast Asian, Black, Filipino, Chinese, Arab, Korean, and Japanese origin, represented almost 3.7% of Hinton's total population in 2001. Statistics Canada further identified that of the total number of families residing in Hinton, Alberta, most families consisted of married couples (2,020), with an average of 3.2 persons living in married households. The remaining 680 family households consisted of 370 common-law families, 310 female lone-parent families, and 85 male lone-parent families. The average number of persons living in either common-law or lone-parent households was between 2.8 and 3.0 persons.

Data on income and education level characteristics by Statistics Canada (2002) suggested that Hinton is a unique population in that education level may not necessarily be reflected in higher income. According to Statistics Canada, the median family income (in couples families) for those between 20 and 34 years of age in Hinton, Alberta, was

$74,259 in 2000. This income level greatly surpassed the provincial median of $65,041. However, the education level for the Hinton population ages 20 to 34 indicated that 29.3% of this population had not completed high school and that 20% of individuals ages 35 to 44 had less than a high school certificate. In contrast, provincial data on education level revealed that 18.2% of the total population ages 20 to 34 and 20% of individuals ages 35 to 44 had less than a high school certificate. The education and income levels for the Aboriginal population in Hinton, Alberta, was much lower than the general population, where 52.8% of the population over the age of 25 did not hold a high school certificate and the average earnings for full-time work over one year was $38,106.

A recent study by Danielzik et al. (2004) identified a negative association between low income and education levels, with a greater likelihood for childhood obesity and/or overweight status. Data derived from Statistics Canada (2002) on income and education levels in Hinton suggested that many families may have adequate income to provide an environment to promote health in children and youth. However, the opportunity for young adults with a low education level to earn a substantially high income in the resource sector raises the question as to whether low education levels may impact choices in families that have sufficient resources to secure healthy foods and opportunities for physical activity.

Preschool Obesity/Overweight Status in Hinton

In the past, it was difficult to estimate obesity and overweight rates among preschool-aged children across Canada. Many surveys relied on parent-reported data over the telephone. Parental reporting of a child's weight and height measurements runs the risk of over- or underestimating the true picture of obesity among youth. However,

according to a report by Shields and Tjepkema (2006), BMI data from the CCHS (2004, as cited in Shields, 2006) reflected a more accurate picture of childhood obesity across Canada because the investigative team actually measured and weighed a national representative sample. Recall that the findings from this survey revealed that 26% of the national population of children ages 2 to 17 are classified with a BMI as being either overweight or obese. In Alberta, the childhood obesity and overweight rates are the lowest in the country. It is estimated that 21% of preschool-aged children ages 2 to 5 in Alberta are either overweight or obese. Overall, 22% of children between 2 and 17 years in Alberta are considered either overweight or obese (Shields & Tjepkema).

The prevalence rates for overweight and obese levels in children ages 2 to 5 who are living in Hinton, Alberta, are currently not available. Provision of health care for Hinton residents is under the direction of the Aspen Regional Health Authority (ARHA, 2004; see Appendix E for map of ARHA). The ARHA provides health services for more than 175,000 residents over a large geographical area of more than 110,000 square kilometres. The boundaries for the ARHA reach rural communities from Cold Lake to northern communities such as Trout Lake and Chipewyan Lake, and they extend westward to as far as Jasper National Park. According to Statistics Canada (2002), obesity rates for adults 18 years of age and over living in the ARHA is estimated at 21.2% of the total population, a percentage that is significantly higher than the provincial adult obesity rate of 15.8%.

Government Programs to Promote Healthy Weights in Early Childhood in Hinton

BMI data on children ages 4.5 to 6 in Hinton, Alberta, have been collected and analyzed in a database through the Child Wellness and Immunization Clinics officially

since the start of 2006. In October 2005, the public health nurses in the Hinton, Alberta, office participated in a healthy growth workshop that was presented by the Nutrition Team Leader for the ARHA to learn more about the new BMI tracking system and to learn sensitive approaches to use in their discussions with parents about their children's BMI in the 4- to 6-year-old wellness clinics. The youngest a child can be to receive preschool vaccination is 4.5 years of age. The purpose of the 4- to 6-year-old child wellness and immunization clinic is to assess growth and development patterns, deliver safety information, and provide preschool vaccines to the children before they enter elementary school. Under the topic of growth and development, parents are asked about their children's eating and physical activity patterns, and they are offered oral and written information on healthy eating and lifestyle behaviours; in addition, the children's weight and height are measured. During the clinic visit, the children's BMIs are calculated and plotted along the CDC (2000) sex- and age-specific growth chart. The public health nurses explain to the parent(s) the purpose of the BMI and encourage parents to seek out additional assessments or education from the local dietician or family physician if the BMI pattern falls under the undernourished or overweight categories (K. Stenhouse, personal communication, December 13, 2006).

The tracking of height and weight is also performed in the 2-, 4-, 6-month, 1-year, and 18-month immunization and wellness clinics. Calculations of the children's BMIs are done only in the 4- to 6-year-old wellness clinic. There are many opportunities in the early years for public health nurses to address child health issues, but there is a wide gap in time between the 18-month and the 4- to 6-year-old immunization and wellness clinics (K. Stenhouse, personal communication, December 6, 2006).

The ARHA's (2004) Healthy Families Program is another outlet for health care professionals to teach families about the importance and benefits of eating a healthy diet and engaging in physical activity. The Healthy Families Program is a long-term program offered to high-risk families in Hinton, Alberta, with new babies for as long as 5 years. The trust that is built between the families and the health care providers over an extended period of time may facilitate greater receptivity from parents to the information on parenting skills and growth and development that is imparted by the public health nurses and home visitors (L. Allan, personal communication, December 13, 2006). One other program delivered by the ARHA that promotes healthy growth patterns through education in the early years is the Let's Talk Baby series. This series is taught by public health nurses and is offered to parents of infants up to 12 months of age (L. Allan, personal communication).

The Parent Link Centre, which is funded by Alberta Children's Services, opened its doors to Hinton families in March of 2007. Parent Link Centres are located throughout Alberta. The purpose of the Parent Link Centre is to provide families with information and referrals to other parenting support and child development programs and to offer education to parents on a myriad of child development issues. The Parent Link Centre also offers a facility with free drop-in times for parents and children to connect with other families in the community (T. Baago, personal communication, March 16, 2007).

Hinton Community Programs for Families with Preschool-Aged Children

Families with preschool-aged children between 3 and 5 years of age have access to two preschools, two daycare centres, one Junior Kindergarten, and a Head Start preschool program that targets Aboriginal children. The primary focus of these programs

is to socialize and prepare children for Kindergarten. In addition to the aforementioned programs, a group of mothers has offered over the past 2 decades a nonprofit playgroup called the Children of Hinton Indoor Playground Society. Parents accompany their children and are offered a place to socialize with other parents while their children play in the indoor playground. However, the cost to attend and a lack of public transportation act as barriers to some families (see Appendix F for a description of community programs for preschool-aged children).

CHAPTER 4: METHODOLOGY

This study examined the relationships among sedentary and physical activity patterns, and certain aspects of the family food environment with the BMIs of the study participants between 3 and 5 years of age. A secondary aim of this study was to identify associations among family SES, parental BMI, and parental perceptions of healthy weights with the preschool child's BMI. A rural population was chosen because of the limited number of studies conducted on this population.

Study Design

This study used a nonexperimental, descriptive-correlational, cross-sectional survey design to assess for strengths of association between the predictor and outcome variables. Relationships between the outcome variable, that is, the BMIs of child participants between 3 and 5 years of age, and the predictor variables were assessed. The predictor variables were as follows: family SES; parental obesity; physical activity levels; sedentary behavior (television, VHS, DVD viewing times, computer and electronic game use); parental perceptions of healthy weights; and certain aspects of the family food environment. It was anticipated that the nonexperimental, descriptive-correlational design would describe and examine the relationship between the predictor and outcome variables being studied in order to assess current practices and/or to develop obesity prevention strategies (Neutens & Rubinson, 2002).

Participants

This study was conducted in the rural town of Hinton, Alberta. Nestled in the foothills of the Rocky Mountains, Hinton, Alberta, is situated along Highway 16 and has a population of just under 10,000 (Town of Hinton, 2007). The sample for this study

consisted of 85 participants ages 3 to 5. The children in the sample, were, on average, 4 years old. Fifty-two percent of the sample were boys, and 48% were girls.

Questionnaire

The self-administered questionnaire (see Appendix G) collected data reported from parents on children ages 3 to 5. The researcher acknowledges that self-reporting methods may have resulted in some inaccurate responses. Questions from two questionnaire instruments were adapted for the survey tool used in this study. Permission to access the questionnaire instruments was obtained electronically from the authors and the Special Surveys Division of Statistics Canada. The self-administered questionnaire for this study was predominantly derived from the instrument developed by Campbell et al. (2006). A small number of questions were adapted from the instrument developed for the National Longitudinal Survey for Children and Youth (Statistics Canada, 2006). Questions designed to assess frequency of structured and unstructured physical activity patterns were developed by reviewing the National Association for Sport and Physical Activity's guidelines for daily structured and unstructured physical activity for preschoolers. Open-ended questions related to parental perceptions of childhood weight and physical activity patterns were developed through a review of the literature. Questions designed to describe recreational activity patterns in the town of Hinton, Alberta, were derived from information identified in the community needs assessment.

The questionnaire used in this study collected data reported by the primary caregiver on the following predictor variables to assess for associations with BMI in children ages 3 to 5:

1. *Parental weight status.* Parental weight status was assessed through self–reported height and weight measurements. Parental BMI was calculated using the following formula: weight (lb) divided by height (in) squared and multiplied by 703. In accordance with the CDC's (2000) criteria, adult BMI categories used in this study were 18.5 to 24.9 kg per meter squared = normal weight, 25 to 29.9 kg per meter squared = overweight, and at or greater than 30 kg per meter squared = obese (as cited in CDC, 2007a).

2. *Family social data.* Family composition, parental education, family income, occupation status, and hours of weekly employment were recorded as either categorical or interval data.

3. *Family food environment.* Parents were asked whether they agreed or disagreed with statements in regard to television use while eating, conflicts between work schedules and family meals, satisfaction with a child's eating habits, and the influence of peers and television viewing on their children's eating habits. A 5-point Likert scale was utilized and scored as follows: (1) *strongly agree*, (2) *agree*, (3) *neutral*, (4) *disagree*, and (5) *strongly disagree.*

Parents were asked how often their families sat down for the evening meal, purchased fast foods for a child's lunch or dinner, or purchased advertised foods on television; how often a child requested advertised foods on television; and how often a child consumed high energy-dense and low-fat foods while engaging in screen time activities. A 5-point Likert scale was utilized and scored as follows: (1) *never*, (2) *once a month or less*, (3) *2-3 times per month*, (4) *1-3 times per week*, and (5) *4 or more times per week.* Lastly, parents were asked how many times per day their child consumed fruits or vegetables. Parents chose among the following responses: (1) *less than 1 time per day*,

(2) *between 1 and 3 times per day*, (3) *between 3 and 4 times per day*, and (4) *5 or more times per day.*

4. *Parental perceptions of adult and childhood weights.* Parents were asked whether they perceived their children's weight as well as their own weight as underweight, average, or overweight at different times in the life cycle. A 5-point Likert scale was utilized and scored as follows: (1) *markedly underweight*, (2) *underweight*, (3) *average*, (4) *overweight*, and (5) *markedly overweight.* Parents also were asked if they were concerned over future weight problems in the children in this study. For this question, a 5-point Likert scale was utilized and scored as follows: (1) *unconcerned*, (2) *slightly unconcerned*, (3) *neutral*, (4) *slightly concerned*, and (5) *concerned.* One open-ended question asked parents to indicate in their own words the signs that a child is becoming overweight.

5. *Sedentary behavioural patterns.* Parents were asked to indicate on a visual analog scale with half-hour increments the amount of time a child usually spends watching commercial and noncommercial television on weekdays and weekend days separately. The total number of commercial and noncommercial hours watched on a usual weekday were combined and analyzed separately from the combined number of commercial/noncommercial hours watched on a usual weekend day. Parents were also asked how often their children play computer games, watches cartoons or other programs for at least 30 minutes on DVD or VHS, and play handheld or television plug-in electronic games. These questions were presented on a 5-point Likert scale and scored as follows: (1) *never*, (2) *once a month or less*, (3) *2-3 times per month*, (4) *1-3 times per*

week, and (5) *4 or more times per week*. Availability of a computer in the home was asked with a dichotomous yes/no question.

6. *Physical activity patterns.* Parents were asked a series of questions to ascertain how often their children engage in the following physical activities: skating (winter season only), public/family swim time, and walking. Parents were also asked how often their children engage in structured (i.e., initiated by parents) and unstructured activities for at least 60 minutes per day. These questions were presented on a 5-point Likert scale and scored as follows: (1) *never*, (2) *once a month or less*, (3) *2-3 times per month*, (4) *1-3 times per week*, and (5) *4 or more times per week*. In addition, parents were asked to list the type(s) of organized sports that their children participated in over the past 12 months, as well as the type(s) of physical activities they would like to see offered in their community for the 3- to 5-year-old age group. Finally, parents were asked to write down in their own words what they perceive as barriers to engage children in physical activity.

The predictor variable was the child's BMI. A child's percentile rank for BMI within this sample was used to measure weight status. The BMI was derived from height and weight measurements taken by the researcher in each family's home. The formula used to calculate BMI = weight (lb) divided by height (in) squared and multiplied by 703. In the CDC (2000) BMI-for-age and sex-specific growth charts, the term "overweight" has replaced the term "obesity" to describe children and adolescents with a BMI at or above the 95th percentile (as cited in CDC, 2007c). In this study, children were identified as being overweight or at risk for becoming overweight according to the BMI for age- and sex-specific percentile cut-off points defined by the CDC (2000) BMI-for-age growth charts. Children with a BMI between the 85th and 94th percentile are classified as at risk

for becoming overweight, and those with a BMI at or above the 95th percentile are classified as overweight (as cited in CDC, 2007a). In this study, each child participant was weighed in light clothing (no shoes) on a portable digital scale. The height of each child participant was measured in a standing position against a flat board to 1/8th of an inch. The height and weight for each child participant was measured twice to reduce the risk of an inaccurate measurement. The BMI for each child was written on the questionnaire by the researcher upon completion of the survey by the primary caregiver.

Procedure

Purposive nonprobability and snowball sampling approaches were used to target the parents of children ages 3 to 5 in Hinton, Alberta. The use of purposive sampling allowed the researcher to invite potential study participants who best met the objectives of the study. The use of snowball sampling allowed the researcher to identify and invite a participant who met the inclusion criteria to participate in the study. This participant then referred the researcher to other participants who also met the inclusion criteria (Neutens & Rubinson, 2002). An expert in the area of childhood obesity reviewed the survey tool, and a pilot study was conducted in May of 2007. Five families from diverse socioeconomic backgrounds who had children ages 3 to 5 participated in the pilot study.

The study was conducted between June and October of 2007. The researcher personally approached families at one of the local daycares, a family-focused elementary school event, and local parks, as well as through casual liaisons with families of young children enrolled in local organized sports programs. Approximately 250 information letters (see Appendix H) were distributed through three elementary schools, one of the daycare centres, the Head Start program, as well as a mom and tots playgroup for

families with children ages 3 to 5. Each parent consenting to participate in the study received in the mail a questionnaire, a consent form (see Appendix I), and a letter (see Appendix J). Each consenting participant also was asked to refer another family with a child between 3 and 5 years of age to the study. Out of 98 consenting participants, 13 participants dropped out of the study, leaving a total sample size of 85 participants. Approval for this study was obtained in May, 2008, from the Research and Ethical Review Board of Lakehead University, Thunder Bay, Ontario, Canada.

Data Analysis

SPSS 11 software was used to describe the data collected from the self-administered questionnaire. Bivariate correlations, *t* tests, and logistic regression analysis tools were used (as appropriate) to identify the strength and association of the predictor variables with BMI. Qualitative data collected from the open-ended questions were analyzed for common themes.

In this study, an initial analysis of the data was stratified into three groups according to each child's weight status and sex. Weight status was identified using the following percentile ranges from the CDC (2000) BMI-for-age growth charts: 5 to 85 = normal weight, 85 to 94 = at risk for becoming overweight, and 95 and above = overweight (CDC, 2007a). Table 1 summarizes the BMI percentile ranges of the children in the study. The combined rate for the boys with a BMI in the "at risk for overweight" and "overweight" range was 36% of the male sample, and the combined rate for the girls accounted for 19.5% of the female sample.

Table 1

BMI percentiles of Children Based on CDC (2000) Growth Charts

	No. of participants	
	Boys	Girls
BMI Percentile Range		
5-84th percentile	28	33
85-94th percentile	11	5
95th percentile and above	5	3

Overall, 18.8% of the children in this sample were identified as being at risk for becoming overweight, and 9.4% of the children were identified as being overweight. Subsequent analysis of the data was stratified according to weight status only because of sample sizes of less than 10 when analyzing according to sex. Weight status was broken down into two groups (because of samples less than 10 in the overweight range) for comparison purposes. Group 1 consisted of 61 children with a normal weight BMI percentile between the 5th and 84th percentiles, and Group 2 consisted of 24 children with a BMI percentile in the at risk for becoming overweight and overweight range, that is, between the 85th and 100th percentiles.

Family Characteristics

A majority of the primary caregivers completing the survey were mothers (97% mothers, 2% fathers, and 1% grandparents). Most of the primary caregivers (95%) reported their race as Caucasian, 2.4% reported Native/Aboriginal, 1.2% reported Arab/West Asian, and 1.2% reported Filipino as his/her race. The relationship to the child

of the primary caregiver's partner was generally reported as the father (97% fathers, 2% mothers, and 1% grandparents). Most of the families were married (87%) or living together in a common-law relationship (7%). Most families (89%) reported two adults over the age of 18 living in the household. Families were likely to have two children (51%), but 17% reported one child, and 32% reported three or more children. Slightly less than half (48%) of the children did not have an older sibling, whereas 47% had at least one younger sibling. Tables 2 and 3 summarize the education level of both parents and the gross family income according to each child participant's weight status.

Table 2

Group Differences in Parental Education Level

	Group 1	Group 2
Primary Caregiver Education Level:		
• % Some high school	4.9	0
• % Completed high school	9.8	33.3
• % Technical or trade school certificate	14.8	12.5
• % 2 years or less of college or university	31.1	25
• % University undergraduate degree or higher	39.3	29.2
Partner Education Level:		
• % Some high school		
• % Completed High School	8.2	4.2
• % Technical or trade school certificate	16.4	16.7
• % 2 years or less of college or university	29.5	41.7
• % University undergraduate degree or higher	14.8	16.7
• % Missing response	24.6	16.7
	6.6	4.2

Note. Group 1: Normal weight children (61)
Group 2: At risk for becoming overweight and overweight (24)

Table 3

Group Differences in Family Gross Income Level

Gross Family Income Level:	Group 1 (%)	Group 2 (%)
• 15,000 to 19,999	1.6	4.2
• 20,000 to 29,999	3.3	4.2
• 30,000 to 39,999	4.9	0
• 40,000 to 49,999	4.9	4.2
• 50,000 to 59,999	8.2	0
• 60,000 to 69,999	9.8	4.2
• 70,000 to 79,999	9.8	8.3
• 80,000 or more	49.2	58.3
• Missing Response	8.2	16.7

Note. Group 1: Normal weight children (61)
Group 2: At risk for becoming overweight and overweight (24)

Relationships between Predictor Variables and Child BMI

Sedentary Activities

Independent sample *t* tests were conducted to assess for differences between mean hours associated with television viewing among children with BMIs in the normal range and children with BMIs in the at risk for becoming overweight or overweight range. Table 4 demonstrates group differences in regard to sedentary activities. There was no significant difference in television viewing hours on weekend days in children with BMIs in the normal range ($M = 2.09$, $SD = 1.43$) and those children with BMIs in the at risk for becoming overweight or overweight" range ($M = 2.25$, $SD = 1.70$), $t(83) = .417$, $p = .678$. However, the mean time spent viewing television on weekdays was significantly different between the two groups. Children with BMIs in the normal range watched significantly fewer television hours on weekdays ($M = 2.04$, $SD = 1.49$) than those children with BMIs in the at risk for becoming overweight or overweight range ($M = 2.89$, $SD = 2.30$), $t(83) = 1.995$, $p = .049$.

There were no significant associations between DVD and VHS viewing frequency, or electronic game use with child BMI. However, an inverse correlation was identified between how often a child played computer games and child BMI. An independent *t* test was conducted to assess for mean differences between the two groups in regard to frequency of computer games and child BMI. Children with BMIs in the at risk for becoming overweight or overweight range played computer games less often ($M = 1.75$, $SD = .98$) than those children with a BMI in the normal range ($M = 2.60$, $SD = 1.19$), $t(82) = -3.08$, $p = .003$.

Table 4

Group Differences in Sedentary Activities

	Group 1		Group 2	
	M	*SD*	*M*	*SD*
Television Viewing Hours on Week Days	2.04* 61)	1.49	2.89* (24)	2.30
Television Viewing Hours on Weekend Days	2.13 (60)	1.41	2.30 (23)	1.71
Computer Game Use	2.60* (60)	1.19	1.75* (24)	0.98
DVD & VHS Viewing for at least 30 minutes per day	3.80 (60)	.935	3.58 (24)	1.10
Handheld and Plug-In Electronic Game Use	1.72 (60)	1.13	1.67 (24)	0.96

Note. Group 1: Normal weight children (61)
Group 2: At risk for becoming overweight and overweight (24)
*significant at $p < .05$. Television viewing hours were scored in hours and minutes, but other screen time activities were scored along a 5-point Likert scale as follows: (1) *never*, (2) *once a month or less*, (3) *2-3 times per month*, (4) *1-3 times per week*, and (5) *4 or more times per week.*

Logistic regression was conducted to examine television viewing times on weekdays and computer game use as predictors for obtaining a higher child BMI rating.

The child BMI was rated as (0) BMI below the 85th percentile and (1) BMI at or above the 85th percentile. Logistic regression revealed that only computer game use was significantly related to the child BMI score, chi square (N = 85, df = 2) = 11.463. The children with BMIs in the at risk for overweight or overweight range were significantly less likely to spend time playing computer games than those with BMIs in the normal range, OR = 0.52, p = .009, with 95% CI = .318 - .852. In addition, although usual weekday television viewing time was related to the children's BMI scores, it made no significant contribution to the children's BMIs relative to the other predictor, OR = 1.213, p = .165, with 95% CI = .923-1.594.

Physical Activity Patterns

A majority of parents (96.5%) reported that their children did not have any long-term health conditions that would prevent or limit their participation in physical activity. Table 5 demonstrates the group differences with regard to physical activity patterns. When the parents were asked to indicate how often their children participated in specific physical activities, indoor or outdoor recreational skating was the only predictor variable to show a positive and significant correlation with the children's BMI, $r(N = 85) = .316$, $p = .003$. An independent sample t test was conducted to compare the mean scores for recreational skating frequency of children with BMIs in the normal range and those with BMIs in the at risk for overweight and overweight range. The children with BMIs in the at risk for overweight or overweight range participated in recreational skating during the winter months more often (M = 3.04 SD = 1.23) than the child participants with BMIs in the normal range (M = 2.25, SD = 1.12), $t(2.865) = 83$, p = .005. There were no significant relationships between public swim times and walking, and how often the

children participated in at least 60 minutes per day of structured and unstructured physical activities with the children's BMIs.

Table 5

Group Differences in Physical Activity Patterns

	Group 1		Group 2	
	M	*SD*	*M*	*SD*
Structured physical activity for 60 minutes per day	4.23 (61)	.76	4.33 (24)	.86
Unstructured Physical activity for 60 minutes per day	4.92 (61)	.27	4.79 (24)	.50
Recreational swimming	2.66 (61)	.81	2.92 (24)	.83
Recreational Skating during the winter months	2.25* (61)	1.12	3.04* (24)	1.23
Walking for at least 15 minutes per day	4.27 (60)	.68	4.33 (24)	.63

Note. Group 1: Normal weight children (61)
Group 2: At risk for becoming overweight and overweight (24)
*significant at $p < .05$. A 5-point Likert scale was used to assess patterns in specific physical activities and was scored as follows: (1) *never*, (2) *once a month or less*, (3) *2-3 times per month*, (4) *1-3 times per week*, and (5) *4 or more times per week.*

When the parents were asked to list the type(s) of organized sports their child engaged in over the past 12 months, three quarters (75%; 7/16) of the parents with children in the overweight BMI range indicated that their children participated in two or more organized sports, and almost half (46%; 28/61) of the parents with children in the normal BMI and 43% (7/16) of the parents with children in the at risk for overweight range indicated the same. On a hierarchical level, soccer was identified the most often (38/85), followed by swimming lessons (37/85), skating lessons (19/85), dance (16/85), and cross-country skiing lessons (10/85). Other organized sports reported by a small number of parents included tae kwon do, hockey, t-ball, alpine skiing lessons, and horseback riding.

When the parents were asked what type(s) of physical activities they would like to have offered in their community for the 3- to 5-year-old age group, nearly a third of the parents (29%; 25/85) requested a gymnastics program. A small number of parents requested more indoor playground equipment and activities such as indoor soccer over the long winter months. A few parents also suggested having aerobics or lane swimming available to parents while their 3- to 5-year-old children were participating in a sport.

When the parents were asked to describe the barriers that they perceive to engage their children in physical activity, nearly one quarter (24.7%) of the primary caregivers reported parental work schedules as a barrier. Many parents citing work schedules as a barrier also indicated that the availability of physical activity programs during daytime hours conflicted with their work schedules. In this sample, 76% of the primary caregivers reported that they were employed. On average, the employed primary caregivers reported working 27.1 hours per week (SD = 12.6 hours), with a range between 2 and 50 hours. Other barriers reported by the primary caregivers included low energy level of parents at the end of the day, cold weather, not enough indoor activities for this age group, caring for a younger sibling, and the cost of lessons and programs.

Family Food Environment

Tables 6 and 7 illustrate group differences in regard to certain aspects of the family food environment. Bivariate correlations and t tests showed no significant differences between the two groups.

Overall, both groups of parents tended to be neutral in regard to the statement that adult work schedules make it difficult to have the evening meal together, and they reported that the whole family usually sits down together for the evening meal four or

more times per week. Parents also tended to disagree with the statement that adults in the family want the television on during meal times. Fast food consumption for the children's lunch and dinner meals tended to be reported by most parents as once a month or less. On average, the consumption of high-fat snack foods while their children participated in sedentary activities was reported by most parents as once a month or less, whereas the consumption of low-fat snack foods was reported as one to three times per week. When the parents were asked how advertised food items influenced their buying decisions and their children's food requests, most parents tended to state that their children normally do not request food items advertised on television.

Table 6

Group Differences in Certain Aspects of Family Food Environment

	Group 1		Group 2	
	M	*SD*	*M*	*SD*
Work schedules conflict with the breakfast meal	2.62 (58)	1.16	2.62 (21)	1.43
Work schedules conflict with the evening meal	3.69 (61)	1.00	3.21 (24)	1.28
It is o.k. for children to eat dinner separately from adults	4.07 (61)	1.01	4.00 (24)	1.02
Evening meal is a time for the family to connect	1.85 (61)	0.81	1.54 (24)	0.72
Satisfaction with how often the family eats dinner together	1.87 (61)	0.84	1.62 (24)	1.01
Adults in the family want the television on during meals	4.28 (61)	0.83	4.33 (24)	0.91
I am satisfied with my child's eating habits	2.26 (61)	0.77	1.96 (24)	0.90
Advertisements on television strongly influence my child's eating habits	3.27 (59)	1.12	4.04 (24)	0.75
Eating habits of peers strongly influence my child's eating habits	2.93 (61)	0.99	3.00 (24)	1.10

Note. Group 1: Normal weight children (61)
Group 2: At risk for becoming overweight and overweight (24)
*Statistically significant at $p < .05$. A 5-point Likert scale was scored as follows: (1) *strongly agree*, (2) *agree*, (3) *neutral*, (4) *disagree*, and (5) *strongly disagree.*

Table 7

Sex Differences in Certain Aspects of Family Food Environment

	Group 1		Group 2	
	M	*SD*	*M*	*SD*
How often does your whole family sit down together for the evening meal?	4.85 (61)	0.35	4.87 (24)	0.33
How often would you buy fast foods for the evening meal?	2.31 (61)	0.76	2.46 (24)	0.77
How often would your child have fast foods for lunch?	2.25 (61)	0.74	2.30 (23)	0.82
How often does your 3- to 5-year-old child request food items advertised on television?	1.78 (60)	0.99	1.42 (24)	0.92
How often do you purchase food items advertised on television that your 3- to 5-year-old child requests?	1.45 (60)	0.67	1.21 (24)	0.50
How often does your 3- to 5-year-old child eat high-fat snacks while engaging in screen time activities?	2.61 (61)	1.11	2.17 (24)	0.96
How often does your 3- to 5-year-old child eat low-fat snacks while engaging in screen time activities?	3.54 (61)	1.23	3.92 (24)	1.13

Note. Group 1: Normal weight children (61)
Group 2: At risk for becoming overweight and overweight (24)
*Statistically significant at $p < .05$. A 5-point Likert scale was scored as follows: (1) *never*, (2) *once a month or less*, (3) *2-3 times per month*, (4) *1-3 times per week*, and (5) *4 or more times per week.*

The consumption of fruits and vegetables on a daily basis was scored differently and is not listed in Table 6 or 7. Overall, most parents reported that their children consumed fruits and vegetables between three and four times per day ($M = 2.54$, $SD = .53$; $M = 2.46$, $SD = .65$).

Parental Obesity and Family SES

There were no significant associations between SES and parental obesity with the children's BMIs. Table 8 summarizes group differences in regard to parental obesity and family SES. For this study, SES was defined as family income and parental education level. On average, parents in this sample reported a gross family income of $70,000 per year or more, and the average level of education was reported as 2 years or less of university or college among primary caregivers. The average education level for the

primary caregiver's partner was reported as a technical or trade school certificate/apprenticeship. The mean BMIs for primary caregivers and partners in both groups were similar. On average, the BMIs for primary caregivers were in the normal weight range, whereas the BMIs for partners were in the overweight range.

Table 8

Group Differences in Parental Obesity and Family SES

	Group 1		Group 2	
	M	*SD*	*M*	*SD*
Primary Caregiver BMI	24.93 (59)	5.18	24.72 (24)	5.50
Partner BMI	26.77 (56)	3.31	26.95 (22)	3.66
Primary Caregiver Education Level	5.9 (61)	1.17	5.50 (24)	1.25
Partner Education Level	5.33 (57))	1.28	5.26 (23)	1.09
Gross Family Income Level	8.59 (56)	1.94	8.95 (20)	2.11

Note. Group 1: Normal weight children (61)
Group 2: At risk for becoming overweight and overweight (24)
*Statistically significant at $p < .05$.

Parental Perception of Childhood Weight

When asked how concerned they were about their children becoming overweight, almost one third (29.2%) of the parents with children who were either at risk for becoming overweight or overweight reported that they were concerned, and nearly one quarter (24.6%) of the parents with children who had a normal BMI reported concern. Incidentally, more than half (57.1%) of the primary caregivers who were classified as being obese reported that they were slightly concerned about their children becoming overweight, but only 22.2% of the primary caregivers who were classified as being overweight expressed slight concern.

When the parents were asked to indicate their children's weight during infancy and the toddler years along a 5-point Likert scale, more than three quarters of the total population perceived their children's weight as average (80.7% and 89.2%). Two responses were missing for each question. Those who perceived their children to have been overweight during infancy and the toddler years accounted for 4.8% and 1.2% of the total sample, respectively.

The parents also were asked to indicate their own weight as well as their child's current weight along the same 5-point Likert scale used to assess perception of weights in earlier years. Only 12.5% (1/7) of parents with overweight children accurately identified their child as currently being overweight, while all of the parents with children at risk for becoming overweight identified their child as being at an average weight. Conversely, when primary caregivers were asked to describe their own current weight, all of the parents (7/7) with a BMI in the obese range accurately perceived their weight as being either overweight or markedly overweight, whereas 77.8% (21/27) of those with BMIs in the overweight range accurately described their own weight as overweight.

When parents were asked to describe in their own words what they perceived to be the signs that a child is becoming overweight, the parents of children in both BMI groups expressed similar descriptors: changes in a child's appearance, difficulties in regard to physical activity, and unhealthy eating habits. Change in a child's appearance was the number one sign reported by parents. Many parents described changes in a child's appearance as "chubby in the belly, legs, and arms"; "looking chunky"; "excess body fat - rolls to stomach, chin, and legs." Another common description made by parents when describing changes in a child's appearance as a sign of becoming

overweight was to compare the way a child looked to other children of the same age: "heavier than other children his age." A small group of parents (10/85) referred to the height-to-weight ratio on a growth chart as an indicator that a child is becoming overweight. In response to one of the open-ended questions on the survey, one parent described the height-to-weight ratio as "actual weight is significantly over the average weight for their height when compared to other children in their age group."

The second most common sign described by parents was related to a decrease in physical activity levels and/or decreased ability of a child to participate in physical activities. Difficulty in a child's ability to be physically active was described by one parent as "unable to run and play without running out of breath." Unhealthy eating was the third most common sign described by parents that a child is becoming overweight. Unhealthy eating was described by some parents as "eating too much junk food," "craving of unhealthy foods," and "nothing offered but fatty and processed foods."

Discussion

This study was conducted to explore the relationship among certain lifestyle, demographic, and familial risk factors with risk for overweight in children ages 3 to 5 who are living in the rural town of Hinton, Alberta. A secondary aim of this study was to assess for relationships between family SES, parental obesity, and parental perceptions of childhood weights with the children's BMIs.

Although several significant relationships were found, many of the variables expected to be predictors were not significant. For example, television viewing time was significantly related to child BMI, but was not identified as a predictor for overweight. In this study, the average number of hours that children with BMIs in the at risk for

overweight and overweight range spent viewing television on a usual weekday was significantly higher ($M = 2.89$, $SD = 2.30$) than those children with BMIs in the normal range ($M = 2.04$, $SD = 1.49$), $t(83) = .1.995$, $p = .049$. This finding supported an earlier study by Jago et al. (2005) that examined the impact of television viewing and physical activity on BMI in a cohort of children between the ages of 3 and 4 years over a 3-year period. Jago et al. identified a positive association between television viewing time and BMI in the 3rd year of the study. Although the current study did identify a positive and significant correlation between television viewing time on a usual weekday and child BMI, the influence of other electronic and computer game use was not identified as a significant risk factor.

Physical activity patterns in this cross-sectional study did not identify any significant differences between the two groups of children other than parents reporting participation in recreational skating during the winter months. Parents of children in Group 2 (overweight) tended to report participation in recreational skating two to three times per month ($M = 3.04$, $SD = 1.23$), whereas parents with children in Group 1 (normal weight) tended to report participation in recreational skating once a month or less ($M = 2.25$, $SD = 1.12$), $t(2.865) = 83$, $p = .005$.

Although most physical activities assessed in this study were not significantly associated with the children's BMIs, the data illustrated the introduction of a wide variety of physical activities at an early age. Organized sports that were reported most often by the primary caregivers included soccer (38/85), swimming lessons (37/85), skating lessons (19/85), dance (16/85), and cross-country skiing lessons (10/85). A small number of parents reported that their children were involved in other organized activities such as

tae-kwon do, hockey, t-ball, alpine skiing lessons, and horseback riding. Outside of organized sports, parents on average tended to report that their children participated four or more times per week in unstructured physical activity (for at least 60 minutes per day) and one to three times per week in structured physical activity (for at least 60 minutes per day). On average, recreational swimming and/or skating was reported as an activity that was engaged in by families on a monthly basis.

This study was unable to detect differences in physical activity levels other than recreational skating patterns among those children in the normal, at risk for overweight, or overweight BMI ranges. However, an open-ended question that asked the parents to describe barriers to engage their 3- to 5-year-old children in physical activity identified work schedules as the most often cited barrier by nearly one quarter (24.7%) of the primary caregivers. Many parents indicated that access times for community programs often conflicted with their work schedules; others reported cost as a barrier. Not surprisingly, when the parents were asked what kind of changes they would like to see in their community in regard to organized physical activities offered for this age group, many indicated that they would like to see more programs offered at different times to accommodate work schedules. A few parents requested the simultaneous offering of physical activities for both adults and preschool-aged children. Another recommendation made by some of the parents was to provide access to an indoor playground to increase physical activity in this age group during the winter season. Recommendations from parents in a community-based paediatric obesity prevention study by Tucker et al. (2006) also supported the use of indoor playgrounds during the winter season and greater access to programs at different times of the day to accommodate the work schedules of parents.

It was promising to hear parents in the current study, as well as from past studies, offer concrete solutions that may bring down the barriers that many parents face when trying to engage their young children in physical activities.

Familial risk factors such as parental obesity and SES also were assessed for relationships with child BMI. Contrary to other studies, parental obesity and SES were not associated with child BMI in this study. A longitudinal study by Magarey et al. (2003) tracked BMI changes in children at different times between the ages of 2 and 20 in a cohort of approximately 155 boys and girls in Australia. They identified a child's weight status at 6 years of age as the strongest independent risk factor for overweight status by age 20. Danielzik et al. (2004) identified such factors as parental obesity, high birth weight, and parental education level as strong, independent risk factors for overweight status in a large sample ($N = 2,631$) of children ages 5 to 7. In the current study, although significant relationships between family SES and child BMI were not identified, many families reported high gross income and education levels, and yet almost one third (29.4%) of the child participants had BMIs in either the at risk for becoming overweight or overweight category. This finding suggested that childhood obesity is a problem that may transcend SES.

In this study, the most interesting findings were identified in the data on parental perceptions of childhood weights. Most parents (87.1%; 74/85) identified their children's current weight as average. The results revealed that only 12.5% (1/7) of parents with children in the overweight BMI range accurately perceived them as overweight. Concern for their children becoming overweight was expressed by only 29.2% of parents with children with BMIs in either the at risk for becoming overweight or overweight range.

On the contrary, when parents were asked to describe their own current weight, more than three quarters of the parents with BMIs in the overweight range accurately perceived their own weight as being overweight, whereas all of the parents with BMIs in the obese range described their weight as either overweight or markedly overweight. The disparity between a parent's perception of his/her own child's weight and the actual BMI of the child has been identified in other studies. For example, Carnell et al. (2005) explored parental perceptions of weight in a sample of 564 preschool-aged children in the United Kingdom and found that only 6% of parents with overweight children accurately perceived the children as overweight. Similarly, Etelson et al. (2005) explored parental perceptions of weight in a sample of 83 children ages 4 to 8 in the United States and concluded that only 1 in 10 parents of overweight or obese children accurately perceived the children as overweight.

Responses from an open-ended question in this study that asked the parents to describe in their own words the signs that a child is becoming overweight may provide some insight as to how a parent determines when a child is becoming overweight. The most common sign reported was the appearance of the child, followed by decreases in physical activity patterns or difficulties sustaining physical activity, and unhealthy eating habits. Changes in a child's appearance were similarly described by many parents as excess body fat in the stomach, chin, arms, or legs, and many also expressed body weight compared to other children (e.g., "heavier than other children his/her age") as a sign. Reduced physical activity and/or difficulty maintaining physical activity levels was the second most common sign described by parents as a sign of a child becoming overweight. One parent described difficulties in maintaining physical activity as "unable

to run and play without running out of breath." Consumption of unhealthy foods was the third most common descriptor reported by parents as a sign that a child is becoming overweight.

In an earlier qualitative study, Jain et al. (2001) conducted focus groups with a small group of low-income mothers who were primarily of African American origin to gain a better understanding of how these mothers determined if a preschool-aged child was overweight or obese. Similar to the results from the current study, the mothers in Jain et al.'s study were more likely to consider unhealthy eating habits and decreased ability to become physically active as signs that a child is overweight. These mothers also believed that excess weight on a young child is primarily the result of a genetic predisposition, and many believed that excess weight in the early years would most likely decrease as the child grows. Although difficult to ascertain from the findings in this study, the low rate of concern over future childhood weight problems in parents with children in the at risk for becoming overweight and overweight range may stem from a belief that excess fat on a younger child will eventually disappear as the child ages and grows taller.

Study Limitations

The current study had many limitations to consider. Random sampling techniques were not used in this study because of the small population size, so generalization of the findings was limited to the study sample. It is also important to note that the ethnic composition of the primary caregivers in this study were predominantly Caucasian. Therefore, the findings from the study should not be generalized to more ethnically diverse populations.

Threat of selection bias in this study also had to be considered. Although the use of the snowball sampling technique effectively increased the preliminary sample of 20 participants to 98, selection bias may have occurred because approximately 20% of the potential study participants were casually known by the researcher (Neutens & Rubinson, 2002). In the current study, strategies to reduce the threat of selection bias were implemented through the distribution of information letters to all parents of children ages 3 to 5 years who were attending one of the local daycare centres, the Head Start program, as well as the Senior and Junior Kindergarten programs in Hinton, Alberta.

Threat of contamination also needed to be considered because the researcher may have developed a previous working relationship with a study participant and may have had previous knowledge of that participant (Neutens & Rubinson, 2002). The researcher worked as a public health nurse in the child immunization and wellness clinics at the Hinton Community Health Services office between July 2002 and May 2006. Presently, the researcher occasionally works as a casual public health nurse in the child immunization and wellness clinics. This researcher clearly stated to each participant that this study had been approved by Lakehead University's Research and Ethics Board and that it was a requirement for completion of the researcher's master's degree in public health. The researcher also was careful not to treat known participants differently when contacting potential study participants by telephone or in person to introduce and explain the study.

The researcher also took into consideration the validity and reliability of the questions used in the survey tool to assess the effect of the independent variables on the dependant variable being studied (Neutens & Rubinson, 2002). In this study, the

researcher extrapolated items from reliable and validated instruments developed by Campbell et al. (2006) and the National Longitudinal Survey of Children and Youth (Statistics Canada, 2006). The researcher developed questions in reference to structured and unstructured physical activity patterns by reviewing the National Association for Sport and Physical Activity's guidelines for daily structured and unstructured physical activity for preschoolers. Although most of the questions were adapted from previously validated studies and the survey tool was reviewed by an expert in the field of childhood obesity research as well as pilot tested, the use of Likert-type questions to assess physical activity and screen time patterns may not have been an appropriate method when trying to identify physical activity and screen time patterns as predictors of child BMI. The use of interval data for television viewing time and frequency data for all other screen time activities may have weakened the relationship between screen time activities and child BMI.

Parental self-reporting of height and weight in the questionnaire may have resulted in inaccurate responses. MacLellan, Taylor, Van Till, and Sweet (2004) compared BMI estimates derived from self-reported height and weight measurements in an adult sample against the BMI estimates calculated from measurements taken by a health care professional. In their study, obesity estimates derived from direct measurements of height and weight were double the obesity estimates calculated when using self-reported height and weight.

Recommendations

- More qualitative studies are needed to gain a richer understanding of how a parent determines when a child is overweight and what the terms overweight and obesity look like on the frame of a preschool-aged child.
- Participatory research studies are needed to empower parents to take ownership of current trends in childhood obesity and to be an active voice in the creation of solutions.
- Access to indoor playgrounds at a low cost should be reviewed and implemented in communities as an effective way to maintain physical activity levels among the preschool-aged population during the winter months.
- Qualitative studies are needed to ascertain how parents feel about screen time use during the preschool years and to ask for suggestions to reduce screen time activities.
- To change current societal terms of reference for childhood obesity, social marketing campaigns are needed to illustrate the changes in weight status among children 25 years ago and today in a sensitive manner.

Conclusion

The researcher examined the relationships of various risk factors with child BMI in a rural Alberta preschool-aged population through the use of a self-administered questionnaire that was completed by the primary caregivers of the child participants ages 3 to 5. Statistical analysis of the data identified few significant associations with child BMI. Although there were no significant associations between family SES with child BMI, in this sample, the proportion of children with a BMI in either the "at risk for

becoming overweight" or "overweight" category (29.4%) is much higher than the province of Alberta's combined rate of 21% for preschool aged children (Shields, 2006). Furthermore, the primary caregivers of children in either the "at risk for becoming overweight" or "overweight" category reported on average, a family income of more than $70,000 and an education level of 2 years or less of college or university. The presence of high SES in many of the families with children categorized in this sample as either "at risk for becoming overweight" or "overweight" is contrary to previous studies that identify low SES as a significant risk factor for excess weight in children and merits further investigation (Danielzik et al. 2004).

The most significant results identified in this study were found in the data related to television viewing patterns and parental perceptions of childhood weights. The analysis contributed to the current body of research, identifying a positive relationship between television viewing on usual weekdays with increases in a child's BMI.

Notably, the most important qualitative data to come from this study were identified in the data on parental perceptions of childhood weights. The inability of most parents of overweight children in this study to accurately perceive their children as being overweight was consistent with the small number of studies in this area examining this disparity. This issue is perhaps the most puzzling barrier to address in the effort to reduce and prevent childhood obesity. Asking parents to provide healthier food choices, engage children in regular physical activity, and reduce screen time activities may prove to be a difficult task if the presence of excess childhood weight is not acknowledged. Childhood obesity is a complex issue that requires multiple strategies to change the current trajectory toward increasingly unhealthy weights among children.

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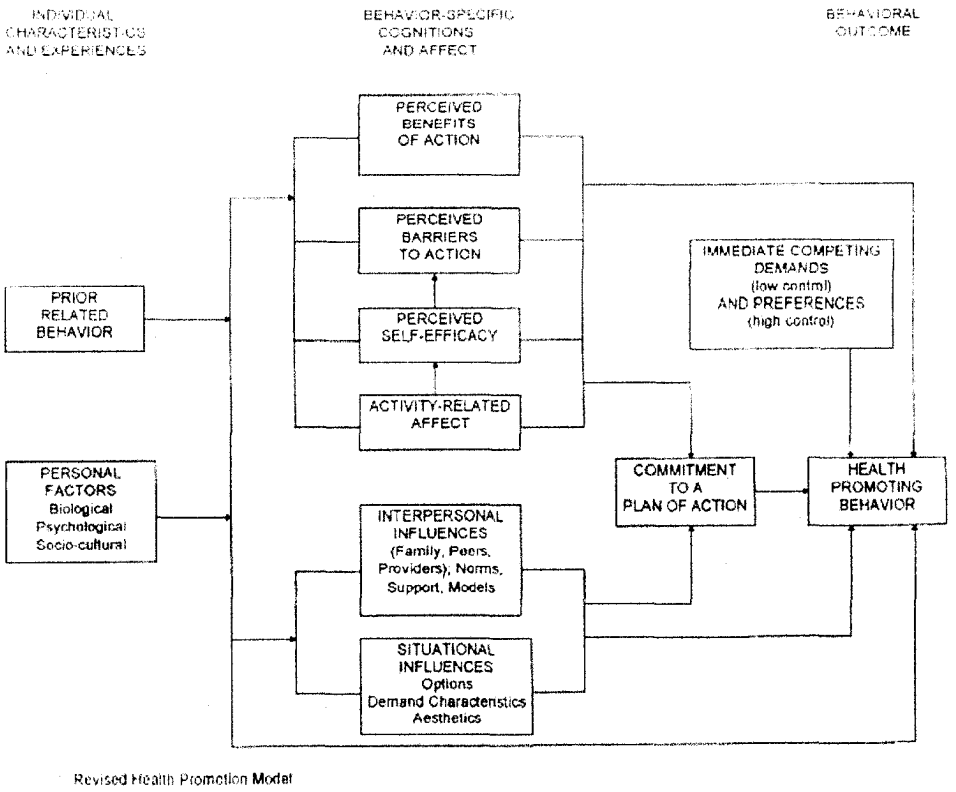
APPENDIX A: PENDER'S REVISED HEALTH PROMOTION MODEL



Note. From *Health Promotion in Nursing Practice* (3rd ed., p. 67), by N. J. Pender, 1996, Stamford, Connecticut: Copyright 1996 by Appleton & Lange. Reprinted with permission.

APPENDIX B: DEFINITIONS FOR ANTHROPOMETRIC TOOLS USED TO DETECT BODY FATNESS IN CHILDREN

Deuterium Dilution Technique. This technique uses deuterium in water form to diagnose obesity. Analysis of urine samples are used to calculate deuterium, total body water, fat free mass, and fat mass levels in the body (Wickramasinghe et al., 2005).

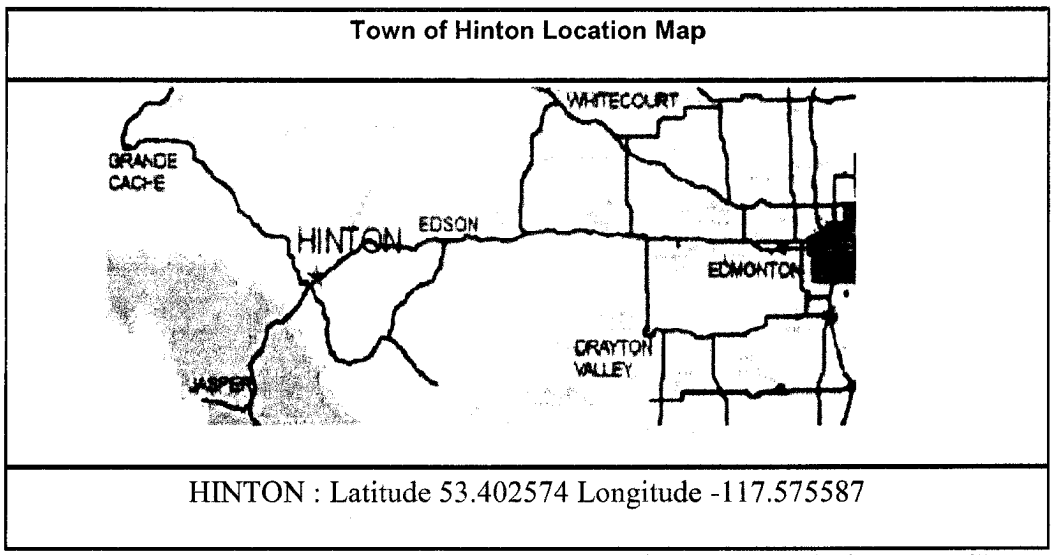
Dual-Energy X-Ray Absorptiometry (DXA). The DXA method uses a body scanner with a low dose of radiation to measure body fat, lean tissue mass, and bone mineral content (Ellis, Shypailo, Pratt, & Pond, 1994).

Rohrer Index (RI). The Rohrer Index calculates the BMI by dividing the weight in kilograms by the height in meters cubed (Reilly et al., 2003).

Subcutaneous Fat Measurement. The thickness of subcutaneous fat can be measured to assess for the degree of overweight or obesity levels (WHO, 1995).

Weight for Height Measurement. The weight-for-height measurement tool assesses body fatness by comparing weight relative to height against a reference group. The reference data from the CDC weight-for-height growth charts are not age specific (Flegal et al., 2002).

APPENDIX C: MAP OF HINTON



Town of Hinton. (2007). Retrieved from http://www.town.hinton.ab.ca/siteengine/activepage.asp?PageID=9

APPENDIX D: RECREATIONAL CLUBS IN HINTON, ALBERTA

Club Name	Description	Contact Information
ATV Society, Hinton	Explore the Foothills of Hinton by ATV	atvhinton@shaw.ca. c/o 27-133 Jarvis Street, Hinton, AB, T7V 1R5
Arrow Launchers, Yellowhead	Experience the challenge of the sport of archery.	Roy Eckleston, president (780) 865-5622. 194 Wilson Ave., Hinton, AB, T7V 1Z6
Badminton Club, Adult	Play badminton Tuesdays and Thursdays, 7:30pm to 9:00pm at Gerard Redmond Catholic School.	Penny Strawson (780) 865-2873. 149 Pembina, Hinton, AB, T7V 2B7
Curling Club, Hinton	Curling from October to March each year.	Ron Christensen, president (780) 865-2413. Box 2624, 837 Switzer Drive, Hinton, AB, T7V 1Y2
Dr. Duncan Murray Recreation Centre	Enjoy pools, arenas, squash, racquetball, volleyball, basketball, skateboard park, concession, sport fields, playground, and meeting rooms.	Stacey Stahl (780) 865-6028. 805 Switzer Drive, Hinton, AB, T7V 1V1
Figure Skating Club, Hinton	Providing instruction in Beginning Skating Skills to Senior Level Figure, plus skating for ages 3 and up.	Shannon Marciszyn, president (780) 865-2966 or Sandi Rasmussen-Connolly (780)865-2934. Box 2962, Hinton, AB, T7V 1Y2
Bodywise Fitness Centre	Fitness Centre	(780) 865-3880
Curves for Women	Fitness Centre	(780) 865-5468
New Image Fitness Centre	Fitness Centre	(780) 865-4199
Yoga Fusion	Yoga Classes	(780) 865-2967
Flying Club, Hinton	The Annual Fly-in is held the 2nd Sunday of June.	Glen Davies (780) 865-2871 or the Clubhouse (780)865-1343. Box 2545, Hinton, AB, T7V 1Y2
Folding Mountain Tae Kwon Do Services	Try out the Korean Martial Arts	Bonnie Lanosky (780) 865-8827. Kin Hall, 795 Switzer Drive, Hinton, AB
Golf Club, Hinton	18-hole semi-private golf club with practice facilities	Web site link www.hintongolfclub.com
Hinton Hikers Volkssport Club	This is the club for you if you enjoy walking and biking!	Wayne Kennedy (780) 865-4332. #329-133 Jarvis Street, Hinton, AB
Hinton School of Dance	Classical ballet and contemporary dance lessons ages 3 years and up	LuAnne Sirdiak, President 865-7004
Minor Hockey Association	The hockey season runs from September to the end of March.	James Duke, President (780) 865-5091. Box 5050, Hinton, AB, T7V 1X3 http://www.hintonminorhockey.com
Hockey, Hinton Heat	This is men's competitive Senior "A" Hockey. Play in the North Central Hockey	Dino Brown (780) 865-1687. Box 6035, Hinton, AB, T7V 1X4

	League.	
Hockey, Hinton Old Timers	There are games every week on Tuesday, Thursday, and Sunday	Jim Bacon, President (780) 865-5530. Box 5222, Hinton, T7V 1X4.
Hockey, Ladies/Girls	Play each Wednesday from October 1 to March 31	Dale Currie, Coach (780)865-4738. 365 Skogg Avenue, Hinton, AB, T7V 1A8
Hockey, Hinton Ladies' Recreation		Sonja Ames (780) 865-4847. 537 Boutin Avenue, Hinton, AB T7V 1Z5

Jack Rabbits	Cross-country ski program ages 5 to 16 years. Meet Saturdays 11:00am to 1:00pm at the Nordic Centre.	Maria Koeld (780) 865-1240. 107 Talbot Drive, Hinton, AB, T7V 1M2
Jasper/Hinton Alpine Ski Team	The team promotes ski development for skiers interested in exploring the basics of ski racing up to senior level FIS racers. A variety of levels of entry are available for ages 8 to 18. Monthly meetings for parents, and ski programs run from December to April.	Chris Zarski, President (780) 817-2572. 117 Huisman Crescent, Hinton, AB, T7V 1H5
Karate Club, Hinton Wado Kai	Offered Monday and Wednesday evenings at Crescent Valley School Gym.	Rose Costacci (780) 865-4430 or Hugh Loughheed (780) 865-4630.
Kayaking and Canoers Club, Hinton Strokers	Kayak and canoe lessons, boat rentals, and trips.	John Holuk, President (780) 865-5431. Box 579A Switzer Drive, Hinton Ab, TZV 1GZ
Lacrosse, Hinton	Try out Canada's National Summer Sport. It is said to be the fastest game on two feet!	Bev or Christine Casemore (780) 865-1362.
Legion Dart Club, Hinton	Men play on Tuesday nights	Rob Lucas (780) 865-2965 or Legion Hall (780) 865-3116. 330 Mountain Street, Hinton, AB, T7V 1K9
Luge Association, Hinton	The luge runs summer and winter.	Cathy Jones (780) 865-2922. 161 Collinge Road, Hinton, AB T7V, 1L9

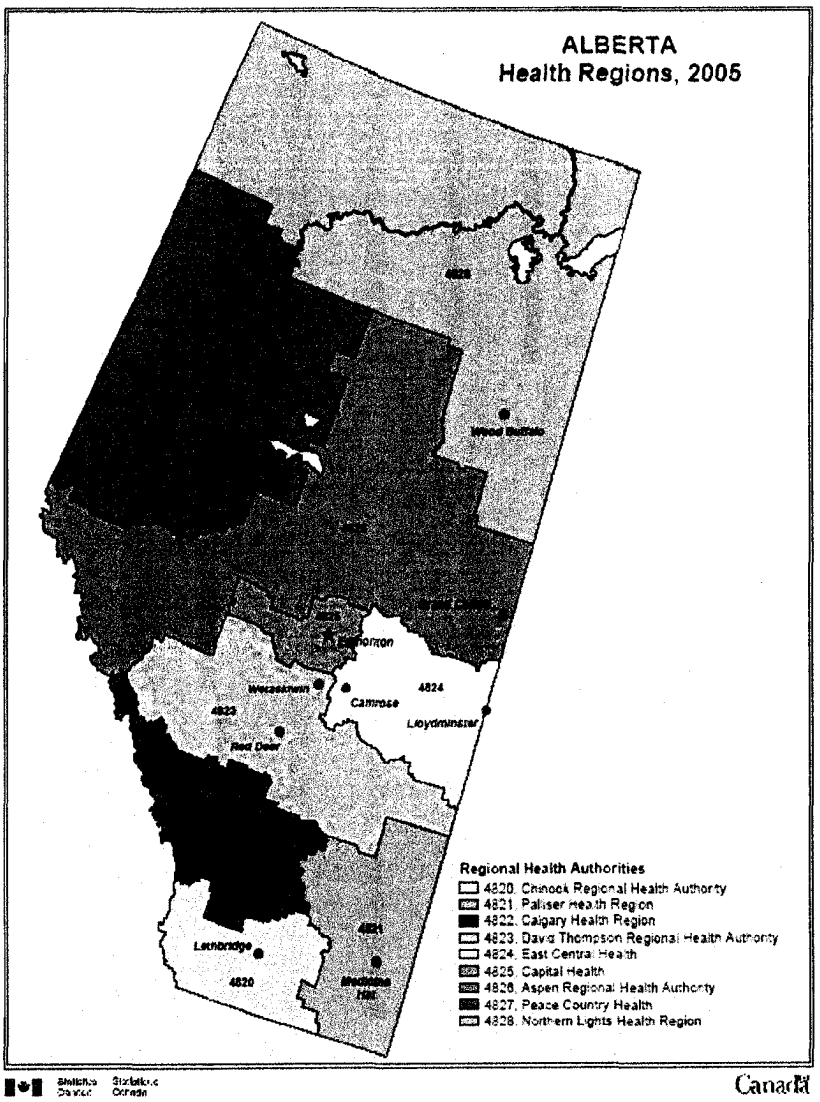
Minor Ball		Terry Bancroft (780) 865-7528. Box 5020, Hinton AB, T7V 1X3
Minor Football		Andrew Coreless (780) 865-5167. 120 Sornberger Place, Hinton, AB, T7V 1H6
Minor Soccer Association, Hinton	Outdoor soccer (April to June), and indoor soccer (October to February) - for children ages 6 to 18.	Roy Ellis, President (780) 817-2766
Motorcross Club		Iris Kowalski (780) 865-7649 or Rick Luc

		(780) 865-5094.
Nordic Skiers, Hinton	Cross-Country Skiing	Dave Schroeder (780) 865-1902. Box 6455, Hinton, AB, T7V 1X7
Ringette Association, Hinton	For boys and Girls ages 5 and older	Claire Reich, President (780) 865-3776.
Scuba Diving Club	The club meets Wednesdays at 5:00pm in the summer months, and once a month on Wednesdays in winter months.	Bryan Jones (780) 865-2922. 161 Collinge Road, Hinton, AB, T7V 1L9
Slo-Pitch League, Ladies	The emphasis for this league is on participation.	Rose Costucci (780) 865-4430. 123 Maple Dr., Hinton, AB T7V 1N5
Slo-Pitch League, Mixed		Terry Bancroft, President (780) 865-7528. Box 5020, Hinton, AB, T7V 1X3
Soccer, Ladies		Monika Braun (780) 865-5944. 185 Maligne Dr. Hinton, AB, T1J 1J5
Soccer, Men's		Gaetan Lapierre (780) 865-3306. 111 Sornberger Place, Hinton, AB, T7V 1H6
Studio One Dance Society	Classical ballet and contemporary dance lessons for ages 3 and up	Barb Laitres 865-2530
Swim Club, Hinton Water Devils	This club offers competitive swimming for kids ages 5 and up. The program runs from May to August	Rick Dallaire, President (780) 865-3739. Box 5115, Hinton, AB, T7V 1X3
Swim Club, Hinton Hammerheads	This new winter swim club offers competitive swimming and Special Olympics opportunities (for ages 6 to 18).	Contact Bill Sommerfeld, President (780) 865-4025.
Swim Club, Masters	This is an adult competitive swim club	Jan Munn (780) 865-3751. 385 Mountain Street, Hinton, AB, T7V 1K6
Tennis Club, Hinton Hitters	Have some fun and exercise with tennis!	Rod Sedrovic (780) 865-2532.
The Perfect Game	5 Pin Bowling Centre and Lazer Tag. Leagues for all ages	Smoking. 12 pm - 10 pm daily. Contact
Mountainview Triathlon& Duathlon		Grant Stewart, President (780) 865-1128. Website information and online registration at www.bearspray.com

Volleyball, Adult	Have some fun with recreational adult volleyball. Playing Mondays and Wednesdays at 7:00pm to 9:00pm (St. Gregory School).	Steve Desrochers (780) 865-7596. 102 Collinge Road, Hinton, AB T7V 1M2

Town of Hinton. (2007). Retrieved from http://www.town. hinton.ab.ca/siteengine/activepage.asp?Page ID=9

APPENDIX E: MAP OF ASPEN REGIONAL HEALTH AUTHORITY



Statistics Canada. (2005). *Health regions 2005, Maps.* Retrieved from http://www.statcan.ca/english/freepub/82-221-XIE/2005001/images/maps/alta_ alb.pdf . Reprinted with permission.

APPENDIX F: COMMUNITY PROGRAMS FOR PRESCHOOL-AGED CHILDREN

Program Name	Description	Organization and Contact Number
Head Start	Preschool program for those over 3 years of age. 30 spaces are designated for Aboriginal children	Hinton Friendship Centre, 865-5189
Little Buds Childcare and Learning Centre	Licensed for 60 children aged 16 months to 5 years	817-2837
Hinton Children's Learning Centre	Licensed for 40 children aged 13 months to 6 years	865-4750
Growing Adventures Preschool	For children 3 to 4 years old	865-2386
Children's Creative Play School Society	For children 3 to 4 years old	865-8838
Westview Family Day Homes	Registered dayhomes for childcare	865-4005
Children's Indoor Playground Society	Provides an outlet for moms and dada and young ones to get out – no childcare provided	865-2002
St. Gregory Catholic Junior Kindergarten		865-4555
Kinder- Adventures	Program run for kindergarten children after-school.	Boys & Girls Club 865-3208

Town of Hinton. (2006). *Hinton community directory.*

APPENDIX G: SURVEY QUESTIONS

ABOUT YOU AND YOUR FAMILY

This questionnaire should be completed by the person in the family who is *mostly responsible* for the care of your 3- to 5-year-old child.

The following questions will provide us with some information about you and your family. If relevant, please also answer for your partner where asked. The details you provide will be treated in the strictest confidence.

Q.1. How old are you? _____ years old

Q.2. What is your sex? (Circle the number beside *one* answer only)

1. Male
2. Female

Q. 3. How much do you weigh at the moment? (*without* shoes or clothes)

_____ kilograms **OR** _____pounds

Q.4. How tall are you? (*without* shoes)

_____ centimetres **OR** _____ feet and _____inches

Q.5. What is your *highest* level of schooling? (Circle the number beside *one* answer only)

1. Never attended school
2. Elementary school
3. Some high school
4. Completed high school
5. Technical or trade school certificate/apprenticeship
6. 2 years or less of university or college
7. University undergraduate degree or higher

Q.6. Do you have a full-time job or part-time job of any kind (either for payment or profit, or unpaid work in a family business)? (Circle *one* answer only)

1. No - I am retired
2. No – I am a student

3. No – I am a non-worker

4. No – I perform home duties

5. Yes

How many hours a week (in total) do you usually work in your job(s)?

_____ hours

Q.7. What is your current marital status? (Circle the number beside *one* answer)

1. Married

2. Common Law/Living together

3. Separated

4. Divorced

5. Widowed

6. Never married

If you have a partner, please answer the following questions, otherwise go to Q14.

Q.8. How old is your partner? _____ years old

Q.9. What is your partner's sex? (Circle the number beside *one* answer only)

1. Male

2. Female

Q.10. Please give your best estimate of how much your partner weighs at the moment? (*without* shoes or clothes).

If you are not sure, please ask him or her.

_____ kilograms **OR** _____ pounds

Q.11. Please give your best estimate of how tall your partner is? (*without* shoes) **If you are not sure, please ask him or her.**

_____ centimetres **OR** _____ feet and _____inches

Q.12. What is your partner's *highest* level of schooling? (Circle the number beside *one* answer only)

1. Never attended school
2. Elementary school
3. Some high school
4. Completed high school
5. Technical or trade school certificate/apprenticeship
6. 2 years or less of university or college
7. University undergraduate degree or higher

Q.13. Does your partner have a full-time job or part-time job of any kind (either for payment or profit, or unpaid work in a family business)? (Circle *one* answer only)

1. No - he/she is retired
2. No – he/she is a student
3. No – he/she is a non-worker
4. No – he/she performs home duties
5. Yes

How many hours a week (in total) does your partner usually work in his/her job(s)?

_____ hours

Q.14. How many adults aged 18 years or more currently live in your house? Don't forget to count yourself.

Write the number here: _____

Q.15. How many children aged under 18 years currently live in your house? (including the child in this study).

Write the number here:_____

Q 16. What was your total household income for the year 2006? (Circle the number beside one answer)

1.	Less than $10,000	7.	$50,000 to $59,999
2.	$10,000 to $14,999	8.	$60,000 to $69,999
3.	$15,000 to $19,999	9.	$70,000 to $79,999

4. $20,000 to $29,999
5. $30,000 to $39,999
6. $40,000 to $49,999
10. $80,000 or more

Q.17. How would you best describe your race or colour? (Circle the number beside one answer only)

1. White
2. Native/Aboriginal
3. South Asian
4. Black
5. Arab/West Asian
6. Filipino
7. South East Asian
8. Latin-American
9. Japanese
10. Korean
11. Other – Specify_____

Q.18. What is your relationship to the 3- to 5-year-old child participant in this study? (Circle the number beside one answer only)

1. Mother
2. Father
3. Grandparent
4. Foster Parent
5. Other:_____

Parental Perceptions of Healthy Weights

Q.1. Please indicate by circling the appropriate response, how you would classify your own weight at each of the time periods listed below. (Please circle only *one* response for each time period).

How would you classify your own weight in childhood (5 to 10 years)?	**Markedly Underweight**	**Underweight**	**Average**	**Overweight**	**Markedly Overweight**
How would you classify your own weight in adolescence?	**Markedly Underweight**	**Underweight**	**Average**	**Overweight**	**Markedly Overweight**
How would you classify your own weight in your 20s?	**Markedly Underweight**	**Underweight**	**Average**	**Overweight**	**Markedly Overweight**
How would you classify your own weight now?	**Markedly Underweight**	**Underweight**	**Average**	**Overweight**	**Markedly Overweight**

Q.2. Thinking about your 3- to 5-year-old child who is participating in this study:

What is his/her date of birth (day / month / year)? _____/_____/_____

How many older brothers/sisters does he/she have living in your house? _____

How many younger brothers/sisters does he/she have living in your house?_____

Does he/she have a twin/triplet living in your house? (please circle) Yes No

Q.3. Please answer the following questions only about the child who is in our study. Please circle *one* answer only for this question.

How concerned are you about your child becoming overweight?	**Unconcerned**	**Slightly unconcerned**	**Neutral**	**Slightly concerned**	**Concerned**

Q.4. Thinking only about the child who is in this study, please indicate by circling the appropriate response how you would classify your child's weight at each of the time periods listed below. Please circle only *one* response for each time period.

How would you classify your child's weight during the first year of life?	**Markedly Underweight**	**Underweight**	**Average**	**Overweight**	**Markedly Overweight**
How would you classify your child's weight as a toddler? (aged 1-3 years)	**Markedly Underweight**	**Underweight**	**Average**	**Overweight**	**Markedly Overweight**
How would you classify your child's weight now?	**Markedly Underweight**	**Underweight**	**Average**	**Overweight**	**Markedly Overweight**

Q.5. In your opinion, what are the signs that a child is becoming overweight?

_____

_____

_____

FAMILY FOOD ENVIRONMENTS

Q.1. For each of the following statements, please circle the response that best describes your answer. *(Please circle only one response per statement)*

Adult work schedules often make it difficult to have breakfast together	*Strongly Agree*	*Agree*	*Neutral*	*Disagree*	*Strongly Disagree*
Adult work schedules often make it difficult to have the evening meal together	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**

In our family, it is OK for the children to eat dinner separately from the adults	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The evening meal is usually a time when our family connects and talks with each other	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I am satisfied with how often my family eats the evening meal together	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Adults in the family want the television on during meal time	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Overall I am satisfied with my child's eating habits	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
What my child sees advertised on television has a strong influence on his/her eating habits	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
What my child's friends eat has a strong influence on his/her eating habits	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Q. 2. For each of the following statements, please circle the response that best describes your answer. *(Please circle only one response per statement)*

How often does your whole family sit down together for the evening meal?	Never	Once a month or less	2-3 times per month	1-3 times per week	4 or more times per week
How often would you buy fast foods (e.g. McDonalds, KFC, Dairy Queen) for the evening meal?	Never	Once a month or less	2-3 times per month	1-3 times per week	4 or more times per week
How often would your child have fast foods (i.e. McDonalds, KFC, Dairy Queen) for lunch?	Never	Once a month or less	2-3 times per month	1-3 times per week	4 or more times per week
How often does your 3- to 5-year-old child request food items advertised on television?	Never	Once a month or less	2-3 times per month	1-3 times per week	4 or more times per week
How often do you purchase food items advertised on television that your 3- to 5-year-old child requests?	Never	Once a month or less	2-3 times per month	1-3 times per week	4 or more times per week
How often does your 3- to 5-year-old child eat high-fat snacks (i.e. cookies, ice cream, french fries) while watching television, video tapes, DVDs, or playing electronic games?	Never	Once a month or less	2-3 times per month	1-3 times per week	4 or more times per week

How often does your 3- to 5-year-old child eat low-fat snacks (i.e. fruit, vegetables, yogurt) while watching television, video tapes, DVDs, or playing electronic games?	**Never**	**Once a month or less**	**2-3 times per month**	**1-3 times per week**	**4 or more times per week**

Q. 3. On average, how many times per day does your 3- to 5-year-old child eat fruits and/or vegetables? (Circle the number beside one answer only)

1. Less than 1 time per day
2. Between 1 and 3 times per day
3. Between 3 and 4 times per day
4. 5 or more times per day

ABOUT YOUR 3- to 5-YEAR-OLD CHILD'S PHYSICAL ACTIVITY PATTERNS

Q. 1. Does your 3- to 5-year-old child have any long-term conditions or health problems that prevent or limit his/her participation at play or in any other activity for a child of his/her age? (Please circle your response)

Yes No

Q. 2. In general, how would you describe your 3 to 5 year-old child's health? (Please circle one response)

Excellent	Very Good	Good	Fair	Poor

Q.3 Compared to other children of the same age and sex, would your child be: (please circle the number beside one answer only)

1. Much less physically active?
2. About as physically active?
3. Much more physically active?

Q. 4. Structured physical activity is defined as an activity that is lead by a parent or childcare provider. Examples of structured activities may include: dancing, playing hop scotch, ring around the rosie or throwing a ball. **Unstructured physical activity is defined as activities that are lead by the child.** Examples can include: running, playing on play structures etc.

For each of the following statements, please circle the response that best describes your answer.

(Please circle only one response per statement)

How often does your 3- to 5-year-old child engage in 60 minutes of structured physical activity? **(60 minutes can be achieved throughout the day by adding up time spent in different activities – i.e. 5 minutes of ring around the rosie plus 10 minutes of dancing etc.)**	**Never**	**Once a month or less**	**2-3 times per month**	**1-3 times per week**	**4 or more times per week**
How often does your 3- to 5-year-old child engage in 60 minutes of unstructured physical activity? **(60 minutes can be achieved throughout the day by adding up time spent in different activities – i.e. 5 minutes of running plus 20 minutes on play structures etc.)**	**Never**	**Once a month or less**	**2-3 times per month**	**1-3 times per week**	**4 or more times per week**

Q. 5. For each of the following statements, please circle the response that best describes your answer. *(Please circle only one response per statement)*

How often does your 3- to 5-year-old child swim/play in the pool during public/family swim times?	**Never**	**Once a month or less**	**2-3 times per month**	**1-3 times per week**	**4 or more times per week**
During the winter season, how often does your 3 to 5 year-old child skate at the recreation skating rink during public skating times and/or skate on an outdoor rink?	**Never**	**Once a month or less**	**2-3 times per month**	**1-3 times per week**	**4 or more times per week**
How often does your 3- to 5-year-old child go out for a walk with you or a child care provider for at least 15 minutes?	**Never**	**Once a month or less**	**2-3 times per month**	**1-3 times per week**	**4 or more times per week**

Q. 6. If your 3- to 5-year-old child has participated in organized sports in the past 12 months, please indicate by circling one or more responses below. (Please circle the number beside your response(s)

1. Swimming lessons
2. Skating lessons
3. Soccer
4. Alpine skiing lessons

5. Jack Rabbit – Nordic skiing lessons

6. Other – please specify: _____

Q. 7. What types of activities or programs would you like to see your community offer to encourage physical activity in children between 3 and 5 years of age?

_____

_____

_____

Q. 8. In your opinion, what is the biggest barrier to getting your 3- to 5-year-old child physically active?

_____

_____

ABOUT YOUR 3- to 5-YEAR-OLD CHILD'S SCREEN TIME HABITS

The following questions are about your child's television viewing, computer use, and electronic game use. For each of the following statements, please circle the response that best describes your answer *(Please circle only one number per statement)*.

EXAMPLE

If your child usually watches one hour of television in the morning and two hours of television later in the day or evening, your response would look like this:

0	½	1	1½	2	2½	(3)	3½	4	4½	5	5½	6 HOURS

Q.1. On a usual WEEK DAY, how many hours does your child spend watching <u>commercial</u> television?

0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6 HOURS

Q.2. On a usual WEEK DAY, how many hours does your child spend watching <u>non-commercial</u> television (e.g., Treehouse, CBC Kids)

0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6 HOURS

Q.3. On a usual WEEKEND DAY, how many hours does your child spend watching <u>commercial</u> television?

|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____| HOURS
0 ½ 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6

Q.4. On a usual WEEKEND DAY, how many hours does your child spend watching <u>non-commercial</u> television (e.g., Treehouse, CBC Kids)?

|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____|_____| HOURS
0 ½ 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6

Q. 5. Is there a computer in your home? (Circle your response)

Yes No

Q. 6. For each of the following statements, please circle the response that best describes your answer. *(Please circle only one response per statement)*

How often does your 3- to 5-year-old child spend time on the computer (playing games – includes educational games)?	**Never**	**Once a month or less**	**2-3 times per month**	**1-3 times per week**	**4 or more times per week**
How often does your 3- to 5-year-old child watch at least 30 minutes or more of cartoons or other programs on DVD or VHS?	**Never**	**Once a month or less**	**2-3 times per month**	**1-3 times per week**	**4 or more times per week**
How often does your 3- to 5-year-old child play hand held electronic games or plug in television games (e.g. Dora the Explore or Disney Plug and Play TV games)?	**Never**	**Once a month or less**	**2 -3 times per month**	**1-3 times per week**	**4 or more times per week**

Do you have any further comments you would like to make?

_____

_____

_____

THANK-YOU FOR YOUR TIME AND CO-OPERATION

PLEASE SEND THIS SURVEY IN THE REPLY PAID ENVELOPE ATTACHED TO

Mrs. Dawn Schroeder
182 Sutherland Avenue
Hinton, Alberta
T7V 1L6

Adapted from:

Campbell, K. J., Crawford, D. A., & Ball, K. (2006). Family food environment and dietary behaviors likely to promote fatness in 5-6 year old children. *International Journal of Obesity, 30*(8), 1272-1280.

Statistics Canada. (2006). *National Longitudinal Survey of Children & Youth Cycle 6 survey instruments 2004/2005 book 1 – Parent, child & youth.* Retrieved from http://www.statcan.ca/english/sdds/instrument/ 4450_Q2_V5_E.pdf

APPENDIX H: RECRUITMENT INFORMATION LETTER

Dear Parent/Guardian,

I would like to invite you to participate in a study titled: "Relationship of Sedentary Behaviour and Physical Activity Patterns to Certain Aspects of the Family Food Environment with the Risk for Overweight in 3- to 5-Year-Old Children in a Rural Environment." My name is Dawn Schroeder, and I am conducting this study through Lakehead University as a distance education graduate student in the Masters of Public Health Program.

The main purpose of this study is to assess for relationships among physical activity, screen time, and certain aspects of the family food environment with risk for overweight in 3- to 5-year-old children living in the rural town of Hinton, Alberta. The findings of this study may be used to support current community strategies to promote healthy habits in the early years or to develop new overweight/obesity prevention strategies.

As a volunteer participant, you will be asked to complete a questionnaire that will be mailed to your residence and to allow the researcher to weigh and measure your 3- to 5-year old child in this study at a time that is convenient for you.

If you are interested in learning more about this study, please contact the undersigned, Dawn Schroeder, at (780) 865-1902 **before September 19, 2007.**

Sincerely,

Dawn Schroeder, RN., BScN

APPENDIX I: CONSENT FORM

I, _____, have read and understood the covering letter of the study titled, "Relationship of Sedentary Behaviour and Physical Activity Patterns to Certain Aspects of the Family Food Environment with the Risk for Overweight in 3- to 5-Year-Old Children in a Rural Environment" by Dawn Schroeder, and I agree to participate.

1. I understand that my voluntary participation requires that I read and sign the consent form, complete the survey, and allow the researcher to weigh and measure the 3- to 5-year-old child study participant.

2. I realize that I may choose not to answer any or all of the questions and that I may choose to withdraw from the study at any time without any penalty. I also am aware that participation in this study has no apparent risk of physical or psychological harm.

3. I understand that the results may be used to support current community strategies to foster healthy habits in the early years or to develop new overweight/obesity prevention strategies.

4. I am also aware that the data I provide will remain confidential and anonymous, and will be securely stored at Lakehead University for 7 years and then shredded. And, as a voluntary participant, I may request a summary of the final report by contacting the researcher, Dawn Schroeder, after September 2008. I am also aware that I can contact the researcher, Dawn Schroeder, by e-mail at addschro@telus.net or by phone at (780) 865-1902, or the thesis supervisor, Dr. Darlene Steven, at (807) 343-8643 if I have any questions regarding the study.

Date: _____ Participant Signature:_____

Researcher Signature:_____

APPENDIX J: COVER LETTER TO POTENTIAL PARTICIPANTS

Dear Participant,

Thank you for volunteering to participate in a study titled, "Relationship of Sedentary Behaviour and Physical Activity Patterns to Certain Aspects of the Family Food Environment with the Risk for Overweight in 3- to 5-Year-Old Children in a Rural Environment". Dawn Schroeder, a Lakehead University distance education graduate student, is conducting this study.

The main purpose of this study is to assess for relationships among physical activity, screen time, and certain aspects of the family food environment with risk for overweight in 3- to 5-year-old children living in the rural town of Hinton, Alberta.

A secondary aim of this study is to assess for relationships among parental perception of healthy weights, family composition, parental weight, and socioeconomic status with risk for overweight in preschool-aged children. The findings of this study may be used to support current community strategies to promote healthy habits in the early years or to develop new overweight/obesity prevention strategies.

As a volunteer participant, you are asked to read and sign the enclosed consent form, complete the enclosed questionnaire, and consent to have the researcher weigh and measure the 3- to -5-year-old child in this study. The questionnaire may take up to 20 minutes to complete. The researcher will contact you within 2 weeks to answer any questions about the survey and to make an appointment to weigh and measure the child participant in this survey at a time that is convenient for you. All answers are accepted, you may choose not to answer any question, and you may withdraw from the study at any time without any penalty. Once you have completed the questionnaire and signed the

consent form, kindly return both forms in the enclosed stamped self-addressed envelope. The information from the questionnaire will be coded, analyzed, and securely stored at Lakehead University for 7 years and then shredded. Participation in this study has no apparent risk of physical or psychological harm.

The results of this study will be reviewed by the Lakehead Ethics Review Board Committee. The results will be shared with the Aspen Regional Health Authority, and an article will be prepared for publication. All responses will be kept confidential and will be reported anonymously in all reports and publications.

As a participant, you may request a summary of the report anytime after September 2008 by e-mailing the researcher, Dawn Schroeder, at addschro@telus.net

As a thank you for your valuable contribution to this study, participation in this study will make you eligible to enter a draw for $100.00. The draw will take place on December 15, 2007. If you have any questions concerning this study, please contact the researcher, Dawn Schroeder, at (780) 865-1902, or the thesis supervisor, Dr. Darlene Steven, at (807) 343-8643, or you can contact the Lakehead University Research Ethics Board at (807) 343-8283.

Sincerely,

Dawn Schroeder, RN., BScN