A Study of the Attitudes Toward Nutrition of Children and Their Parents

by

Charlotte Kassera

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Ann M Parsons

Ann Parsons, PhD

The Graduate School

University of Wisconsin-Stout

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The Graduate School
University of Wisconsin-Stout
Menomonie, WI

Author: **Kassera, Charlotte R.**

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ABSTRACT

Frequency of obesity is at an all-time high in the United States; the incidence of obesity among school-aged children has more than doubled over the past three decades. Many different factors affect the prevalence of obesity; one of these factors is attitude toward nutrition. This study looked for relationships between healthy eating attitude (HEA) with gender, age, and HEA of their parent(s) in children ages 6-11 attending two Menomonie, WI elementary schools. HEA data was collected from 42 children and 26 parents in 2006 and 62 children in 2009 using the Hearts N' Parks survey instrument. Mean total HEA for all children was 3.2 ± 0.19 out of a possible total score of 7.0; no significant difference was observed between mean of the 2006 and 2009 data or across genders. Mean HEA of 1st graders was statistically lower than the mean HEA of 3rd and 5th graders. No relationship was observed between the HEA of children and that of their

parent(s). Future studies are necessary in order to more thoroughly evaluate possible relationships between these factors.

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Chapter I: Introduction

> The 20th century saw remarkable and unprecedented improvements in the lives of the people of our country. We saw the infant mortality rate plummet and life expectancy increase by 30 years. Deaths from infectious diseases dropped tremendously, and improvements in medical care allowed many individuals with chronic disease to lead longer, fuller lives. Yet despite these and other successes, complex new health challenges continue to confront us. Overweight and obesity are among the most important of these new health challenges. Our modern environment has allowed these conditions to increase at alarming rates and become highly pressing health problems for our Nation. (U.S. Department of Health and Human Services, 2001, p. XI)

According to the World Health Organization (WHO), there were 1.6 billion people age 15 or older worldwide who were overweight in 2005; of those, at least 400 million people were obese. WHO projects that by the year 2015, there will be 2.3 billion overweight adults in the world, and over 700 million who are obese. Furthermore, in 2005 there were at least 20 million children under the age of 5 who were overweight (WHO, 2006). Once thought of as a problem only in wealthy countries, obesity is becoming more and more of an issue in low- and middle-income developing countries at the same time its prevalence is rising in developed countries. Obesity is sometimes seen along with malnutrition in the same individual, because foods that provide calories do not always provide necessary nutrition (Papas et al., 2007). The increasing prevalence of obesity in both adults and children is cause for great concern in societies around the world.

Obesity and overweight are known to be associated with increased risk factors for many chronic diseases, including cardiovascular disease and type 2 diabetes, as well as other adverse effects such as social stigmatization and depression. In overweight and obese children, signs of traditional adult diseases are being observed. Whitlock et al. (2005) have suggested that these weight-related complications of chronic disease will continue to become even more common among children. Childhood overweight and obesity have been linked with increased risk of premature death and disability in adulthood. Studies suggest that a large percentage of overweight or obese children continue to be overweight or obese into adulthood (Whitlock et al., 2005).

The consequences of obesity are felt economically as well; in the year 2000 costs of obesity were estimated to be $117 billion. This is quite an increase from the estimated $99 billion in costs attributable to obesity in 1995 (U.S. Department of Health and Human Services, 2001).

Overweight and obesity are caused by intake of energy in excess of energy expenditure, or in other words, calorie-rich diet and physical inactivity. What makes the etiology of obesity more complex, though, is that there are many other factors that influence the development of overweight and obesity, including those that are genetic, environmental, and behavioral. Studies of twins, families, and adoption have shown that obesity is highly heritable. However, it is unlikely that human genes have changed so much in the last century as to cause an increased prevalence in obesity of epic proportions (Wodarski & Wodarski, 2004).

While it is probable that genetics plays a role in the susceptibility of an individual to obesity, additional likely culprits of the obesity epidemic are changes in the built

environment and human behavior. Increases in urbanization, mechanization of many forms of work, family structure, community safety, recreational technologies, and changing modes of transportation all have contributed to an increasingly sedentary lifestyle. At the same time, energy-dense foods and large portion sizes have become more available to consumers, increasing the caloric intake of many individuals.

Research on reasons for increased prevalence of obesity is one strategy in addressing the problem. Focus has also been placed on both treatment and prevention of obesity. Obesity prevention is ideal; however, the growing prevalence of obesity means that for many, treatment is now the only option. Unfortunately, the complex etiology of obesity oftentimes makes treatment and prevention challenging (Yang et al., 2007).

Although prevention is the best option, methods of obesity interventions and treatment are continually being piloted and studied. Interventions have become increasingly popular in attempting to curb obesity prevalence, especially among children. These interventions include those that are school-based, community-based, and family-based. School-based interventions allow a large segment of the childhood population to be reached, while family-based and community-based interventions target environmental aspects as well. Behavioral counseling is an example of a type of intervention which may include behavior modification, special diets, and/or physical activity to help patients adopt and maintain healthy behaviors. Although little evidence exists for the benefit of any intervention plan over another as of yet, preliminary studies suggest that weight and health improvements are possible through the utilization of comprehensive obesity interventions. Suggestions by experts in the field include considering an individual's genetic makeup and family environment when tailoring prevention and treatment

programs for eating behavior (Yang et al., 2007). Understanding factors that influence weight status, including attitude toward healthy eating, can help in designing effective obesity interventions (Taylor et al., 2005). By identifying relationships between healthy eating attitude (HEA) and other variables, factors that affect HEA can be better understood and generalized to the population.

Statement of the Problem

Frequency of obesity is at an all-time high in the United States. By identifying healthy eating attitudes (HEA) of children and their parents, relationships between HEA and other factors can be better understood. This understanding can be incorporated into future treatment and prevention programs.

Research Questions

The following questions were asked by the researcher during the study and statistical analyses.

1. Is there a relationship between children's HEA and their gender?
2. Is there a relationship between children's HEA and their age?
3. Is there a relationship between HEA of children and those of their parent(s)?

Purpose of the Study

The purpose of this investigation was to document whether relationships exist between children's HEA with gender, age, and their parents' HEA in Menomonie, WI. Comprehensive data including anthropometric measures as well as survey responses had been previously collected by University of Wisconsin-Stout graduate students in fall of 2006 and spring of 2009 and had yet to be analyzed.

Assumptions of the Study

In this study, it is assumed that parents and children have completed the survey as truthfully, accurately, and completely as possible. In addition, it is assumed that the represented population that was assessed in 2006 is also represented by the pool of participants in 2009.

Definition of Terms

These terms are important for the reader; the definitions clarify their use in the remainder of the study.

At risk for overweight. In children, a BMI greater than or equal to the sex- and age-specific 85th percentile but less than the 95th percentile (Wang & Beydoun, 2007).

Body Mass Index (BMI). Weight in kilograms divided by height in meters squared, written BMI = kg/m^2 (Yang et al., 2007). This measurement is used to assess an individual's weight status in relation to healthy weight, overweight, and obesity (United States Department of Health and Human Services, 2000). For adults, a BMI of less than 18.5 kg/m^2 is classified as underweight, 18.5-24.9 kg/m^2 is normal weight, 25.0-29.9 kg/m^2 is overweight, 30.0-39.9 kg/m^2 is obese, and a BMI of equal to or greater than 40 kg/m^2 is classified as extremely obese (Yang et al, 2007).

Built environment. Aspects of a person's environment which have been human-made or modified, as opposed to naturally occurring aspects of the environment (Papas et al, 2007).

Calorie. The equivalent to a kilocalorie, the unit of measure used to measure the energy produced by food when metabolized in the body (United States Department of Health and Human Services, 2000).

Energy Expenditure. The amount of energy a person uses to be physically active, digest food, circulate blood, and breathe. Energy expenditure is measured in calories (Weight-control Information Network, 2007).

Healthy weight. A body weight that puts an individual at lower risk of weight-related health problems than an overweight or obese individual. For adults, a BMI $\geq$18.5 and <25 is considered to be a healthy weight (United States Department of Health and Human Services, 2000). For children, a BMI $\geq 5^{th}$ percentile and $<85^{th}$ percentile is considered to be a healthy weight (CDC, 2009b)

Hypertension. High blood pressure (United States Department of Health and Human Services, 2000).

Metabolism. All chemical processes that go on in the body to convert food eaten into energy that can be used by the body (United States Department of Health and Human Services, 2000).

Morbiditiy. Incidence of disease in a population (U.S. Department of Health and Human Services, 2001).

Obesity. Excess body fatness (Flegal et al., 2006; United States Department of Health and Human Services, 2000). According to Yang et al. (2007), an adult BMI of 30.0-39.9 kg/m^2 is classified as obese and an adult BMI of equal to or greater than 40 kg/m^2 is classified as extremely obese.

Overweight. Weight in excess of a weight standard for age and gender, which includes muscle, bone, fat, and water (Flegal et al., 2006; United States Department of Health and Human Services, 2000; Wodarski & Wodarski, 2004). According to Yang et al. (2007), an adult BMI of 25.0-29.9 kg/m^2 is classified as overweight. In children,

overweight is defined as a BMI greater than or equal to the sex- and age-specific 95th BMI percentile (Wang & Beydoun, 2007).

Physical Activity. Any form of body movement that substantially increases energy expenditure, whether it is exercise or daily activities including all forms of body motion such as fidgeting or pacing (United States Department of Health and Human Services, 2000).

Type 2 Diabetes Mellitus. Often referred to as Type 2 diabetes, this is the most commonly occurring form of diabetes mellitus. Type 2 diabetes mellitus results from insulin resistance and abnormal insulin action. Type 2 diabetes mellitus was previously referred to as adult-onset diabetes because it is more prevalent in adults, but its prevalence in overweight children and adolescents is increasing. (United States Department of Health and Human Services, 2000).

Limitations of the Study

This study was conducted in Menomonie, Wisconsin, a small rural city with a dominant white ethnic population. In addition, only two elementary schools were interested in participating in the study, which further reduced the sample size. These factors limit the extent to which the findings can be extrapolated for other, more varied demographic areas. Participation was on a volunteer basis, so some participants may have only completed certain parts of the survey, or not participated at all. In order for data collected through surveys to be accurate, the participants must have answered the surveys honestly and completely. Finally, a smaller number of parents completed the survey as compared to the number of children who completed surveys.

Methodology

This study involved collecting information from children and their parents at two Menomonie, WI elementary schools about their attitudes toward nutrition. Using the Hearts N' Parks survey, data was collected both in the fall of 2006 and the spring of 2009. Appropriate statistical analyses were conducted to look for relationships in the data.

Chapter II: Literature Review

Introduction

This chapter will include an overview of obesity in both adults and children, the prevalence of obesity, and reasons for the increased occurrence of obesity. Next, adverse effects of obesity will be discussed. The chapter will conclude with influences on children's attitudes toward nutrition, and an overview of various obesity treatments including interventions.

Obesity Overview

Obesity, in the simplest sense, results from an energy intake in excess of energy expenditure (World Health Organization, 2006; Cope et al, 2004). In general, it has been observed that obese individuals eat more and/or exercise less than individuals who are not obese (Wodarski & Wodarski, 2004). The imbalance of energy may differ from person to person and is impacted by genetic, environmental, and other factors (Weight-control Information Network, 2006) which include appetite, food preferences, metabolism, physical activity, and muscle fiber type and function (Cope et al., 2004).

Classification schemes for body weight are based upon BMI for children and adults. BMI, which stands for body mass index, is calculated using the following formula: BMI = weight (kilograms) / height (meters)^2. An adult BMI equal to or greater than 25 kg/m^2 and less than 30 kg/m^2 is classified as overweight, while an adult BMI equal to or greater than 30 kg/m^2 and less than 40 kg/m^2 is classified as obese (Wang & Beydoun, 2007; Yang et al, 2007). In adults, this classification system goes further to define a BMI of 40 or greater as extremely obese (Yang et al, 2007). At the other end of

the weight status spectrum, a BMI of less than 18.5 kg/m^2 is considered underweight (Yang et al, 2007).

BMI in children are not separated into defined groups; rather, they are compared to gender- and age-specific growth charts. The Centers for Disease Control and Prevention (CDC) have developed growth charts for children aged 2-19 years old using data collected nationally from the 1960s to 1994. A child's BMI is compared to children of the same gender and age to find where the child's BMI is compared to the reference value on the chart. In children, at risk for overweight is defined as equal to or greater than the 85^{th} percentile and less than the 95^{th} percentile, and overweight is defined as equal to or greater than the 95^{th} percentile (Wang & Beydoun, 2007).

Prevalence

According to the World Health Organization (2006), in 2005 approximately 1.6 billion people worldwide 15 years of age and older were overweight and at least 400 million aged 15 and older were obese. In addition, the organization projected that by the year 2015, worldwide about 2.3 billion adults will be overweight and more than 700 million adults will be obese.

Rates of obesity are increasing throughout the world, with prevalence highest in North America, the Middle East, Central Europe, and Eastern Europe (Henderson & Brownell, 2004). Obesity was once considered a problem only in high-income countries. Recently, however, overweight and obesity have dramatically been on the rise in low- and middle income countries, especially in urban settings (World Health Organization, 2006). Henderson and Brownell (2004) stated that in developing nations, obesity is sometimes occurring alongside of malnutrition, with these individuals having a greater

incidence of abdominal obesity which is associated with more risk factors for health problems. While obesity was once associated with wealthier segments of society, in many countries it is now becoming more closely linked with poverty and social exclusion (James, 2002).

Still, the Weight-Control Information Network (2006) reported that "the link between low socio-economic status and obesity has not been conclusively established, and recent research shows that obesity is also increasing among high income groups" (p. 3). Even when looking worldwide, no segment of the population seems to be safe from this epidemic (Wodarski & Wodarski, 2004).

Childhood obesity is increasing at rates even higher than those of adults (Henderson & Brownell, 2004). Societies throughout the world have seen an increase in childhood obesity, which suggests an inevitable future increase in adult obesity; it is estimated that approximately 40% of overweight children will become overweight adults (Cope et al., 2004). Wodarski and Wodarski foresee an even heavier population to come, stating conclusions that suggest 70-80% of overweight and obese children and adolescents will remain so after becoming adults (2004). According to Whitlock et al., "Obesity/overweight has been declared an epidemic and a 'public health crisis' among children worldwide due to an alarming increase in its prevalence" (2005, p. e125). According to the World Health Organization (2006), at least 20 million children worldwide under the age of 5 were overweight in 2005.

The Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System (BRFSS) monitors prevalence and trends of overweight and obesity, both nationally and by state, for individuals of all ages. In 2008 the system reported that,

in Wisconsin, 37.5% of all adults are overweight and 26.0% of all adults are obese (CDC, 2008). National statistics for 2008 indicate that 36.5% of all American adults are overweight, which is one percent less than Wisconsin's overweight prevalence (CDC, 2008). Nationwide, obesity prevalence is 26.6%, which is 0.6% higher than Wisconsin's obesity prevalence (CDC, 2008). Therefore, Wisconsin's overweight and obesity prevalence is quite similar to the current national prevalence. The CDC's NHANES 2003-2006 survey reported that nationally, 17.0% of children aged 6-11 were considered overweight, with a BMI ≥95% (CDC, 2009a). Data from a 2005 national survey found that 13.5% of children in Wisconsin were overweight, which is lower than the national prevalence (U.S. Department of Health and Human Services, 2008).

Reasons for Increased Occurrence

Generally speaking, the health status of Americans has improved over the last three decades. However, during this same time period, the number of overweight children has more than doubled (Cope et al., 2004). Genes do not change quickly enough to create a significant change in the short time period in which this increase has been observed (Wodarski & Wodarski, 2004). Although genes may relate to a person's susceptibility for obesity, their role will not be discussed here.

There is another factor that has considerably changed over the past century, however: the environment. The built environment may affect diet through an individual's access to food and the types of food accessible; the either limited or abundant access may be due either to geographic location of an individual in relation to food outlet, or because of the cost of food (Papas et al., 2007). It has been found that food cost often is considered more important to individuals than food availability, which has a negative

impact on risk of obesity; while healthier foods tend to cost more, energy-dense foods often cost less (Papas et al., 2007). Food is almost always available in American society, and this constant availability helped to shape our built environment to encourage behavior that increases risk of obesity. National surveys collected between the 1970s and 1990s have revealed patterns that are likely to increase risk of obesity such as increases in restaurant portion sizes, more frequent eating at fast food and other restaurants, increased consumption of soft drinks and snack foods, and an increase in total energy consumption (Wang & Beydoun, 2007).

An individual's built environment may affect their access to physical activity facilities as well. Limited access occurs in neighborhoods lacking accessible and connected sidewalks, other areas where it is unsafe to walk, and neighborhoods far from playgrounds and recreational facilities. With sprawling suburbs and increased reliance on vehicles for transportation, many communities have facilitated a decrease in total physical activity. An increase in physical activity is more likely in areas where the built environment encourages it with facilities such as playgrounds for children, recreational facilities, and better community designs with accessible and connected sidewalks or bike trails (Papas et al., 2007).

Adverse Effects

"Morbidity from obesity may be as great as from poverty, smoking, or problem drinking." (U.S. Department of Health and Human Services, 2001, p. 8). Overweight and obesity are associated with a plethora of risk factors in adults that typically intensify progressively as BMI increases (World Health Organization, 2006). While there is a difference between some excess weight, overweight, and obese, even moderate amounts

of weight gain can increase risk of death from comorbidities (U.S. Department of Health and Human Services, 2001). Level of risk also changes depending where upon the body the most fat is stored; fat stored intra-abdominally presents the greatest health risk (Henderson & Brownell, 2004; Weight-control Information Network, 2007). These risk factors include coronary heart disease, which is already the number one cause of death in the world, and type 2 diabetes, which has rapidly become a global epidemic (World Health Organization, 2006; Henderson & Brownell, 2004; Wodarski & Wodarski, 2004; U.S. Department of Health and Human Services, 2001).

Other increased risk factors associated with obesity include endometrial, colon, postmenopausal breast, and other cancers (World Health Organization, 2006; Henderson & Brownell, 2004; Wodarski & Wodarski, 2004; U.S. Department of Health and Human Services, 2001), musculoskeletal disorders (World Health Organization, 2006; Henderson & Brownell, 2004; Wodarski & Wodarski, 2004; U.S. Department of Health and Human Services, 2001), stroke (World Health Organization, 2006; Henderson & Brownell, 2004; U.S. Department of Health and Human Services, 2001), hypertension (Henderson & Brownell, 2004; U.S. Department of Health and Human Services, 2001), sleep apnea and other breathing problems (U.S. Department of Health and Human Services, 2001), high blood cholesterol (U.S. Department of Health and Human Services, 2001), dyslipidemias (Wodarski & Wodarski, 2004), reproductive problems in women (U.S. Department of Health and Human Services, 2001), increased surgical risk (U.S. Department of Health and Human Services, 2001), and a reduction in life span (Wodarski & Wodarski, 2004; U.S. Department of Health and Human Services, 2001).

Risk factors associated with childhood obesity are present as well. With the increased prevalence of childhood obesity, Whitlock et al. (2005) stated that "weight-related health consequences will become increasingly common among children" (p. e125). As a result of childhood obesity, morbidities that are often seen in adults are being seen more frequently in children and adolescents (Whitlock et al, 2005). An example of this is type 2 diabetes mellitus, which used to be called "adult-onset diabetes" (Flegal et al, 2006; Shaya et al, 2008; Tsiros et al, 2008; United States Department of Health and Human Services, 2000). In addition, childhood overweight and obesity are risk factors for pulmonary, orthopedic (Shaya et al, 2008; Whitlock et al, 2005), gastroenterologic, neurologic, and endocrine conditions, as well as cardiovascular risk factors (Shaya et al, 2008; Whitlock et al, 2005). Other risk factors with a higher prevalence in overweight children include insulin resistance (Whitlock et al, 2005), impaired glucose tolerance (Whitlock et al, 2005), increased blood pressure (Flegal et al, 2006; Shaya et al, 2008; Tsiros et al, 2008), and elevated blood lipid levels (Flegal et al, 2006; Tsiros et al, 2008). Although these health consequences do not appear in all obese children, most medical complications related to obesity and overweight do not become apparent for decades (Whitlock et al., 2005).

Adverse effects are not only those of a medical nature, but psychological, social, and economic as well. This is compounded by the fact that society tends to emphasize the importance of thinness (Neumark-Sztainer & Haines, 2004). According to the U.S. Department of Health and Human Services (2001), obese individuals are at risk of developing psychological disorders such as depression, and are also at risk of having psychological difficulties due to social stigmatization. Because society tends to

emphasize physical appearance, obese individuals may experience prejudice and discrimination when searching for jobs, at school, or in social situations (Weight-Control Information Network, 2006). Unfortunately, many adults and children alike hold the erroneous presumption that people who are overweight or obese are simply lazy or gluttonous; this can lead to feelings of peer rejection, shame, depression, lowered self-esteem, and stigmatization for overweight or obese adults and children (Weight-Control Information Network, 2006; Shaya et al., 2008).

Obesity is not only associated with direct health care costs for preventive, diagnostic, and treatment services, but also indirect costs such as the value of wages lost by those unable to work because of illness or disability as well as the value of future wages lost due to premature death (U.S. Department of Health and Human Services, 2001). In the year 2000 obesity added up to $61 billion in direct costs and $56 billion in indirect costs (U.S. Department of Health and Human Services, 2001). Henderson and Brownell (2004) stated that a "combination of serious sequelae and rapidly increasing prevalence means that obesity has become the single most expensive health problem in the United States, surpassing smoking and alcohol in its medical and financial impact" (p. 340). According to the U.S. Department of Health and Human Services (2001), treatment of type 2 diabetes, coronary heart disease, and hypertension make up most of the medical costs associated with obesity.

Shaping and assessment of attitudes

Formation of attitudes toward food and nutrition begin at an early age. Both genes and the environment are proposed to influence a child's diet in their early years and beyond, but because parents are usually the ones creating a child's environment in the

early years, it is hard to clearly separate and define the interactions of these two factors. Repeated exposure to a new food is often necessary for a child to like a food. If a child's environment does not provide opportunities to learn to like vegetables or whole grains, the child is not likely to choose these foods—particularly if repeated exposure to an environment promoting high fat and energy dense foods is part of the child's built environment.

Additionally, parental use of food as a means to get a reward, such as eating broccoli before being able to play, results in negative attitudes toward those foods. Conversely, when food is used as a reward, such as cookies after a child cleans up their room, the result is a positive attitude toward the food used as a reward.

Feeding practices have also been shown to play a role in children's attitudes toward nutrition. Two studies have found that children whose parents use food restriction on their children eat more when placed in an unrestrictive setting, while children whose parents use less food restriction on their children were responsive to internal cues of hunger and satiety when placed in an unrestricted setting. Therefore, parental control regarding nutrition is likely to influence the attitudes toward nutrition of their children (Birch, 1998).

Because attitude is subjective, it can be difficult to assess. Various measurements of attitude have been applied (Anderson et al., 2007; Lee et al., 2005; McCoach, 2002; Tait & Purdie, 2000). A French study of 1,000 children used trained interviewers and a structured questionnaire to assess attitudes of children and their parents, asking questions such as whether the interviewee agreed to the statement "you can eat whatever you want" (Bellisle et al, 2000, p.107). Another study on attitudes of nutrition with 7th and 8th

graders asked whether the participant had a positive attitude or a negative attitude toward a food item (Bordi et al, 2005). These surveys, as well as the Hearts N' Parks survey, also include components used to assess nutrition knowledge and behavior.

Interventions

Because the obesity epidemic affects many individuals and various aspects of quality of life, is important for communities, families, and individuals to take action and reduce their health risks. Although overweight and obesity prevention is optimal, there are many treatment options available for those who have excess weight. Surgical procedures such as gastric bypass or gastric banding, pharmacological agents, dietary interventions, physical activity regimens, behavioral therapy, and combined lifestyle approaches have all been used to various effects (American Dietetic Association, 2006; Papas et al., 2007; Shaya et al., 2008; Tsiros et al., 2008; Whitlock et al., 2005).

Numerous intervention approaches have been piloted; whether the setting is community-based, family-based, or school-based, the interventions usually involve a combination of lifestyle changes including reduced energy intake, increased physical activity, decreased sedentary activity, and promoting family involvement (American Dietetic Association, 2006; Tsiros et al., 2008). While these intervention approaches have been used in both adults and children, children seem to be more easily motivated to modify their lifestyles, perhaps because their habits are not well-conditioned yet (Tsiros et al., 2008). Community-based interventions may take the form of group therapy or camps (Tsiros et al., 2008), or may involve changing the built environment of the community to make it more inductive to physical activity (Papas et al., 2007). Family-based interventions bring together children and their parents to work toward common

goals of behavioral modification of both diet and physical activity (Jiang et al., 2005). School-based interventions are often utilized for children, because a great deal of their day is spent at school; school-based interventions often involve a child's parent(s) to some extent as well, as they are usually responsible for procuring food the child eats at home (Shaya et al., 2008). As children spend a great deal of time at school, many adults spend a great deal of time at work. For adults, worksite health promotion programs may include interventions to increase physical activity and healthy eating; these programs can contribute to a reduction in health care costs, which make them lucrative to both employees and their employers (United States Department of Health and Human Services, 2000).

Conclusion

Many factors affect weight status and risk of obesity; attitude toward nutrition is one of these factors. Understanding these factors and their relationships with one another can help to design more effective obesity intervention strategies in the future.

Chapter III: Methodology

Frequency of obesity is at an all-time high in the United States. By identifying and understanding the HEA of parents and children, programs for obesity intervention can be targeted, implemented, and carried out more effectively. This chapter will include an overview of the methodology used in conducting this study, including subject selection and description, instrumentation, data collection procedures, data analysis, and limitations.

Subject Selection and Description

Prior to data collection in 2006 and 2009, approval from the UW-Stout Institutional Review Board was sought and approved (Rasmussen, 2007; Samz, 2009). Descriptions of consent forms and subject selection are described in detail in these references. The population selected was students in elementary schools in Menomonie, WI. The sample size was 104 students in grades 1, 3, and 5; 42 students were surveyed in fall of 2006, and 62 were surveyed in spring of 2009.

Instrumentation

The Hearts N' Parks survey was used to assess attitudes toward nutrition of both children and their parents (Appendices A and B). The Hearts N'Parks survey is available in age appropriate forms (child, adolescent, parent) and was used by the National Blood, Lung, and Heart Institute (NHLBI) for its Hearts N' Parks program. The child Hearts N'Parks survey is based primarily on the Child and Adolescent Trial for Cardiovascular Health (CATCH) instruments, while the adult Hearts N'Parks survey is based on several different instruments including the CDC's BRFSS and NHLBI materials (National Recreation and Park Association, 2004).

The Hearts N' Parks child survey questions have pictures associated with answers, which facilitates use for the age range of 6-11 years. This survey includes questions relating to nutrition knowledge, behavior, and attitude as well as physical activity attitude and behavior. The data for this study is taken from the nutrition attitude category of the child survey, which consists of seven questions asking the child "What would you do?" with a choice between two possible answers: either a healthy food item, or an unhealthy food item (Appendix A). Answers were scored giving one point for a correct answer and zero points for an incorrect answer, for a possible high score of seven points. This survey was used to assess children's attitude toward nutrition in both the fall 2006 and spring 2009 data collections. Each child completed the survey on their own, with help from research assistants in reading the survey, if necessary. Teachers did not accompany children to the data collection area, and parents were not present because the data collection occurred during the school day.

During data collection in fall 2006, the Hearts N' Parks parent survey was administered to each child participant's parent(s) through the mail. Like the child survey, the parent survey consists of categories relating to nutrition knowledge, attitude, and behavior, as well as physical activity attitude and behavior. The parent data for this study is taken from the nutrition attitude section of the parent survey, which consists of questions 10.a.-f. and 11.a.-h. under the heading "Heart-Healthy Eating" (Appendix B). The six sub questions of number 10 ask parents to choose how important certain nutrition-related practices are to them, on a scale ranging from "very important" to "not important at all". Possible scores for each sub question ranged from 4 for "very important" to 1 for "not important at all". There is a total possible score for question 10

of 24 points. The eight sub questions of number 11 ask parents to what extent they agree to certain nutrition-related statements, on a scale ranging from "strongly agree" to "strongly disagree". Possible scores for each sub question ranged from 4 for "strongly disagree", which reflects a positive HEA, to 1 for "strongly agree", which reflects a more negative HEA. The question 11 score can be as high as 32, for a total possible combined HEA score of 76.

Data Collection Procedures

The Hearts N' Parks survey was administered to all children and parents agreeing (i.e. signing consent forms) to participate in the study. Data from children was collected at school, and coincided with anthropometric measurements. Parent surveys were sent home with children and then mailed back. Additional data collection procedures are described in detail in the theses of Diane Rasmussen (2007) and Kelly Samz (2009).

Data Analysis

Appropriate statistical analyses were run as indicated within the results section. Statistical analyses included independent t-tests, crosstabs, chi-square, and ANOVA. All results presented are means and standard errors. For the discussion section, mean percentage scores were calculated by dividing the total mean score by the total possible score for each item. All data was analyzed using the Statistical Program for Social Sciences, version 17.0.

Limitations

A major limitation was the fact that only two Menomonie elementary schools participated in the study; two elementary schools participated in the 2006 data collection, and only one of those elementary schools participated again in the 2009 data collection.

This resulted in a total of 42 child participants in 2006 and 62 child participants in 2009. Furthermore, parent participation in completing the adult version of the Hearts N' Parks survey (Appendix B) was limited to 2006, and resulted in a total of 26 completed parent surveys. More participation of both children and parents would increase confidence in interpreting data and inferring findings to the population.

Data was collected in a rural, Midwestern area with a small sample size; this limits the extent to which the results can be extrapolated to other populations. Although it would be inappropriate to apply the results from this study to other populations, the results are reflective of rural communities in general.

Chapter IV: Results

This chapter will include results of the data collected from the participants using the Hearts N' Parks survey. Demographic information for the participants will be presented, as well as the results of each research question investigated.

Item Analysis

During the fall of 2006 and the spring of 2009, data was collected from a total of 104 elementary students at two elementary schools in Menomonie, WI using the Hearts N' Parks survey. These students were volunteered by their parents to participate in each study. Of the 104 participating students, 40.4% (n=42) were surveyed in fall 2006, and 59.6% (n=62) were surveyed in spring 2009. Based on gender, the child participants were 43.3% (n=45) male, and 56.7% (n=59) female. The students were predominantly Caucasian. The children were all in grade 1 (n=40), grade 3 (n=48), or grade 5 (n=16); corresponding ages for these grade levels are typically 6-7 years for grade 1, 8-9 years for grade 3, and 10-11 years for grade 5. The children ranged in age from 6-11 as indicated by Table 1.

Table 1

Age of Participating Children

Age in years	n	%
6	13	12.7%
7	24	23.5%
8	25	24.5%
9	21	20.6%
10	12	11.8%
11	7	6.9%

Total Healthy Eating Attitude (HEA) scores were determined by the number of correct answers in the HEA section of the Hearts N' Parks survey. Total scores were determined for the two years combined (n=104) and separately for fall 2006 participants (n=42) and spring 2009 participants (n=62). The mean total score of 2006 and 2009 combined was 3.2 ± 0.19. The mean HEA score of fall 2006 participants was 3.6 ± 0.28, while the mean HEA score of spring 2009 participants was 3.7 ± 0.22; these results are not statistically significantly different. No significance was observed with t-tests on raw data, or when data was grouped into pass/fail categories with the criteria of scores from 0-4 representing the "fail" group, and scores from 5-7 representing the "pass" group. Frequencies of individuals meeting this pass/fail criteria were analyzed using chi-square, and the number of people who passed was not significantly different than the number of people who failed.

Is there a relationship between children's HEA and their gender?

Total HEA scores and independent sample t-tests were determined separately for male and female fall 2006 participants and male and female spring 2009 participants, and then determined for 2006 and 2009 participants combined.

Mean HEA of male 2006 participants (n=17) was 3.2 ± 0.47, while mean HEA of female 2006 participants (n=25) was 3.9 ± 0.34; these results are not statistically different when analyzed with an independent samples t-test. Mean HEA of male 2009 participants (n=28) was 3.4 ± 0.26, while mean HEA of female 2009 participants was 3.9 ± 0.33; these results are also not statistically different. Total mean HEA score of all male participants in 2006 and 2009 combined (n=45) was 3.3 ± 0.24, while 2006 and 2009 combined mean score of all female participants (n=59) was 3.9 ± 0.24; not surprisingly, these results are not statistically different. An analysis using a 2x2 ANOVA between the two years and the two genders found no statistically significant results within or between any of the variables. Analyses of frequencies of males versus females that passed/failed using crosstabs and chi-square found no statistically significant difference for 2006, 2009, or both years combined.

Is there a relationship between children's HEA and their age?

For these analyses, participants were grouped into their respective grade levels by age, where ages 6-7 are 1st grade, ages 8-9 are 3rd grade, and ages 10-11 are 5th grade. Mean HEA scores were determined for fall 2006 participants, spring 2009 participants, and all participants combined.

The combined mean HEA score of 1st graders (n=40) was 2.9 ± 0.23, combined mean HEA score of 3rd graders (n=48) was 4.1 ± 0.25, and combined mean HEA score of

5th graders was 4.3 ± 0.43. These results, presented in Figure 1, show that the overall mean HEA score of 1st graders was statistically lower than the mean HEA score of both 3rd and 5th graders.

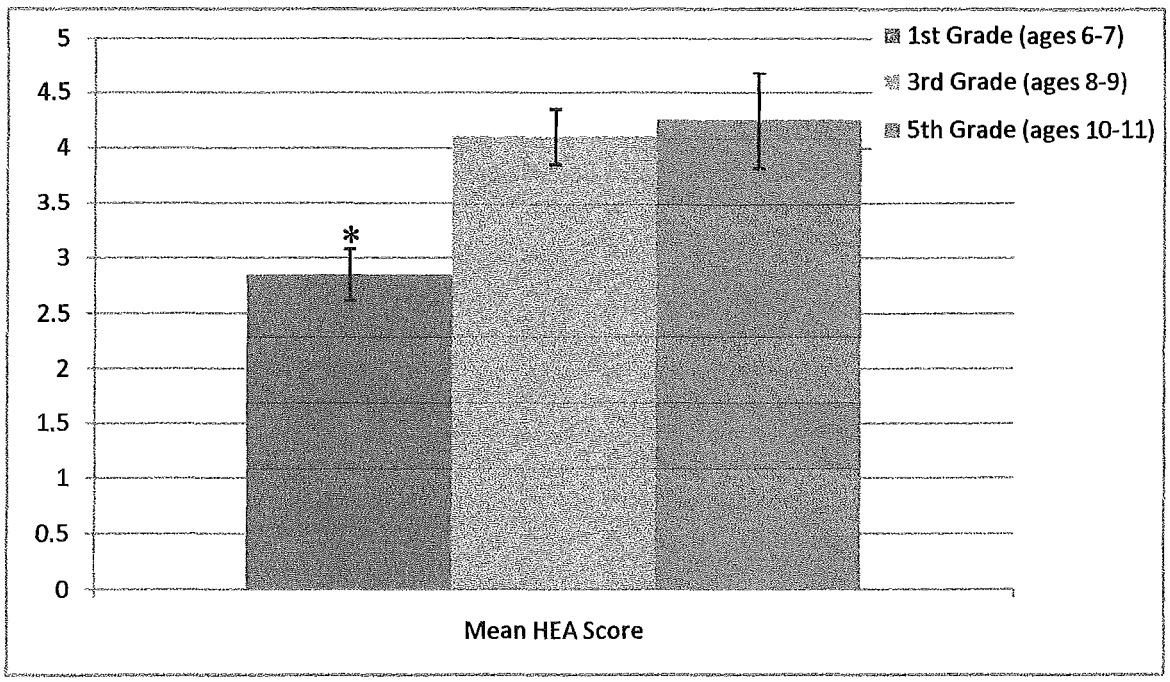

Figure 1. *2006 & 2009 combined mean HEA score by grade.*
* significantly different from 3rd and 5th graders, $p<0.05$, one-way ANOVA

Is there a relationship between HEA of children and those of their parent(s)?

There was not enough data collected on the HEA of parents and children in 2006 to answer this research question using statistical methods. However, the data can be presented as a scatter plot (Figure 2). The R^2 value for this relationship is 0.0008, which indicates there is no relationship between the HEA of children and that of their parents. Parent and corresponding child data was only used from the 2006 data collection; parent data using the Hearts N' Parks survey was not collected in 2009.

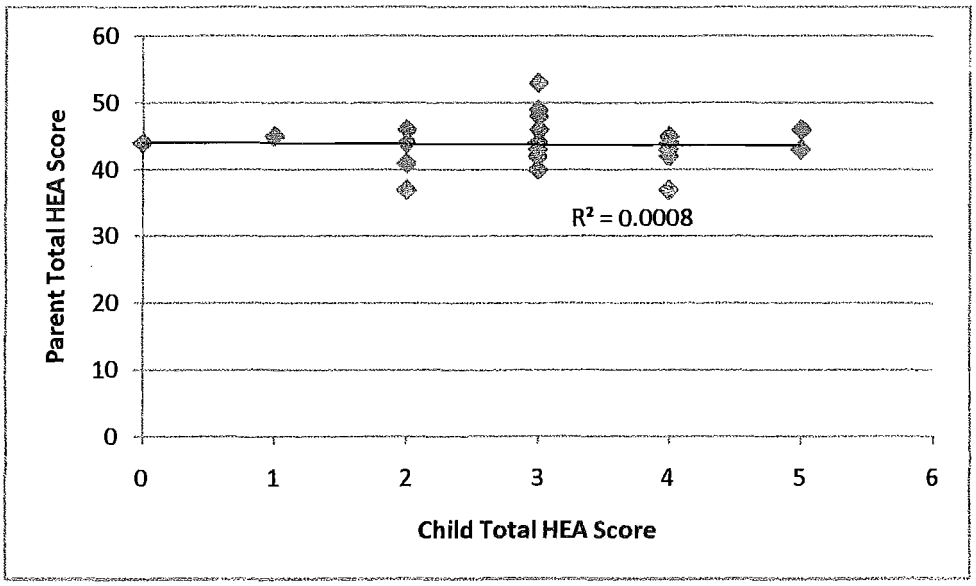

Figure 2. *2006 Child HEA vs. Parent HEA.*

Chapter V: Discussion

This chapter contains the comparison and discussion of data collection and the relationship to other findings. Recommendations for further study in the area of child and adult obesity will conclude this chapter.

Limitations

A major limitation of this study was participation. Two Menomonie elementary schools participated in the fall 2006 data collection, and one of those schools participated in the spring 2009 data collection. As a result, 42 children participated in fall 2006 and 62 children participated in spring 2009 for a total of 104 child participants. Parent participation was even lower, with a total of 26 parents participating in fall 2006. Parent data was not collected in 2009. Greater participation in the study would increase confidence in interpreting results.

Another limitation is the extent to which the study results can be extrapolated to other populations. The study was carried out within Menomonie, WI which is a rural Midwestern area; therefore, the results should be reflective of rural communities in general, but not other populations.

Conclusions

This study used the Hearts N' Parks survey, and so results from this study were compared to results from the Hearts N' Parks pilot studies (National Recreation and Park Association, 2004). Hearts N' Parks pilot studies ran from 2002-2004 with a total of 2,066 child participants and 850 adult participants. The child participants in this study were 43.3% male and 56.7% female; the Hearts N' Parks participants were 49.1% male

and 50.9% female. There were age differences between the two populations as presented in Table 2.

Table 2

Age Comparison of Participants

Age Group	Hearts N' Parks*	Menomonie
Less than 6 years old	7.7%	0%
6 & 7 years old	20.3%	36.2%
8 & 9 years old	35.9%	45.1%
10 & 11 years old	36.1%	18.7%

* Data taken from the Hearts N' Parks—Report of 2004 Magnet Center Performance Data (National Recreation and Park Association, 2004)

Hearts N' Parks reported their results as mean percentage scores; for purposes of comparison, results of this study will be discussed as mean percentage scores as well. When considering the total percentage of healthy answers in the nutrition attitude portion of the Hearts N' Parks survey, children participating in Menomonie chose the healthy choice 51.4 ± 4.01% of the time in 2006 and 52.5 ± 3.11% of the time in 2009. The overall mean for the two years was 52.1 ± 2.66 %. These mean scores are slightly higher than those of the Hearts N' Parks pilot study, in which children chose the healthy choice 50.6% of the time. These findings suggest that children in Menomonie, WI have a comparable HEA to children nationwide; however, statistical analysis was not conducted.

Interestingly, the trend observed in Menomonie indicates that as children get older their attitude increases. This is different from the results observed in the Hearts N' Parks

pilot study. The Hearts N' Parks pilot study grouped children into two age groups for data analysis: 10-11 years of age, and 9 years and younger. When results were analyzed using this age grouping, child participants in Menomonie ages 10-11 years chose the healthy choice $54.9 \pm 6.11\%$ of the time as compared to the 10-11 year olds in the Hearts N' Parks pilot study, who chose the healthy choice 49.6% of the time. Considering the variability in the current data, it is unlikely that there is a significant difference between the two sets of data. However, a difference could be attributed to the differences in age distribution between the two populations, as the Hearts N' Parks pilot study had a higher percentage of children in the 10-11 age group than the Menomonie study. It is also possible that this could be attributed to differences in nutrition education practices for children in different areas of the United States. Child participants in Menomonie ages 9 years and younger chose the healthy choice $51.6 \pm 2.74\%$ of the time, which is comparable to the Hearts N' Parks pilot study in which children ages 9 and younger chose the healthy choice 51.1% of the time.

In Menomonie, a relationship was observed between HEA and age, as the HEA of 1st graders was found to be statistically significantly lower than the HEA of both 3rd graders and 5th graders. This may be reflective of the children's nutrition knowledge; a study of the same cohort of children found that 1st graders have a significantly lower knowledge of nutrition than 3rd graders and 5th graders (Samz, 2009). Although attitude and knowledge are two separate entities, these results suggest that nutrition knowledge may influence a child's attitude toward nutrition. In contrast with HEA and age, no relationship was found between children's HEA and their gender; this is consistent with results from the Hearts N' Parks pilot study.

In Menomonie, parents chose the healthy choice 57.6 ± 4.63% of the time; this percentage is lower than results from the Hearts N' Parks pilot study, in which adults chose the healthy choice 75.3% of the time. This difference could be attributed to variation in nutrition education background or other demographic factors. This difference could also be due to great inequalities in sample size for the two studies; the Menomonie sample size was 26 adults, while the Hearts N' Parks pilot study sample size was 850 adults.

Recommendations

Several recommendations can be made to improve studies similar to this one. First, greater participation is needed from both children and parents in order to increase confidence in interpreting results, generalizing results to the population, and to allow for comparison between gender, age, and children and parents. Greater participation in multiple Menomonie schools would allow for comparison between different schools as well. In addition, a longitudinal study of children in the school district would be beneficial, as this would allow tracking of any changes in the nutrition attitudes, knowledge, and behavior of children, as well as anthropometric measurements over time.

Although the adult Hearts N' Parks survey provided some baseline attitude information about the parents, additional information would have been helpful in order to more accurately assess the extent to which the parents' and children's attitudes are related. Parents can influence a child's HEA in many ways, including the groceries and food they purchase for themselves and the child (Shaya et al., 2008), their feeding practices, and the overall environment they create for the child related to nutrition (Birch,

1998). Knowing more about these types of factors can help to paint a better picture of what, if any, relationships exist between a child's HEA and that of their parent(s).

Finally, anthropometric measurements, such as those performed by Rasmussen and Samz in each of their data collections, add depth to the data and provide another measurement to correlate with HEA. It can be beneficial to know a child's HEA, but knowing what that means in relation to weight status forms a more complete picture of what HEA really means. Anthropometric data was collected at the same time as the HEA data analyzed in this study, but was not analyzed for this thesis. Methodology for both survey and anthropometric data collection used by Rasmussen and Samz could serve as a model for similar studies in the future (Rasmussen, 2007; Samz, 2009).

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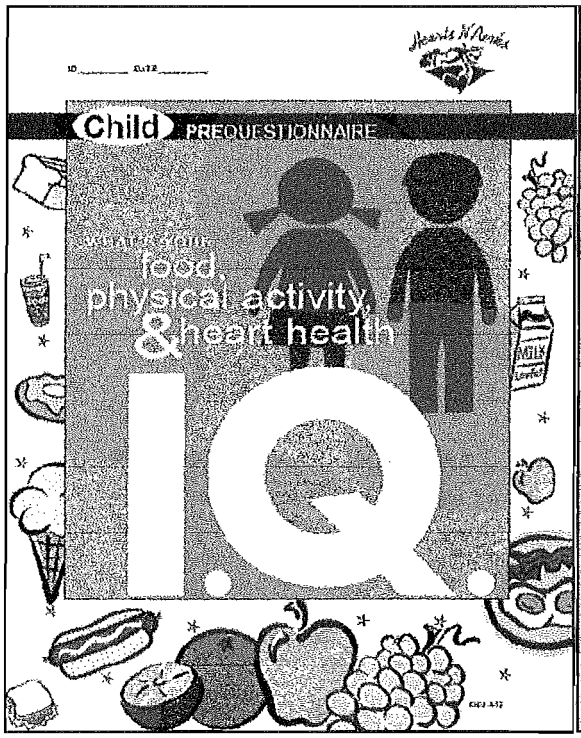
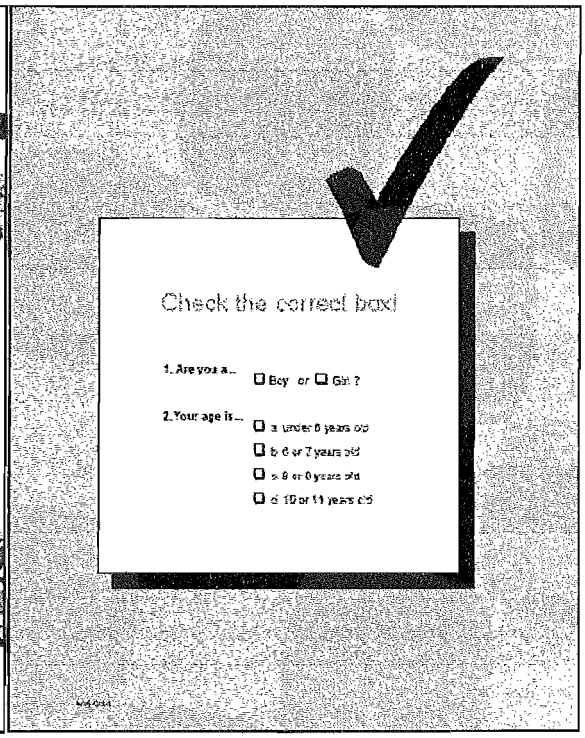
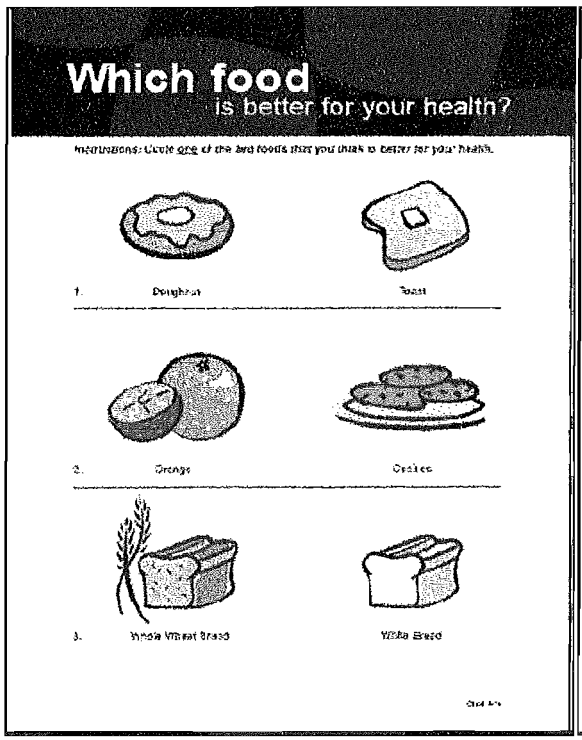
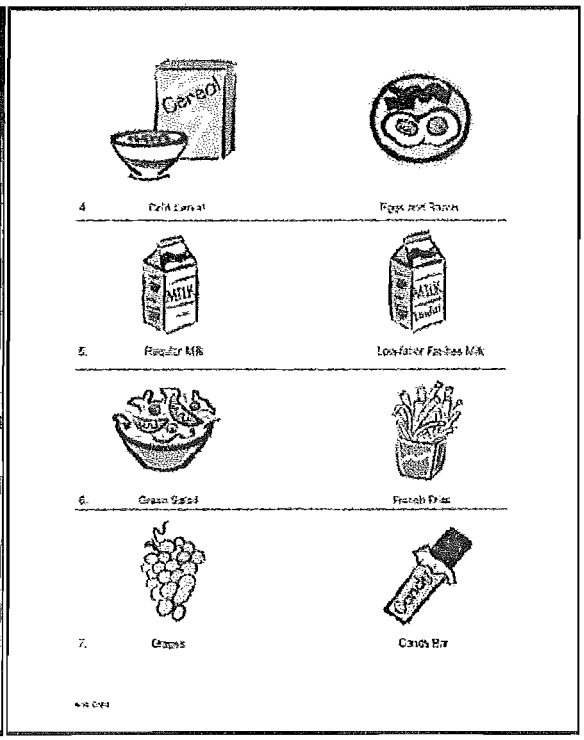
Appendix A: Child Hearts N' Parks Survey


ID _____ Date _____
Child PREQUESTIONNAIRE
food, physical activity, & heart health
IQ


Check the correct box!
1. Are you a... ☐ Boy or ☐ Girl ?
2. Your age is...
☐ a. under 6 years old
☐ b. 6 or 7 years old
☐ c. 8 or 9 years old
☐ d. 10 or 11 years old


Which food
is better for your health?
Instructions: Circle one of the two foods that you think is better for your health.
1. Doughnut
Toast
2. Orange
Cookies
3. Whole Wheat Bread
White Bread


Cereal
4.
Eggs and Bacon
5. Regular Milk
Low-fat or Fat-free Milk
6. Green Salad
French Fries
7. Grapes
Candy Bar

What foods **do you eat** most of the time?

Instructions: Circle one of the two foods that you eat most often.

1. Baked Potato

French Fries

2. Fruit Juice

Soda

3. Cookies

Apple

4. Hot Dog

Sandwich with Lettuce & Tomato

5. Chocolate Cake

Orange

6. Ice Cream

Fresh Fruit Popsicle

7. Regular Milk

Low-fat or Fat-free Milk

What would **you do?**

Instructions: Answer each question by choosing one of the two foods.

1. If you were at the movies, which one would you pick?

Popcorn with salt and butter

Popcorn without salt and butter

2. If you were going to eat your lunch, which would you do?

Eat the food without adding salt

Shake salt on the food before eating

3. Which food would you put on your hamburger?

Ketchup

Tomato

4. Which would you pick to drink?

Regular Milk

Low-fat or Fat-free Milk

5. Which food would you eat for a snack?

Candy Bar

Fresh Fruit

6. Which food would you choose for dinner?

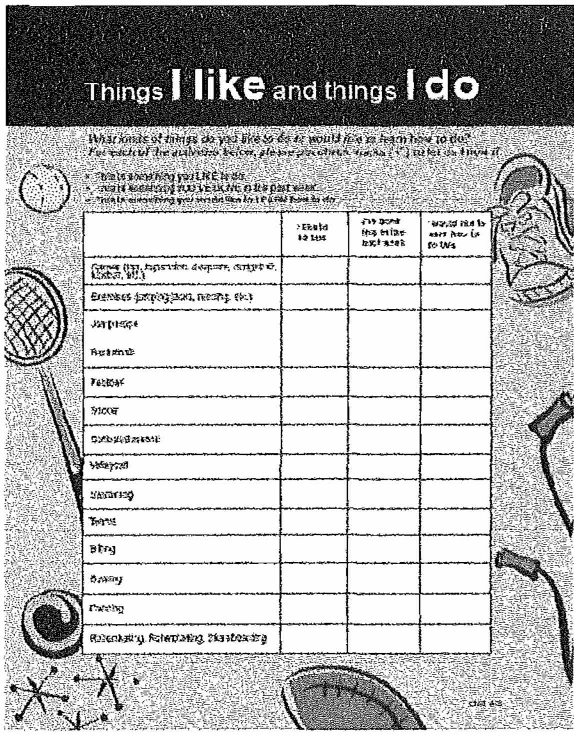
Baked Potato

French Fries

7. Which would you order if you were going to eat at a fast food restaurant?

Hamburger

Green Salad

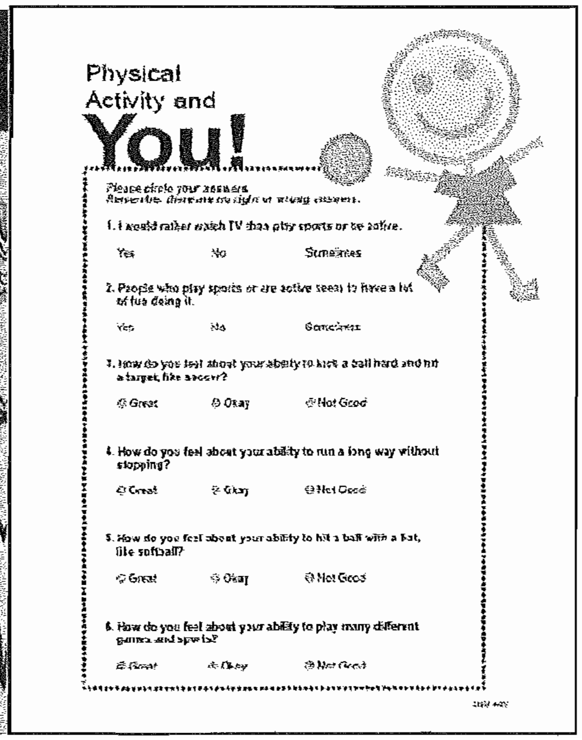


Things I like and things I do

What kinds of things do you like to do or would like to learn how to do?
[illegible]

[illegible]

	[illegible]	[illegible]	[illegible]
Games ([illegible])			
Exercises ([illegible], running, etc.)			
Jump rope Basketball			
Football			
Soccer			
Softball/baseball			
Volleyball			
Swimming			
Tennis			
Biking			
Bowling			
Dancing			
Rollerskating, Rollerblading, Skateboarding			



Physical Activity and You!

Please circle your answers.
Remember, there are no right or wrong answers.

1. I would rather watch TV than play sports or be active.

   Yes No Sometimes

2. People who play sports or are active seem to have a lot of fun doing it.

   Yes No Sometimes

3. How do you feel about your ability to kick a ball hard and hit a target, like soccer?

   Great Okay Not Good

4. How do you feel about your ability to run a long way without stopping?

   Great Okay Not Good

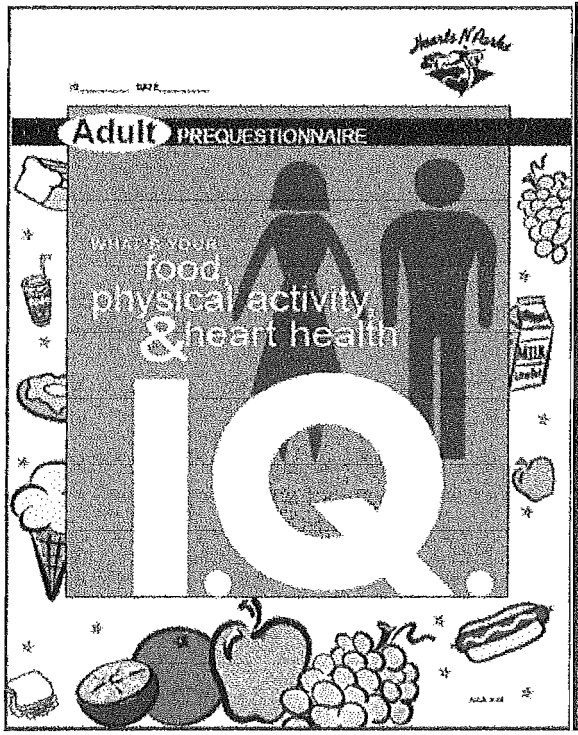
5. How do you feel about your ability to hit a ball with a bat, like softball?

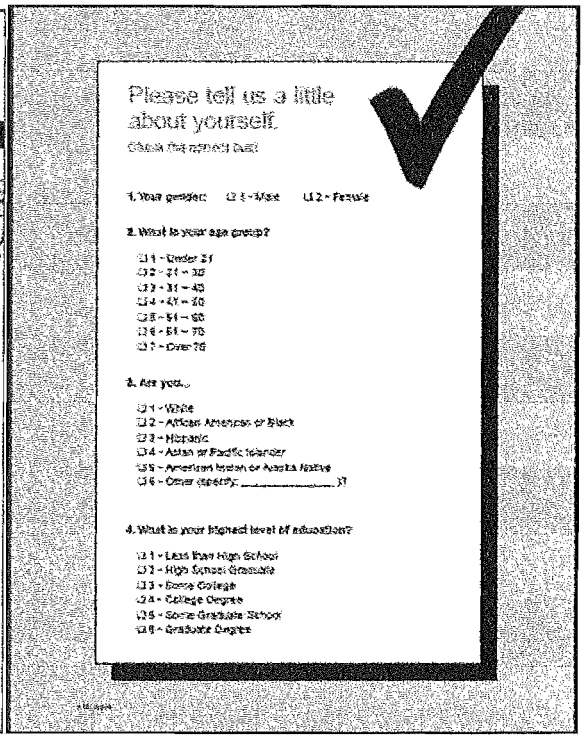
   Great Okay Not Good

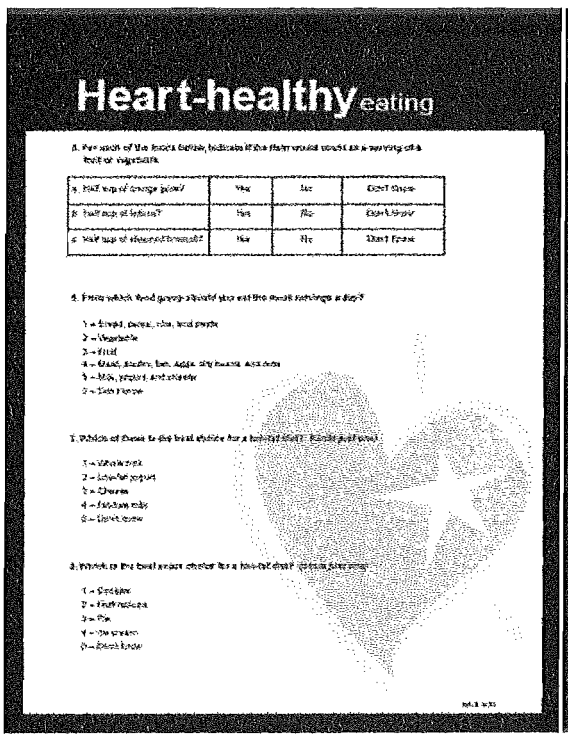
6. How do you feel about your ability to play many different games and sports?

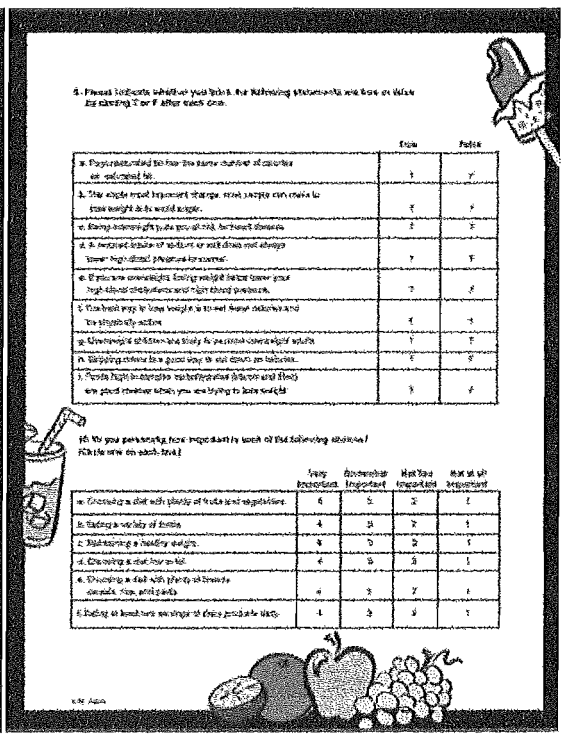
   Great Okay Not Good

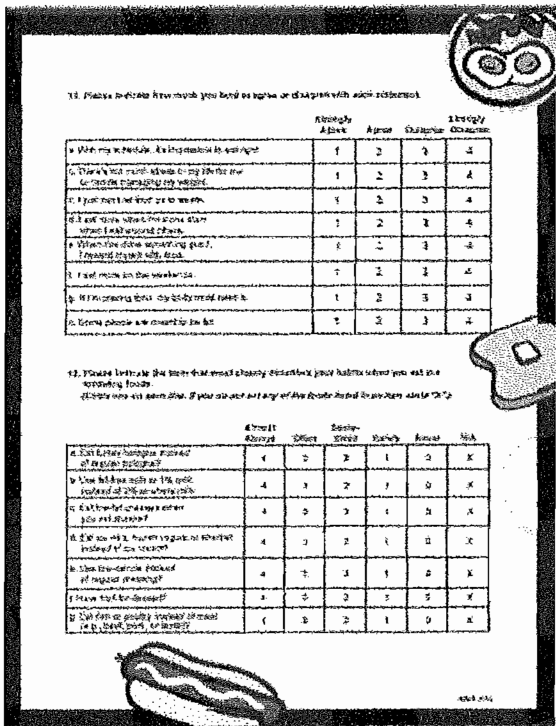
Appendix B: Adult Hearts N' Parks Survey

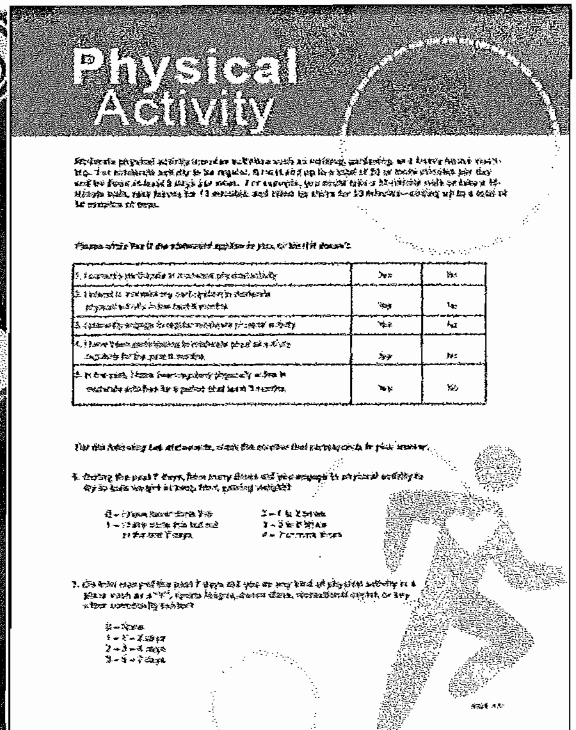

Adult PREQUESTIONNAIRE
What's your
food
physical activity,
& heart health
IQ

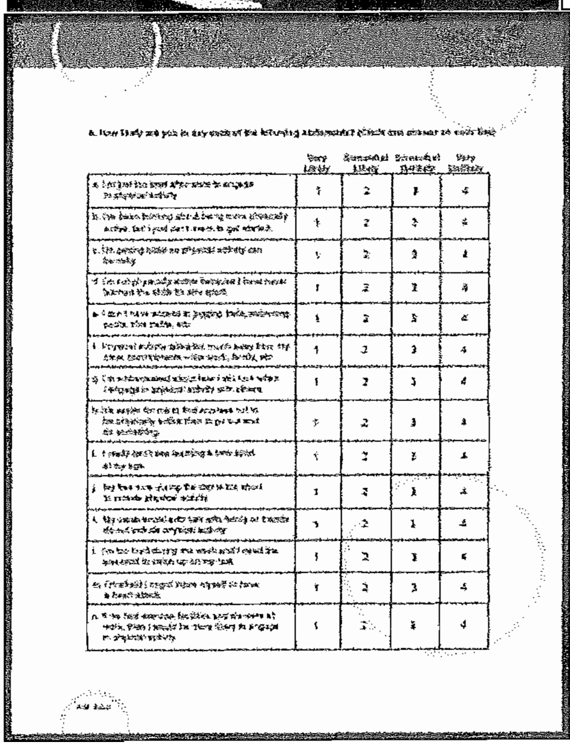

Please tell us a little about yourself.

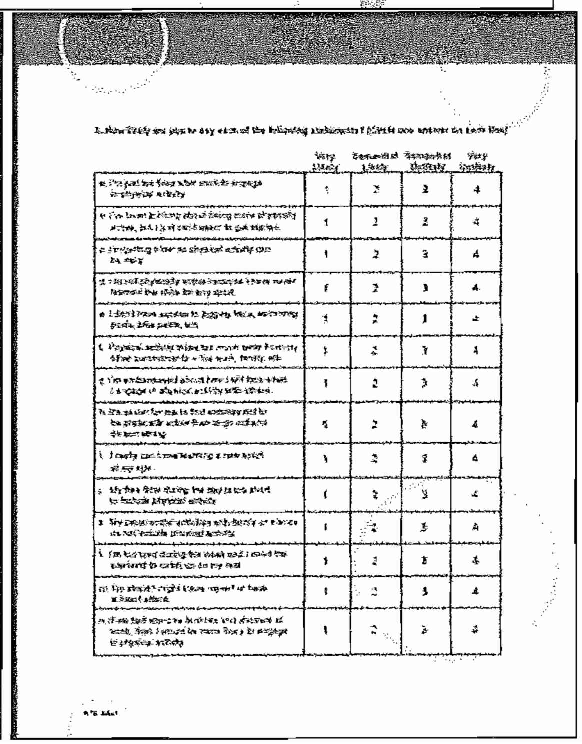

Heart-healthy eating

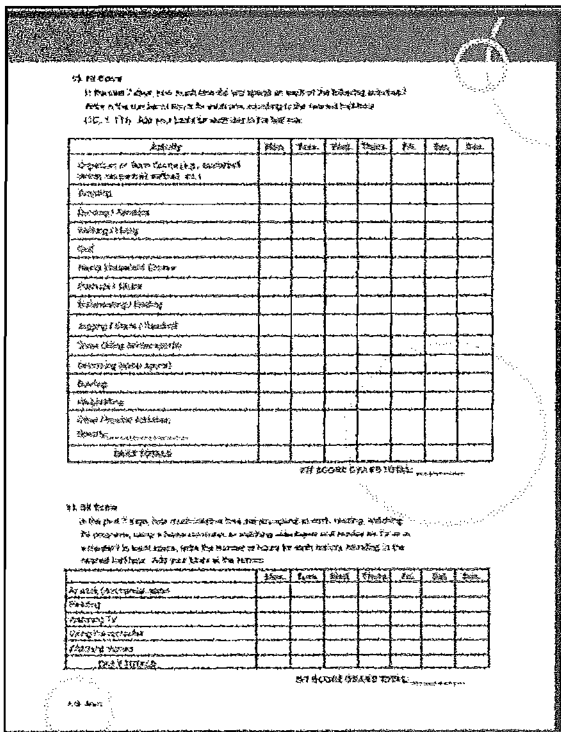


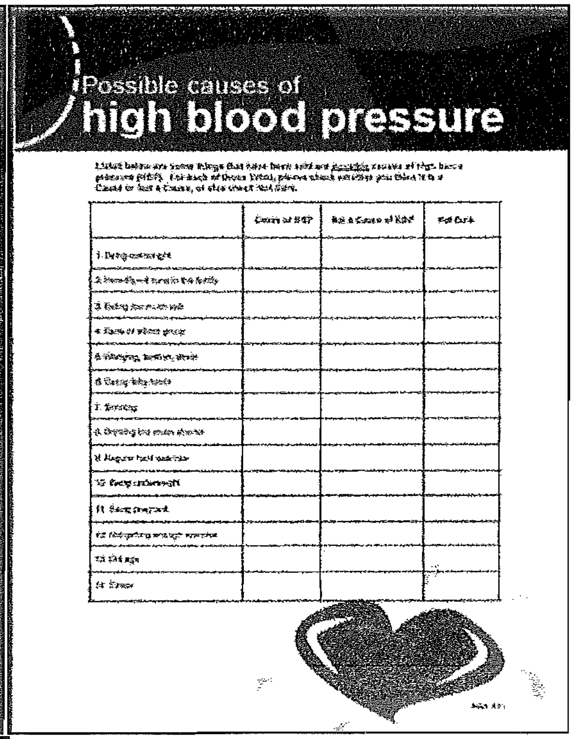


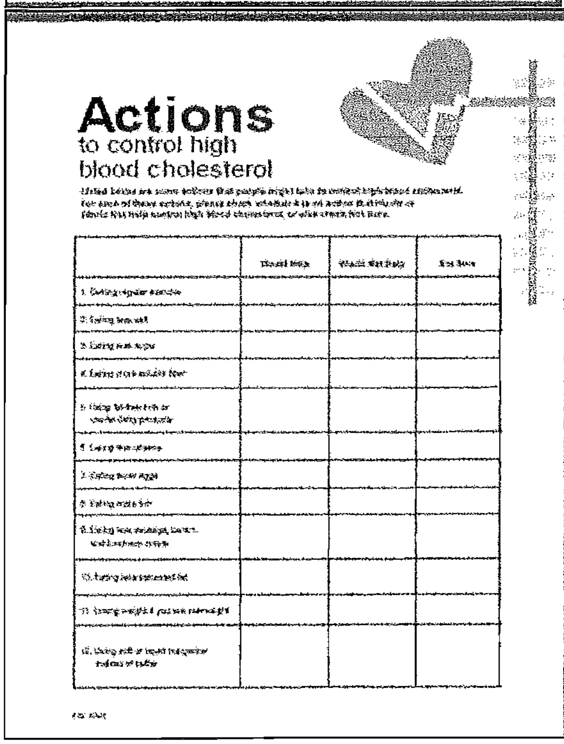

Physical
Activity








Possible causes of
high blood pressure


Actions
to control high
blood cholesterol