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Effects of Educational Intervention on Children’s Knowledge of Obesity Risk Factors

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Effects of Educational Intervention on Children's Knowledge of Obesity Risk Factors

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This thesis for honors recognition has been approved for the Department of Health Sciences.

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Abstract

Childhood obesity has become a significant healthcare concern in the US with rates tripling within the last decade. The increasing prevalence of childhood obesity puts these children at risk for several diseases and other associated health problems. This quantitative research study posed the question of the effectiveness of an educational intervention on children’s knowledge of obesity risk factors. This investigation assessed obesity awareness and understanding of the importance of physical activity and a nutritious diet before and after an educational intervention in 123 seventh grade students. The health and physical education teacher at the participating school conducted the intervention over two 50 minute class periods. The intervention was developed from the school district’s approved health curriculum and from existing research reviewed in this study. A pre, post survey method was used to assess the effectiveness of the educational intervention and descriptive statistics were used to interpret the results. This small-scale school based intervention was effective in increasing knowledge of obesity risk factors in middle school students. The intervention was more effective in increasing obesity awareness and educating about diet and nutrition than portraying the importance of physical activity. More extensive interventions are needed for maximum benefit and long term impact. Continued efforts to reduce and prevent childhood obesity are needed to restore the health of this nation.
Acknowledgements

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Dedication

I would like to dedicate this thesis study to my loving, supporting family especially my parents, Jerry and Mary Allen. You have shown me how to achieve my goals and have stood behind through all my struggles. Thank you for all you have done for me.
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Chapter I

Background

According to a report by Trust for America’s Health (2009), childhood obesity rates have more than tripled in the last three decades, with 30 states having over 30 percent of their children above the overweight mark. The Center for Disease Control and Prevention (CDC) defines the terms overweight and obese as ranges of weight that are greater than what is considered healthy for a given height. These ranges of weight have also been identified as increasing the likelihood of certain diseases and other associated health problems such as Type II Diabetes, hypertension, sleep apnea and liver disease. The screening tool used to identify possible weight problems in children recommended by both the CDC and American Academy of Pediatrics (AAP) is Body Mass Index (BMI) (CDC, 2010).

BMI is a number calculated from the child’s weight and height and is a reliable indicator of body fatness for most children. Once BMI is calculated for the individual child it is plotted on the CDC’s BMI-for-age growth chart for children aged two to nineteen. This chart is a helpful indicator to show the child’s relative BMI according to age, sex, and height compared to the rest of the nation. BMI results are interpreted differently for children than for adults (BMI for-age growth charts) because it needs to consider normal growth patterns for different age groups according to height and sex rather than using the universal normal range for BMI for
adults. The BMI percentile ranges correspond to weight status categories, the following are the normal ranges: Underweight is classified as a BMI in the range of less than the fifth percentile, healthy weight is in the range of fifth percentile to the 85th percentile, overweight is in the range of the 85th percentile to the 95th percentile, and obese refers to scores over the 95th percentile. BMI is not a diagnostic test for weight problems, but is a useful calculation tool for health care providers to identify possible health problems and then to perform other assessments to determine possible diagnoses and treatments (CDC, 2010).

Childhood obesity can occur in children and adolescents. When children are well above their ideal weight for age and height according to BMI, they can develop serious health problems such as type II diabetes and hypertension (CDC, 2009). Several health implications that could be studied related to obesity are the increased risk for adulthood obesity and corresponding problems, and educational plans to prevent childhood obesity risk factors. The honors thesis study focused on prevention of childhood obesity risk factors which include poor diet, inadequate activity levels, and personal awareness. The prevention was conducted through an educational intervention. The purpose of this study was to assess the effectiveness of educational intervention pertaining to children’s awareness of childhood obesity risk factors.
Risk Factors

A Variety of factors contribute to a child’s obese state, many of which are preventable through healthy lifestyle choices, such as balanced eating and physical activity. Education about the risks for obesity may also contribute to overall health. A high calorie and low nutrient dense food diet associated with very low levels of activity is the most common cause of obesity in children. In other words, in most cases childhood obesity is the result of caloric imbalance; too few calories are expended for the amount of calories that are consumed. Children may also be at risk of becoming obese due to genetics, psychological and socioeconomic factors, and familial influence. (Mayo Clinic, 2008).

Genetics may cause an increase in susceptibility in weight gain for youth, but genetics must exist in combination with environmental and behavioral factors to have a significant impact on the development of obesity. In some cases, genetics can play a significant role in causing obesity, but the outstanding rise cannot primarily be from genetics alone. The populations’ genetic characteristics have not changed as strikingly in the last three decades yet the prevalence of childhood obesity has climbed to nearly three times its value thirty years prior. Behavioral and environmental factors must be examined in addition to the possibility of genetic attribution (CDC, 2009).

Single behaviors cannot directly cause obesity, but they may add to an individual’s caloric imbalance and as a result, contribute to obesity.
Energy or caloric intake, physical activity levels, and sedentary behaviors are important behavioral factors that may contribute to childhood obesity. Today’s population of children and adolescents are generally consuming excess energy in several different forms. Contributing factors of excess energy intake are: the large portions of food and drink that are offered at most restaurants, eating meals out of the home, frequent snacking on energy dense foods, and drinking beverages such as soda pop and energy drinks with high levels of sugar. There is growing evidence of the association of consuming excess sugar-sweetened drinks with a high number of calories and weight gain in youth. In addition to this, liquid forms of energy are not as filling and can lead to more intake of calories (CDC, 2009).

Physical activity in children has been proven to not only have a positive impact on body weight, but also on blood pressure and bone strength. Children that are active are more likely to be active teens and later adults. This corresponds to the statistic of 70% of obese children becoming obese adults because if active children mature into active adults, they have a decreased chance of becoming obese. Physical activity should be incorporated into school-aged children’s days. However, between 1991 and 2003, there was a 14 percentage point drop in physical activity in the schools. The percentages changed from 42 percent in 1991 of all school-aged children participating in physical activity at school to 28
percent in 2003. In addition to this, less than one third of high school students are meeting their daily activity level requirements (CDC, 2009).

Schools should implement more activity into their students’ days to help meet activity level requirements, but another factor must be considered in the decrease of students meeting their physical activity needs. Media sources have influenced the amount of exercise children are getting because of the significant amount of time they spend watching TV, movies, playing video games, on the computer, or other sedentary behaviors. Research published by the Henry J. Kaiser Family Foundation (2004) have shown that there is a positive correlation between time spent watching TV and increased prevalence in of childhood obesity. The reasons for this are children are spending their time in front of some type of media source instead of participating in physical activity, they tend to consume numerous high calorie snacks during this time, they are exposed to food advertisements which may influence unhealthy food choices, and lack of physical activity lowers their metabolic rates (KFF, 2004).

The environments where children spend most of their time in are critical in influencing food choices and physical activity levels. Within the home environment, parents are the role models for their children and usually their children have similar eating habits and activity levels. Almost 80% of children under the age of five with working mothers are in some type of child care facility. Child care providers are sharing the responsibility of shaping young children’s eating and physical activity
behaviors during a crucial developmental period in the children’s lives. The majority of children aged five to 17 are enrolled in school and they spend most of their day at school, making the school environment an important player in influencing healthy behaviors. In response to the obesity epidemic, more schools are taking active roles in improving the nutrition and physical activity levels of students (CDC, 2009).

In addition to the home, child care settings, and school environment, the community environment where one lives in can directly affect one’s behavioral patterns. Communities with less access to safe parks and biking or walking pathways may reduce the likelihood of children walking or biking to school, as well as children not playing outside in parks or recreation areas. Affordability of healthy food is another issue within the community because if there is no access to affordable, healthy food, people in that neighborhood will be less likely to buy healthy food (CDC, 2009).

Low income groups tend to have a higher prevalence of obese children due to high costs of healthy food, availability of fast food, and lack of time to cook healthy meals (NACHRI & NACH, 2007). The community environment may be a factor linking prevalence of obesity in low income neighborhoods. According to the CDC (2009), non-Hispanic black girls had the highest prevalence of obesity and among the boys, Hispanic children ranked the highest. In a recent study, researchers found that about ten percent of children under age two, more than ten percent of two
to five year olds, 19.6 percent of six to 11 year olds, and 18.1 percent of 12 through 19 year olds were at or above the 95\textsuperscript{th} percentile for body mass index (Ogdon, 2010).

**Health Implications**

Children that are obese most commonly have health problems that are directly correlated to high percentages of body fat. Type II diabetes, most commonly developed by adults, is now being diagnosed in children daily. Obese children are more likely to develop asthma, sleep apnea, hypertension, liver disease and metabolic syndrome. Childhood obesity can cause pain through all the associated medical problems, but children can also experience joint and back pain because their musculoskeletal system is not built to support the extra weight (Mayo Clinic, 2008). Obese children may also experience discomfort at school from being too big to comfortably fit in the desks. Children who are obese have a 70 percent chance of becoming an obese adult with increased health complications (NACHRI & N.A.C.H, 2007).

The health problems seen in obese children are amplified in the obese adult. Ninety percent of type II diabetics have a BMI greater than 23. Obese adults have a five times greater chances of developing hypertension that can later develop into other forms of heart disease. The occurrence of cancer, liver disease, gall bladder disease, respiratory problems, and osteoarthritis all increase as BMI increases (Kopelman, 2007).
Impact of Obesity on Individuals and Family

Along with these health problems, children can also suffer from low self-esteem, bullying, depression and problems in school (Mayo Clinic, 2008). Obese children are concerned and insecure about their body image and physical appearance and suffer from social rejection and emotional hurt (Puhl, 2007). Consequences of such emotions may cause isolation and social withdrawal which in turn may worsen obesity with increased likelihood of behaviors such as overeating and sedentary activity. It is apparent that discrimination and prejudice are part of everyday life for most obese children (Chaput & Tremblay, 2006).

Childhood obesity has an impact on the family because of the higher medical costs correlated with poor health caused by obesity. Successful interventions for childhood obesity involve the entire family participating in healthier lifestyles with the parents as the role models (Mayo Clinic, 2008). Childhood obesity’s impact on society is shown through the rising costs of health care associated with obesity. Medical costs linked to obesity are exerting a burden on social and economic development. Currently, the burden of obesity related health costs is $147 billion a year and the average obese person spends about 40 percent more on health care than the average-weight person (CDC, 2009). In addition to the high direct medical costs due to obesity, obese children have a high prevalence for becoming obese adults. Obese adults are not as physically fit which interferes with productivity. This
may add another burden to both society and economics (Trasande, 2009).

**Education**

Unhealthy behaviors developed in early to late childhood often carry over into adulthood and some of these behaviors may have a positive correlation with increased mortality and morbidity in adults. The decline in quality diets and meeting physical activity needs are closely related to the increase in childhood obesity. Because most children attend schools on a daily basis, it is important to integrate health interventions into schools to end the growth of the obesity epidemic (Fahlman, Dake, McCaughtry, & Martin, 2008).

Researchers have used different techniques in studying the obesity problem in the school setting. Both quantitative and qualitative methods have been used to study educational techniques related to the risk factors of obesity such as in poor nutrition and inadequate physical activity levels. Certain quantitative methods examined used pre-test and post-test analysis to determine the effectiveness of an educational intervention on different obesity risk factors. A research study discussed in the review of literature, by Harrell, Davy, Stewart, and King, (2005) used a quantitative, correlational design and found that small-scale interventions may provide improvements in health awareness and health behaviors for the students participating in the intervention. Other studies such as the Lee, Lai, Chou, and Chang (2009) research use qualitative
methodologies such as using focus groups and interviews to explore children’s existing knowledge on obesity risk factors such as nutrition and exercise have been effective in targeting certain themes for future interventions.

Nola Pender developed the Health Promotion Model (HPM) and defined health as a positive dynamic state, not merely the absence of disease. Health promotion includes increasing one’s level of well being. The theoretical propositions of the HPM influenced this honors thesis research study in a variety of ways including: persons commit to engaging in behaviors from which they anticipate deriving personally valued benefits, persons can modify cognitions, affect, and the interpersonal and physical environment to create incentives for health actions, and positive affect toward a behavior results in greater perceived self-efficacy, which can in turn, result in positive affect (Nursing Research Articles, 2011). Assuming these propositions with health promotion, this study will attempt to teach positive outcomes with healthy behaviors to enhance health knowledge and promote healthy behaviors with the attained knowledge.

**Summary**

Childhood obesity is a continually growing problem in today’s society. Identified risk factors such as poor nutrition and inadequate physical activity are important in understanding the etiology of obesity (KFF, 2004). Other factors contribute to a child’s obese state, but it is the preventable factors that this study will focus on. Educating children about
healthy eating, the importance of physical activity, and obesity facts is critical in ending the obesity epidemic. If educational interventions in schools can be shown to be effective in increasing children’s knowledge about obesity risk factors then perhaps this may prevent the increasing obesity problem. In addition to preventing obesity, children will be more knowledgeable about healthy lifestyles and will potentially choose to engage in healthy behaviors which will then not only benefit their own health, but benefit that of their families, society, and economy.
Chapter II

Review of the Literature

Increasing obesity rates calls for prevention and treatment strategies to improve the health of our nation’s children. In this review of literature, current and historical research studies will be examined pertaining to childhood obesity issues. Etiology and risk factors for childhood obesity will be discussed. The literature will explore current prevention strategies within schools and other health care practices. The practicality and validity of the strategies will also be discussed.

Impact of Diet and Nutrition on Obesity

Diet quality in children and adolescents has declined increasingly in the last few decades and this occurrence has a profound effect on the rise of childhood obesity (Fahlman, Dake, McCaughtry, & Martin, 2008). In 2008, Fahlman, Dake, McCaughtry, and Martin tested the effectiveness of the Michigan Model (MM) Nutrition Curriculum on nutrition knowledge and eating behaviors in middle school students. This study used a pre-test, post-test quasi-experimental design with a sample size of 783 middle school students. The instrument developed consisted of 33 questions, assessing the students eating patterns and knowledge of nutrition facts and was tested for internal reliability. The intervention was conducted by teachers trained in the MM curriculum, and was taught over a period of one month. The post-test was administered two weeks after the conclusion of the intervention. Statistical analysis was used to determine
effectiveness by comparing pre/post-tests in both control and experimental groups. The results indicated that middle school students who were taught the educational lessons not only increased their nutrition knowledge, but also were more likely to make healthy changes in their diet. This study is an example of a successful educational program focusing on prevention of childhood obesity. Implementation of a curriculum similar to the MM should be considered for all states (Fahlman, Dake, McCaughtry, & Martin, 2008).

Childhood obesity prevention methods were studied by O’Dea and Wilson in 2006. This investigation supported the idea that the nutritional value of breakfast and socio-economic status (SES) of children are accurate predictors of body mass index (BMI). Along with the factors of age, gender, and height, researchers found that other factors can serve as predictors of potentially high BMI in children such as dietary self-efficiency, contents of breakfast and SES of the parents. Children with low self-efficiency, those eating an innutritious breakfast or no breakfast and with low SES tended to have a higher BMI than children with high self-efficiency. The sample size of this study was large, 4441 students, and randomly selected from all territories of Australia (O’Dea & Wilson, 2006).

In O’Dea and Wilson’s study, a large scale, cross-sectional survey was conducted using questionnaire data and anthropometric measurements to gather information on each of the factors; nutrition of breakfasts, physical activity level, food variety, nutritional knowledge,
dietary self-efficiency, SES, height and weight. The collected information was assessed with a multiple linear regression model to test for significance of the factors to BMI. An implication for clinical practice is the association found between low SES and overweight boys and girls. The findings of value in this study are the correlation of higher BMI in children of low SES and those that do not eat a healthy breakfast. This indicates that steps of prevention in childhood obesity may be possible through providing nutritious breakfasts for children in schools (O’Dea & Wilson, 2006).

Nutritional studies conducted by the Centers of Disease Control (CDC) in 2003 and 2004 concluded that children attending public school have higher BMI than those in private schools. Using data gathered from the CDC’s study, this research by Hooker in 2010, investigated the relationship between school type and obesity trends. The State and Local Area Integrated Telephone Survey Program was utilized to investigate the physical and psychological health status of children ages 0 to 17 years old. The results of this survey found significance between higher BMI in children attending public school versus private school and even higher BMI if the student was a part of the National School Lunch Program (NSLP) or School Breakfast Program (SBP). The sample included 62,880 participants randomly selected and surveyed on type of school, physical activity, NSLP/SBP and BMI. The results were organized with nonlinear regression models to test for significance of factors to BMI. The findings of
the study indicate that school health practitioners need to work with the physical education department to ensure that children are getting enough exercise as well as being nutritiously sound. School nurses should also monitor each student’s BMI and be actively involved in keeping the children at a healthy weight. The positive association of high BMI with children eating NSLP or SBP indicates that these programs should be modified to better meet the nutritional needs of school children (Hooker, 2010).

**Impact of Physical Activity on Obesity**

A qualitative research design was used by Lee, Lai, Chou, and Chang in 2009 to explore obese school children’s perceptions of exercise. The purpose of the study was to identify key motivations to encourage obese children to participate in regular exercise. Purposive sampling was used to identify the 11 out of 1,714 students who were obese that were to be in the study. Focus groups were formed and were based around five open-ended questions that explored what the children knew about exercise and how they felt during and after exercise. The mean BMI for the group of 11 students, aged 11 to 13 years old, was 27.2 kg/m², which is considered obese for children of that age. All of the students in this group reported that they felt their health was either excellent or good. Upon data analysis of the focus groups, six themes were recognized, including “(a) positive impressions of doing exercise, (b) recognition of negative effects associated with not exercising, (c) feelings of discomfort
during exercise, (d) self-ambivalence, (e) false beliefs about exercise, and (f) making excuses for not doing exercise” (p. 172). This study is important because it identified why obese children do not want to exercise. However, obese children do recognize positive impressions with doing exercise and the negative effects of not exercising. Teachers and health care providers can use this information in creating effective exercise plans for obese children (Lee, Lai, Chou, & Chang, 2009).

The study by Topp, Jacks, Wedig, Newman, Tobe, and Hollingsworth (2009) created the Tommie Smith Youth Athletic Initiative (TSYAI) to significantly improve participant’s cardiovascular fitness, body composition, and dietary habits. The study sample was 63 students in a predominately African American school, grades K-5, 60% of whom were overweight or obese. The TSYAI intervention is a 14 week program that consisted of 3 after school sessions a week. Two of the sessions involved physical activity, while the other session was a nutritional education class followed by 45 minutes of group physical activity. The study design used a pre- and post-test of a single group to analyze if the TSYAI program reduced the risk factors for childhood obesity. The comparisons of the two tests at the end of the program showed no significant decreases in BMI or fat percentages, but improved cardiovascular fitness, and lean body mass. However, there was no control group in this study so significance of improved cardiovascular fitness and lean body mass could be due to another contributing factor. Future intervention studies should be done...
incorporating a control group to validate the results of this study. Health care professionals and community members need to actively participate in the prevention of childhood obesity by creating and providing programs like the TSYAI (Topps, Jacks, Wedig, Newman, Tobe, & Hollingsworth, 2009).

The risk factors of primary concern in this particular research question are the above factors, physical activity and nutrition. The findings from the research articles reviewed indicate that exercise programs need to be created that are targeted toward children in an appropriate manner, making exercise a positive activity that children enjoy partaking in. The reviewed research also implied that nutrition knowledge and healthy breakfasts are important in obesity prevention. Other risk factors have significant importance in the study of childhood obesity and should be considered in conjunction with the primary factors, therefore are discussed as well.

**Familial Influences**

Washington, Reifsnider, Bishop, Ethington, and Ruffin’s study (2010) examined differences in variables between normal and overweight children and concluded that several ecological factors influence the BMI of preschoolers leading to obesity. Statistical differences in various aspects of the home such as mother’s sensitivity and responsiveness to her child, mother’s BMI, and dietary intake were found, but not in the variables related to parental employment state or culturally adaptive status. This
was a cross-sectional study of 200 Mexican American children ages 2-3 receiving nutritional assistance for Women, Infants, and Children program (WIC). Half of the children in the sample were overweight while the other half were of normal weight for age and height. Diet, home environment, anthropometrics, demographic data, parent-child interaction, physical activity and acculturation were assessed for comparison with overweight and normal weight children. Different instruments were used to measure each of the variables including: The 24-Hour Diet Recall, Home Screening Questionnaire, BMI, Nursing Child Assessment Teaching Scale, Baecke Scale of Habitual Physical Activity, and Acculturation Rating Scale for Mexican Americans-II. The limitation of this study is that the sample group only consisted of low-income Mexican-American. This study showed that multiple ecological factors can influence BMI and may lead to obesity. It is important for health care professionals to teach parents about the importance of controlling environmental factors like parental influence, maternal stress, and availability of food that are risk factors to childhood obesity (Washington, Reifsnider, Bishop, Ethington, & Ruffin, 2010).

**Stigma and Psychosocial Effects**

In an older study done by Strauss (2000), he found that by age 13 to 14 years old boys who were obese, girls from Hispanic families who were obese, and girls from Caucasian families who were obese had significantly lower levels of self-esteem compared to their non-obese counterparts. The sample of this study included 1520 children, ages 9 to
10 in 1992 or 1994, born to mothers participating in the National Longitudinal Survey of Youth. Self-esteem was measured using the Self-Perception Profile for Children at age 9 or 10. A 4-year follow-up with the sample included taking the same survey again. The follow-up scores were available for 79% of the original sample. The Self-Perception Profile for Children tool has an internal reliability of .73-.86; variability is due to the age the survey is administered to. The first time the children took the self-esteem survey; there were no significant differences between obese and non-obese children. However, after the 4-year follow-up, obese boys, obese Hispanic girls, and obese Caucasian girls all had significantly lower self-esteem levels compared to non-obese counterparts. In addition to lower self-esteem, obese children at ages of 13 to 14 reported higher rates of sadness and loneliness were more likely to engage in high-risk behaviors. It is important for health care professionals to understand the psychosocial consequences of childhood and adolescent obesity during this critical time of self-esteem establishment in treating individual children. This information can be put into practice by creating appropriate and effective treatment strategies that not only treat the obesity problem, but help strengthen the individual’s self-confidence in themselves and ability to participate in a healthier lifestyle (Strauss, 2000).

**Summary of Risk Factors**

The risk factors discussed all play an integral role in the causation or prevention of childhood obesity. Childhood obesity usually develops
because of a combination of several factors so it is important to analyze all the possible reasons that a certain child is progressing towards obesity. Poor nutrition, inadequate physical activity, and obesity awareness are risk factors of significant importance for childhood obesity.

**Treatments**

There are several modern treatments for childhood obesity including diet, exercise, behavior modification, drug therapy and bariatric surgery (Endocrine Today, 2009). However, this study focused mainly on assessing the efficacy of educational interventions to change unhealthy lifestyles and increase knowledge of obesity risk factors.

**Educational Intervention and Prevention**

A health intervention program was investigated by Harrell, Davy, Stewart, and King with the purpose of increasing health awareness among middle-school children in Mississippi. A total of 205 fifth grade students from two different schools, one school as an experimental group and the other as a control group, were enrolled in the intervention program. The “Know Your Body” health knowledge questionnaire was used to test the participants’ baseline knowledge of the risk factors associated with obesity. Metabolic parameters such as BMI, waist circumference, blood pressure, blood glucose concentration, blood lipid concentration, and cholesterol levels were obtained for each student before and after the intervention to enhance students’ awareness of cardiovascular risk factors. The intervention was developed with researchers coordinating
with science teachers in the school to create a program that would address nutrition, physical activity, heart disease, and diabetes. The intervention consisted of four class session lessons over the course of four months, followed by a repeat of the "Know Your Body" health questionnaire. The results showed that the intervention was effective in increasing the health knowledge of middle-school students as well as improving certain dietary behaviors compared to the control group. This study supports the idea that small-scale interventions can be effective in increasing students’ health knowledge and making students more aware of cardiovascular disease and other obesity risk factors (Harrell, Davy, Stewart, & King, 2005).

Golan, Kaufman, and Shahar’s (2006) experiment comparing intervention strategies of childhood obesity targeting the parents alone versus the parents and children together found that it may be beneficial to exclude the child from active participation in health-centered programs. The health centered approach to childhood obesity had better results in the parent’s only group because parents were encouraged to change familial lifestyles and behaviors to benefit the entire family. The parent and child group may not have been as successful because children tend to resist change and act oppositely in order to avoid it. The sample group consisted of 32 families with obese children from the ages of 6-11. Families were randomized into one of the two groups to participate in a 6 month educational and behavioral program for healthy lifestyle. A
regression model was used to analyze the results between the two groups in terms of BMI, overweight status, eating and activity patterns, and food stimuli at home. It is important for the families, especially the parents, of the obese children to be involved in the treatment process. Family based healthy lifestyle programs should be recommended by health care professionals in the treatment plan for obese children (Golan, Kaufman, & Shahar, 2006).

The development of an obesity prevention and management program for children in a rural setting used applied theory-based health behavior constructs in a Kansas town. The project was designed as two related studies over a 12 month period. The first study included gathering information from community members about their views on obesity risk factors and what the community is and should be doing to prevent childhood obesity. One hundred and thirteen questionnaires were distributed and only 44 were returned therefore the results may be biased towards interested people. The returned questionnaires indicated moderate importance for all the listed risk factors with psychological factors scoring higher. They also reported limitations to children’s physical activity and suggested a few ways to overcome these limitations. The second part of the study consisted of a six week educational intervention in a sixth grade classroom with five lessons and also a family fun night to promote physical activity and nutrition. This program incorporated the recommendations from the first study. The sample included 65 sixth
graders and 25 of their families. The effectiveness of the educational intervention was analyzed statistically by comparing the pre- and post-test scores of both children and families. The results were not significant for students’ individual health attitudes and behaviors but significant changes did occur among families in terms of healthy eating and physical activity levels. The health implications for this study may include conducting interventions that focus on family participation because it seems as if the results are more beneficial to everyone involved in the research when the family is included (Hawley, Beckman & Bishop, 2006).

The implementation of a walking school bus (WSB) program at an elementary school in New Mexico in 2006 demonstrated that parents and children will increase their physical activity when involved in group efforts. The WSB “walking to school” study showed to be a practical way of implementing exercise into the students’ and parents’ days if participation and safety could be ensured. The study group is quite small with only one elementary school with two WSBs. The WSB program was established with the directors of school, parent volunteers, and health care providers involved. Body mass index (BMI) of both children and adult volunteers were collected before and after the WSB and were analyzed with a paired t-test. Researchers also held focus groups to discover parental and student thoughts of the WBS and its efficiency. Further research with the WSB program in different locations around the United States is necessary to determine its efficiency and if the program reduces obesity risk factors.
This study shows that low cost interventions are possible in communities and that focusing on group participation in obesity prevention is much more appealing to both parents and children (Sussman, Negrete, Patterson, Mittleman, & Hough, 2010).

**School Nurses and Health Care Providers’ Roles**

A descriptive correlational study design was used by Nauta, Byrne, and Wesley (2009) discovered that school nurses in New Jersey were knowledgeable about childhood obesity, but not many were competent in prevention, testing for, and treatment of obesity in their students. Since school nurses are the health professionals that children are in contact with the most, it is important for all school nurses to be competent in identifying obesity, prevention strategies, and successful treatment of childhood obesity (Nauta, Byrne, & Wesley, 2009).

Nauta, Byrne, and Wesley’s research used a 55-item, five-point Likert-type questionnaire and was issued to a convenience sample of 103 school nurses in New Jersey who attended the county school nurses’ association meeting. This tool incorporated Pender’s Health Promotion Model to examine school nurses knowledge and practices toward childhood obesity. The original tool had a reliability of 0.80, but the revised tool’s reliability had an overall p value of 0.77. Descriptive statistics were used to analyze and interpret the results from the survey concerning school nurses’ practice and knowledge of childhood obesity. The instrument used in this study has high construct validity because this tool
has been used in two previous studies. However, there are some limitations to this tool. Generalizability is limited due to a convenience sample and a return rate of only 46% (Nauta, Byrne, & Wesley, 2009). Further studies of this topic have been done and revisions to the assessment tool have been made.

Murphy and Polivka’s (2007) descriptive study of parental perceptions regarding childhood obesity indicated that most parents agreed that body mass index (BMI) was an appropriate measurement of obesity in schools, obesity was an increasing problem and that obesity is caused due to inactivity and poor eating habits. The information on parental preferences allows school nurses to implement appropriate school prevention and treatment strategies. The survey was conducted via a convenience sample method, including parents with children in an after-school program in an Ohio suburban school system. The instrument used was the “Parental Perceptions of Body Mass Index and Obesity in School-Age Children” (p.44). It has 44 questions that ask parents about their views on BMI, concepts about obesity, factors that cause obesity, the school’s role in preventing obesity and demographic information on parent and child. The survey was a revised version of a survey used to assess school nurses’ perceptions on childhood obesity. The previous survey based on Pender’s Health Promotion Model, had an internal reliability of 0.80. However, the reliability of the revised survey was 0.66. The tool used in this study is a revision of Pender’s Health Promotion Model which has
been used since 1982. However there are some limitations to this survey, of the 506 surveys distributed only 117 were returned, consequently results may be biased toward interested parents. Heights and weights of parents and children were reported by the parents so there may have been an error in the data collection. Also, the perceptions of the parents in this study do not represent the perceptions of a more diverse population because the survey only included parents in a suburban area (Murphy and Polivka, 2007).

Researchers using qualitative methodology found that most general practitioners and nurses felt that their role in treating childhood obesity was to raise the issue of the child’s weight to the child and parents. Eighteen general practitioners (GPs) and nurses were interviewed on their views about their role in treating childhood obesity and data was analyzed using framework analysis. GPs and nurses felt that there were many barriers to treating childhood obesity such as time constraint, lack of training, lack of resources, and lack of research for successful intervention methods. They felt as if they could only address the child’s weight as a problem and suggest diet and exercise, but the family would have to integrate their own treatment plan into their daily lives. The health implications from this study are that health professionals do not feel equipped to intervene with the childhood obesity problem and lay responsibility on the families for addressing the problem with their children. If current research provides evidence for health care
professionals to engage in motivational and behavior change counseling in treatment of childhood obesity, then it should be implemented to use in standard obesity treatment (Walker, Strong, Atchinson, Saunders & Abbott, 2007).

Summary

The review of literature explored the different risk factors, etiologies, and treatment strategies of childhood obesity. The review is strong with research literature pertaining to this study’s primary factors; physical activity, nutrition, and education intervention strategies. The reoccurring appearances of these topics in all the articles provide sufficient data and support for the importance of these specific risk factors in this study. However, there are many other risk factors and treatment methods for childhood obesity that are not explored extensively due to their direct irrelevance to this study.

Conceptual/Theoretical Framework

The theoretical framework that directed this study was Nola Pender’s Health Promotion Model (HPM). The HPM’s focus is on achievement of higher levels of well-being and self-actualization and categorizes the factors influencing behavior. The modifying factors that the HPM describes are behavioral factors, situational factors, interpersonal influences, and biological and demographic characteristics. Behavioral factors describe a person’s prior experiences with the given activity while situational factors are their behaviors in response to their
environment. Interpersonal influences include the social support and expectations of others such as family and peers. Biological and demographic characteristics include age, gender, income, and ethnic and racial backgrounds which pertain to the self-actualization piece of this model. The modifying factors are said to indirectly affect health behaviors while the cognitive-perceptual factors are important in determining motivational strategies for improving health. Such factors include the individual's perspective on the importance of health and also on the benefits of healthy behaviors. This model also notes the importance of understanding how one defines health because this affects how they perceive their own health and impacts behaviors toward their health (Galloway, 2003).

Using this model, the educational intervention was developed to promote health in middle school students by increasing one’s level of well-being. It will explain some of the modifying and cognitive-perceptual factors in relevance to childhood obesity. For example, certain behavioral and situational factors were discussed in regard to childhood diet, exercise patterns, and obesity risk factors. The educational intervention will portray the benefits of healthy eating and ample exercise in order for the students to understand the importance of these healthy behaviors. This intervention ideally will create a positive affect toward healthy behaviors which will result in greater perceived self-efficiency and increased positive affect for middle school aged students.
Chapter III

Methodology

Childhood obesity rates have more than tripled in the last decade. Children that are obese have a 70 percent chance of becoming an obese adult (CDC, 2009). Obesity causes many health problems and severely affects one's quality of life. The purpose of this research study is to determine the effectiveness of an educational intervention on the awareness of the obesity risk factors such as poor nutrition, inadequate activity levels and obesity knowledge with middle-school students. This study is needed to test the effectiveness of educational interventions pertaining to childhood obesity risk factors.

This study addressed the question of the effectiveness of educational intervention pertaining to children’s awareness of childhood obesity risk factors, obesity knowledge, nutrition, and importance of physical activity, using a pre-survey and post-survey study design. These methods were appropriately assessed by utilizing a paired dependent t-test to interpret the results.

Procedure

This research proposal was approved by the Carroll College Institutional Review Board in the spring of 2010. Preliminary approval was granted by the school district to use the school as the setting for study and the students in the school as the sample population. In the fall of 2010, an initial meeting was set up with the school’s superintendent, principal,
school nurse, and health and physical education teacher to discuss the procedure of the research study. Procedure methods and the dates for the research were approved and permission was obtained to conduct the research in the school. Further contact was made with the school’s Health and Physical Education teacher because the study was done in this class period. The principal investigator (PI) and the health teacher worked closely together to develop the protocol for the educational intervention.

The sample population included a non randomized convenience sample of 123 seventh grade students in a Lewis and Clark County middle-school. The research study was designed to imitate a normally scheduled day of class for the students in order to decrease distractions. Prior to the first day of the intervention, the health teacher informed the students about the research study. The teacher explained the procedure of the research and how they would be taking a survey before and after their lesson. The concept of a Likert scaled was explained to the students to familiarize them to the format of the survey so they could answer the questions to the best of their ability. Due to the context of the study, parental and personal permission was not needed because the study was considered a normal educational lesson.

Thursday, January 6, 2011, was the first day of the research study and would include the students answering the pre-survey (See Appendix A) and the first half of the educational intervention (See Appendix B). The study was conducted over the course of the day in five class periods.
There were 28 students in first period, 29 in second period, 26 in third period, 26 in fourth period and 14 in sixth period of the day. The students came into the classroom like they would on a normal day. The PI was introduced and the pre-survey was explained and handed out to all off the students. In all five class periods, the pre-survey was finished by all students in approximately 12 minutes. The students returned the surveys to the PI and they were collectively placed in an envelop labeled “Pre-Surveys.” Upon the completion of the first survey, the first half of the intervention was taught. In order to retain internal consistancy, the teacher explained to the students that they could not ask any questions until the completion of the post-survey. Questions asked by students could alter the information discussed and could possibly give certain classes an advantage over the other classes. The health teacher was committed to keeping the intervention consistent over all five periods and strictly followed the PowerPoint presentation while teaching the intervention.

The second part of the educational intervention and answering of post-survey was conducted on Tuesday, January 11, 2011 with the same students. The second part of the intervention began with an activity that introduced the topic of body composition and body mass index. After the activity, the rest of the intervention was taught. At the conclusion of the intervention, the post-surveys were handed out to all students. An additional question was verbally added to the post-survey by the PI after
observation of the pre-survey and having two students ask what the term “obesity” meant. The PI announced for the students to write “Yes” or “No” on the bottom right hand corner of the back page of the post-survey in response to this question, “I have heard of obesity before this lesson and I knew what it meant?” The post-survey was completed by all students in approximately ten minutes and then collected by the PI and placed in an envelop labeled “Post-Surveys.”

**Intervention**

The educational intervention was a lesson assembled by the principle investigator (PI) and the middle-school Health and Physical Education teacher at the participating school. The educational intervention was created with information and activities from Nygard and Hopper’s (1998) *Innovative Fitness Connections* physical fitness curriculum and from other reviewed research sources (CDC, 2009, KFF, 2004, USDA, 2011). The curriculum has been approved by the National Health Physical Education, Recreation, and Dance council. The school board of the participating school had previously approved this curriculum as a worthy curriculum to be used for middle school students. Other information incorporated into the educational intervention lesson included Montana facts about childhood obesity as evidenced from the 2009 Montana Youth Risk Behavior Survey and reoccurring obesity facts pulled from reviewing existing research.
The intervention was a 60 minute presentation delivered over two class periods to the students by their normal classroom teacher. This presentation was a computer designed PowerPoint entwined with age appropriate handouts such as a copy of the MyPyramid used in the presentation and activities from the Nygard and Hopper curriculum that demonstrated the subject matter. The information in the PowerPoint included obesity facts, nutrition, and importance of physical activity as evidenced by current research and from the approved curriculum (See Appendix B).

The PI and the health teacher worked together to create a lesson that would teach all of the material tested for on the pre-survey. In order for the intervention to be delivered successfully and to ensure consistency, the health teacher that presented the intervention strictly followed the PowerPoint lesson plan and did not allow the students to ask questions until the post-survey was finished. The PI observed the classroom during the intervention (See attached PowerPoint presentation and handouts listed in Appendices timeframe approximately 60 minutes.)

After the pre-survey was administered, the first part of PowerPoint presentation on obesity facts, nutrition, and the importance of daily physical activity was taught to the students. In the first part of the lesson, a visual aid was used to help the students with the concept of caloric imbalance (Nygard & Hopper, 1998). The aid used a teeter totter analogy to show the difference between calories consumed and calories expended (See
Appendix G). In order for the students to understand the percentages discussed in the lesson about Montana obesity risk factor statistics from the Montana Youth Risk Behavior Survey, the teacher numbered off the students and called out a certain number of students to stand to represent the percentage for that class. For example, if the percentage was 20% of students drink at least one can of soda everyday, then four students out of the class of 20 would stand. The first part of the lesson ended with an activity that involved the students doing a body typing worksheet (Nygard & Hopper, 1998) (See Appendix E). The students worked in groups to help each other with the worksheet and to understand that everyone has different body characteristics.

The second part of the lesson was taught 4 days after the first lesson because school only has health class on Tuesdays and Thursdays and the first day of the intervention was on a Thursday. The second part of the lesson started with an activity from Nygard and Hopper’s curriculum to teach body composition. The Body Comp Patrol Activity divided the students into four groups. Each team had a hula-hoop representing a body that contained 16 red balls which represented muscle and 4 white balls that represented fat. The students all started out with a “body” that had a healthy body composition of 20% fat. When the activity started, one student from each team ran to another team’s “body” and traded a fat ball for a muscle ball. Team members ran back to their team and then the next student traded a fat ball for a muscle ball. Teams did this fat-muscle
exchange for 2-3 minutes and at the end of the activity, students calculated their body fat percentages and categorized their team as normal, overweight, or obese. The game was repeated a second time and the team again had to calculate their body fat percentages by dividing the total number of fat balls over the total number of fat plus muscle balls.

After this activity, the rest of the lesson was taught. Handouts of the Food Pyramid and were given to the students for the section on the nutrition and food grouping (See Appendix C). The class as one group played an online matching game from the Dairy Council of California website, to help them learn to assign the different colors of the food pyramid to the corresponding food group. The Kid’s Activity Pyramid developed by Penn State University was used in the lesson to show how the food pyramid correlates with activity requirements for a healthy lifestyle (See Appendix D). For example, the food pyramid shows limited amounts of fats and oils for daily diets and the activity pyramid puts sedentary behaviors in this same category as activities to reduce.

Instrumentation

The instrument used in this research study was a survey used to assess students knowledge prior to the intervention and the following the intervention (See Appendix A). The pre-survey consisted of 24 questions assessing the participants’ awareness of obesity knowledge and risk factors for obesity such nutrition and the importance of physical activity. This survey assessed the participants’ opinions of the contributing factors
in causing obesity, importance of a healthy diet, and importance and
different aspects of physical activity. The surveys had specific questions
for each of the factors being assessed. The post-survey was a replica of
the pre-survey. The surveys were developed with questions from previous
intervention studies and from reviewed literature by the PI under the
direction of Dr. Gallinger, professional surveyist.

The 24 question Likert style survey consists of ten questions about
obesity facts and risk factors, seven questions about physical activity,
seven questions about nutrition, and then a six part question about the
food pyramid. The first 23 questions were answered by circling a number
that corresponded to the student’s opinion on the topic. The Likert scale
was a one through four scale that represented opinion strength. The
number one represented strongly disagreeing, two was disagree, three
was agree, and four was strongly agree. The section on the food pyramid
asked the students to name the food group that each color of the pyramid
represented.

The food pyramid was included on the survey because it has
served as an important learning tool in educating all ages on food groups
and the appropriate serving sizes for a healthy diet. In 1988, the US
Department of Agriculture (USDA) first began creating a graphic to
represent the food groups. Its purpose was to show the ideas of variety,
proportion, and moderation in a diet. The first food pyramid was released
in 1992. The graphics and text conveyed variety and proportionality with
pictures and the size of the food group. With the increasing knowledge about nutrition science, the pyramid has been modified according to updated information on serving sizes and what food groups are most important. The most recent edition of the food pyramid was published in 2005, this pyramid “MyPyramid” with the slogan “Steps to a Healthier You” incorporates the ideas of the first edition but adds physical activity, gradual improvement, and personalization. MyPyramid is designed to encourage consumers to make healthier food choices and to be active everyday (USDA, 2011). This message is key in preventing obesity and therefore is important to be incorporated into this study.

Certain questions on the survey were developed from a previous study that used a survey to find out parental perceptions of childhood obesity. Questions two, four, and six through eleven were extrapolated from Murphy and Polivka’s survey in their study on parental perception’s of childhood obesity. This survey had an internal reliability of 0.80 (Murphy & Polivka, 2007). Questions one, three, five, and 12 through 23 were written based on a review of the existing literature and research and revealed items that load according to the research’s most important factors. The final survey was evaluated by two content experts, Dr. Dawn Gallinger and Dr. Lauri Fahlberg and approved by the participating school district for content and age-appropriateness.
Data Analysis

The null hypothesis of this study was as follows: Ho = 0 (There is no difference in the pre and post survey scores among participants). The research hypothesis: Ha: ≠ 0 (There is a statistically significant difference between the pre and post survey scores among participants). To compare two paired values such as the pre and post survey scores where both observations were taken from the same subjects a paired t-test was used (TexaSoft, 2007).

Results from the pre and post surveys were analyzed with a paired t-test using Microsoft Excel software. In order for the results to achieve significance, a p-value of less than 0.05 must be reached with a confidence interval of 95%. The mean observation number, degrees of freedom, t-stat, and one tailed p-value was calculated for each variable, pre and post survey scores. Each question was paired from the pre and post surveys for statistical difference and then all of the pre-surveys were paired against all of the post-surveys for overall significance. Each of the three factors being assessed on the surveys were analyzed in groups to determine which factor had the most impact. The pre and post survey were analyzed collectively instead of individually by student due to confidentiality standards.

The first 23 questions on the survey were answered using a Likert scale with a range of one to four. For most of the questions, a four, or strongly agree was the anticipated response for the end result.
Participating students were scored for each answer with a range of one to four. If the student chose four for their answer, then they received the highest score for that question and this indicated that they understood the importance of the certain factor. For example, question number one was: Childhood obesity is increasing within my school, community, and country? If a student answered with a four on this question, strongly agree, this showed the researcher that they were aware of the increasing obesity problem. However, for three questions on the survey, strongly disagree was the anticipated answer, so while inputting the data into the Excel spreadsheet, if students answer with a one, they received the highest score, a four, and so a four was entered as their answer for that question. If they answered a four on that particular question, a one was entered as their score, indicating that they didn’t understand the importance of that question’s factor.

The last question of the survey was a six part question relating to the Food Pyramid. Students were asked to name the food group that each color on the pyramid represents. There are six food groups so the range of scores for this question was zero to six. If a student answered all six food groups correctly, they received a six for question 24. If a student did not answer any of the food groups correctly they received a zero for question 24. Question 24 was paired separately from the rest of the survey because it had a different range of possible scores.
Confidentiality

This research was approved by the Carroll College Institutional Review Board. Participants were all volunteers, but due to the educational nature of the intervention personal and parental consent was not necessary. All research was kept anonymous including the specific participating middle school. There was no identifying information on the pre and post surveys and after the participant completed both surveys, the turned the completed survey into the PI who put them in to an envelop where all of the completed surveys were collected. The two separate envelopes, one for the pre-survey and one for the post-survey, were kept in a secure place in the principle investigators possession.

Risks and Benefits

There are no known risks to the participants in this study. The direct benefit to the individual participants would be an educational lesson that teaches awareness of the risk factors and health implications associated with childhood obesity. The lesson emphasized healthy living styles including a healthy diet and daily physical activity. The benefits to society will be the education of the effectiveness of educational intervention on childhood obesity risk factors. Implementation of educational lessons into school which focus on prevention of obesity and healthy lifestyles will increase children's understanding of the seriousness of obesity and promote healthier living amongst children. If childhood obesity can be
prevented through educational interventions, children will have a greater chance of maturing into healthy adults.
Chapter IV

Results

The instrument analyzed in this study was the 24 question survey on obesity risk factor awareness, nutrition, and importance of physical activity. The first 23 questions were answered using a Likert scale with the range of one to four. One represented the answer strongly disagree, two was for disagree, three was for agree, and four represented strongly agree. The pre and post survey were analyzed collectively instead of individually by student due to confidentiality standards. The sample population included 123 seventh grade students in a health and physical education class in a Lewis and Clark County middle school.

The research question explored in this research study related to the effectiveness of an educational intervention on children’s knowledge of obesity risk factors by comparing pre-survey scores to post-survey scores. The research hypothesis was $H_a \neq 0$: There is a statistically significant difference between pre and post-survey scores. The null hypothesis was $H_0 = 0$: There is no difference between pre and post-survey scores. The analysis of the pre and post-survey scores determined the effectiveness of the educational intervention as a complete unit and then by individual risk factor.

The results from the paired t-test of the entire group of pre-survey scores paired against all the post-survey scores showed statistical significance for the educational intervention as one whole unit. As shown
in Table 1, the p-value was below the value of 0.05 which was the set standard for determining statistical significance. Table 2 shows the means, t Stat, and p-value for each of the questions on the survey for the obesity awareness factor. Out of the nine questions for obesity awareness, six of them had a statistically significant difference between pre and post-survey scores. Table 3 shows the results for the physical activity factors. On three out of the seven questions students improved their scores significantly. Table 4 shows the results for the nutrition factors. Five out of the seven questions had significant differences. Table 5 shows the results from the food pyramid question. The students vastly improved their scores on this part of the survey with the mean on the pre-test at 1.870 to the mean on the post-test at 5.520.

Table 1. Overall t-Test: Paired Two Sample for Means

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Observations</th>
<th>Df</th>
<th>t Stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Survey</td>
<td>2.890</td>
<td>2952</td>
<td>2951</td>
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<tr>
<td>Post-Survey</td>
<td>3.292</td>
<td>2952</td>
<td>2951</td>
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<td></td>
</tr>
</tbody>
</table>

Table 2. Obesity Awareness t-Test: Paired Two Sample for Means

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Mean Pre-Survey</th>
<th>Mean Post-Survey</th>
<th>t Stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.780</td>
<td>3.268</td>
<td>-4.803</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>2</td>
<td>3.512</td>
<td>3.654</td>
<td>-1.392</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>3</td>
<td>3.398</td>
<td>3.447</td>
<td>-0.520</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>4</td>
<td>2.910</td>
<td>2.976</td>
<td>-0.623</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>5</td>
<td>3.032</td>
<td>3.228</td>
<td>-1.826</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>10</td>
<td>2.341</td>
<td>3.130</td>
<td>-8.392</td>
<td>&lt;0.05</td>
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<tr>
<td>11</td>
<td>2.667</td>
<td>3.114</td>
<td>-4.325</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>12</td>
<td>2.341</td>
<td>2.634</td>
<td>-3.036</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>23</td>
<td>2.211</td>
<td>2.967</td>
<td>-6.571</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>
Table 3. Physical Activity Factors t-Test: Paired Two Sample for Means

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Mean Pre-Survey</th>
<th>Post-Survey</th>
<th>t Stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>3.187</td>
<td>3.488</td>
<td>-3.259</td>
<td>&lt;0.05</td>
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<tr>
<td>17</td>
<td>3.431</td>
<td>3.715</td>
<td>-3.653</td>
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<td>18</td>
<td>3.260</td>
<td>3.390</td>
<td>-1.563</td>
<td>&gt;0.05</td>
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<tr>
<td>19</td>
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<tr>
<td>20</td>
<td>1.927</td>
<td>1.674</td>
<td>2.319</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>21</td>
<td>3.309</td>
<td>3.537</td>
<td>-2.378</td>
<td>&lt;0.05</td>
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<tr>
<td>22</td>
<td>3.496</td>
<td>3.569</td>
<td>-0.861</td>
<td>&gt;0.05</td>
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Table 4. Nutrition Factors t-Test: Paired Two Samples for Means

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Mean Pre-Survey</th>
<th>Post-Survey</th>
<th>t Stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>3.333</td>
<td>3.610</td>
<td>-3.869</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>8</td>
<td>2.935</td>
<td>3.203</td>
<td>-2.504</td>
<td>&lt;0.05</td>
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<td>9</td>
<td>2.252</td>
<td>3.065</td>
<td>-7.668</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>13</td>
<td>3.618</td>
<td>3.561</td>
<td>0.717</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>14</td>
<td>3.463</td>
<td>3.601</td>
<td>-1.595</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>15</td>
<td>2.691</td>
<td>3.292</td>
<td>-5.595</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>16</td>
<td>3.195</td>
<td>3.545</td>
<td>-3.473</td>
<td>&lt;0.05</td>
</tr>
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</table>

Table 5. Food Pyramid Question t-Test: Paired Two Samples for Means

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>t Stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Survey</td>
<td>1.870</td>
<td>-17.732</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Post-Survey</td>
<td>5.520</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter V
Discussion

The research question of this study was to determine the effectiveness of an educational intervention on children's knowledge about obesity risk factors. The educational intervention’s effectiveness was analyzed by surveying students’ opinions on the importance of certain healthy lifestyles and other obesity risk factors before and after the lesson. The intervention was effective in increasing the middle school students’ knowledge of obesity risk factors collectively. In order to determine the strengths and the weaknesses of the intervention, the results for the surveys were broken down into individual factors: obesity awareness, physical activity, and nutrition.

The obesity awareness factor had nine questions on the survey and on six of the questions students increased their understanding of the importance of these factors. The questions that the students had a significant difference in scores were the questions about the different factors that may cause obesity such as media sources, peer pressure, and genetics. Collectively, the sample population also had a significant increase in awareness of the rising obesity problem. The questions that the students did not significantly increase their scores on were questions about importance of being a healthy weight, the increased health problems associated with obesity, and outgrowing obesity later in life.
The importance of physical activity factor had the smallest percentage of scores that were significantly different in the post-survey. Student only improved their scores on three out of the seven questions about physical activity. Students improved their scores on questions about the importance of exercise in general, but did not understand the benefits of exercise or the correct amount of time per day that should be spent doing some kind of physical activity. This factor had the least amount of questions on the survey and had the least amount of significance.

Nutrition was the third factor of importance on the survey and in the intervention. There were seven questions on the survey on nutrition that were answered with the Likert scale and then the Food Pyramid inquiry was the final question. Five out of the seven questions answered with the Likert scale were significantly different in the post-survey. Students increased their knowledge about the risk in eating junk food and overeating. They also became more aware of the importance of drinking water and eating meals with their family. The questions that did not statistically differ were the questions about food variety in a healthy diet and importance of a good breakfast. The Food Pyramid had perhaps the most outstanding difference amongst pre and post-survey scores. On the pre-survey, the average score for understanding the Food Pyramid was 1.870. This means that the majority of the students only labeled one to two of the food groups correctly. In the post-test, the average score was
5.520 out of a high score of six. This vast improvement between the pre and post-survey food pyramid scores supports the idea that the intervention was effective in teaching students about the food groups on the pyramid.

An interesting finding from the survey was derived from a question added to the post-survey upon observation of the students during the pre-survey. Two of the students openly asked the principle investigator what the term obesity meant while taking the pre-survey. This happening inspired the addition of the yes or no question on the post-survey: I have heard of obesity before this lesson and I knew what it meant? There were 24 students out of class of 123 that answered “No” to this question. The fact that nearly 20% of the seventh grade students had either never heard of the term obesity or did not understand what it meant is outstanding. This implied either a lack of knowledge about obesity or a lack of vocabulary.

The results from the analysis of pre and post-survey scores show the strengths and weaknesses of the intervention. The intervention was successful overall in making students more aware of obesity and the specific risk factors. By risk factor, the majority of the obesity awareness and nutrition questions had statistically significant improvements on the post-survey. The physical activity factor did not have the majority of questions with significantly higher scores. This shows that the intervention was more effective in teaching about obesity awareness and nutrition, and
not as effective in portraying the importance and benefits of physical activity.

Upon reviewing the methodology and results, there are several alterations that could be made to improve this intervention. The intervention covered the three key factors in childhood obesity over a course of two 50 minute class periods. The amount of information that could be taught to the students in an interactive style was limited due to time constraints of only having two class periods for the intervention. Extending the intervention over several consecutive days would possibly be more effective in teaching more information about obesity risk factors and would give time for review of material discussed in previous lessons. More information spread out over a longer period of time with opportunity for reviewing previous material could possibly lead to long term comprehension about obesity risk factors and healthy lifestyles.

Another factor that was not addressed in this study was that of special education students participating in the intervention. There were 11 students in the class of 123 that had special needs and in normal test taking would have had the test read to them. This may have skewed the results slightly because 11 of the students may not have answered the questions on the survey to the best of their ability because of varying comprehension levels. In future interventions in the school setting, special education children participating should receive the extra help they need in
order to get the most out of the intervention as well as to not skew the results.

In conclusion, efforts to reduce childhood obesity are imperative in restoring the health of the younger generation in the United States. The majority of children spend a significant amount of time in the school environment making educational settings a great opportunity for health interventions. This pilot study aimed to assess the effectiveness of educational intervention on middle school students’ obesity awareness, importance of physical activity and nutrition. This study found that a small-scale intervention may provide some improvement in middle school students’ awareness of obesity risk factors and the importance of physical activity and healthy diets. It is important for children to develop healthy behaviors at a young age so that unhealthy behaviors do not carry over into their adult lives. More extensive interventions are needed for maximum benefit and long term impact and also to determine if knowledge makes a difference in actual behavior change to healthy choices.
References


Appendix

A. Pre/Post Survey
B. PowerPoint Presentation
C. MyPyramid
D. Activity Pyramid
E. Somatotyping Worksheet
F. Body Comp Patrol Activity
G. Caloric Imbalance Poster
Appendix A: Survey

**Circle the NUMBER that you think best fits the question**

**Strongly disagree=1  Disagree=2  Agree=3  Strongly Agree=4**

1) Childhood obesity is increasing within my school, community, and country?

   1 2 3 4

2) Being a normal weight is important for me to be a healthy person?

   1 2 3 4

3) Obese children have a higher risk of developing health problems associated with their weight such as diabetes?

   1 2 3 4

4) Most obese children will outgrow their obesity and be a normal weight as an adult?

   1 2 3 4

5) Obese children may have more problems with self-esteem and friendships?

   1 2 3 4

6) Poor eating behaviors such as eating junk food (candy bars, chips, cookies) everyday has a major role in causing obesity?

   1 2 3 4

7) Playing video games, watching TV, or spending time on the computer instead of playing outside or participating in a sport has a major role in causing obesity?

   1 2 3 4

8) Overeating at every meal has a major role in causing obesity?

   1 2 3 4

9) Vending machines in schools have a major role in causing obesity?

   1 2 3 4
10) Magazines, movies, and TV commercials (media) all play a major role in causing obesity?

1 2 3 4

11) Peer pressure (peers exercise and eating habits) plays a major role in causing obesity?

1 2 3 4

12) If other people in your family are obese, you are more likely to become obese?

1 2 3 4

13) Eating a variety of foods (fiber, protein, vegetables, fruit, dairy sources) each day contributes to a healthy diet?

1 2 3 4

14) It is important to eat a good, nutritious breakfast every morning to be healthy?

1 2 3 4

15) It is important for families to eat together on most nights to be healthy?

1 2 3 4

16) Drinking 8 glasses of water every day is important to be healthy?

1 2 3 4

17) Is it important for to do some kind of exercise for at least 60 minutes every day to be healthy?

1 2 3 4

18) Exercising regularly can provide stress relief and relaxation?

1 2 3 4

19) Walking for short distances (10 minutes) or doing minimal amount of activity is sufficient to be healthy and prevent poor health effects.

1 2 3 4

20) Doing 30-60 minutes of moderate to vigorous exercise 3 days a week is sufficient to maintain a healthy body weight

1 2 3 4
21) Burning calories during exercise is essential in maintaining a healthy body weight.

22) Participating in physical activities and sports teams with peers are good ways to meet friends and build relationships.

23) A BMI (body mass index) of 32 is a healthy BMI?

Food Pyramid Exercise
Name the food group that each color stands for:
Appendix B: PowerPoint Intervention

### Definition of Childhood Obesity

- Childhood obesity is the result of caloric imbalance
  - Too few calories expended for the amount consumed
- Caloric Balance poster
  - (Nygard and Hopper, 1998)

### Childhood Obesity Facts

- Childhood obesity has increased
  - Prevalence in 12-19 year olds have gone from 5% to 18%
- Risk factors
  - Cardiovascular disease
  - Bone and joint problems
  - Sleep apnea
- Obese youth are more likely to be obese adults.
  - (CDC, 2010)

### Montana Facts

- The 2009 Montana Youth Risk Behavior Survey indicates that among high school students:
  - 10% were obese (students who were > 95th percentile for body mass index, by age and sex, based on reference data).

### Dietary Behaviors

- Unhealthy Dietary Behaviors
  - 82% ate fruits and vegetables less than five times per day during the 7 days before the survey.
  - 73% ate fruit or drank 100% fruit juices less than two times per day during the 7 days before the survey.
  - 87% ate vegetables less than three times per day during the 7 days before the survey.
  - 26% drank a can, bottle, or glass of soda or pop at least one time per day during the 7 days before the survey.

### Physical Inactivity

- Physical Inactivity
  - 13% did not participate in at least 60 minutes of physical activity on any day during the 7 days before the survey.
  - 79% were physically active at least 60 minutes per day on less than 7 days during the 7 days before the survey.
  - 42% did not attend physical education (PE) classes in an average week when they were in school.
  - 68% did not attend PE classes daily when they were in school.
  - 26% watched television 3 or more hours per day on an average school day.
  - 18% used computers 3 or more hours per day on an average school day.
Appendix B: Continued

Body Composition

Fat vs. Muscle

Importance of Fat

- Healthy Levels of Fat Mass are essential for:
  1. Insulation of organs
  2. Protection of organs
  3. Absorbing vitamins
  4. Nerve conduction
  5. Energy

Two Factors that affect BC

- Body Composition is affected by:
  1. The number of calories eaten (energy in)
  2. Amount of activity performed (energy out)

- Controllable Factors
  1. Healthy diet (energy in)
  2. Increased physical activity (energy out)

Influences on Body Composition

- Genetics
  - Genes passed on from our parents.
- Eating patterns
  - High or low fat diet
- The total number of fat cells that you have.
- The amount of physical activity you do.

Body Types

- Somatotype
  - The type of body shape you have based on genetics.
- 3 different body types
  - Endomorph (heavier, rounder appearance)
  - Mesomorph (muscular appearance)
  - Ectomorph (thin appearance)
Body Comp Patrol Activity
- Divide students into 4 equal teams.
- Give each team 4 white balls (fat) and 16 red balls (muscle) and place in a hula hoop. This represents a body that is 20% body fat—healthy range for both male and female.
- Object: teams will try to lose all their fat (white) by running to the other teams’ hoops (one person from each team at a time) and dropping 1 of their fat balls into their hoop and taking 1 muscle ball back to their own hoop.
- At the end of two minutes, teams will calculate their body fat percentages and compare that to healthy ranges.

Body Fat Percentage
- How much body fat is healthy?
- BMI = Body Mass Index
- Obese > 30, Overweight 25-29.9, Normal 18.5-24.5

<table>
<thead>
<tr>
<th>Classification</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessively Lean</td>
<td>under 5%</td>
<td>under 8%</td>
</tr>
<tr>
<td>Lean (high performance)</td>
<td>5-9%</td>
<td>8-17%</td>
</tr>
<tr>
<td>Healthy</td>
<td>10-20%</td>
<td>18-25%</td>
</tr>
<tr>
<td>Moderate</td>
<td>21-25%</td>
<td>26-32%</td>
</tr>
<tr>
<td>Obese</td>
<td>over 25%</td>
<td>over 32%</td>
</tr>
</tbody>
</table>

How to Improve Muscle Power
- Walk instead of drive.
- Mow the lawn with a walking mower instead of riding one.
- Volunteer to shovel snow.
- Stairs instead of the elevator.
- Park farther away from your destinations.
- Less screen time.

Muscle Power
- Brief piece of history: In the last 100 years, we have become a nation of people that is rapidly approaching an unhealthy epidemic. In large part the epidemic is caused by a lack of exercise and unhealthy eating habits. At the beginning of the 20th century, human muscle power provided 33% of the energy needed to run the farms, homes and factories.

What is Muscle Power
- How much our bodies are used to complete tasks.
- In what ways do you think people used “muscle power” in their lives 50-100 years ago? (Brainstorm)
- Muscle power provided 33% of our energy at the start of the 20th century. What percentage do you think is used today?

Outside Influences
- Media (food commercials, magazine covers)
  - Commercials can influence behavior
  - Can also be used to address current obesity problem
- Peer pressure (as a group how are you eating/behaving (activity), most social activities include food)
- Food choices (vending machines, etc.)
Appendix B: Continued

Nutrients
• 6 classes of nutrients
  – Water
  – Vitamins
  – Minerals
  – Protein
  – Carbohydrates
  – Fats

Of these nutrients...
• Which is the most important?
  – Water (at least 8 glasses per day)
• Which ones provide us with energy?
  – Carbohydrates, Protein, Fats
• Which one should you consume the most in your daily diet?
  – Carbohydrates
• How much of your daily calories should come from fat and protein?
  – 30% from fat (less than)
  – 12% from protein

Food Pyramid
• http://www.mypyramid.gov/
• Online activity
  • http://www.dairycouncilofca.org/Tools/MyPyramid/

Activity Pyramid

Daily Physical Activity
• Be active at least 60 minutes per day
• Do 10 minute bursts of activity at a time
  IT ALL ADDS UP!
Appendix B: Continued

Ways to avoid obesity

• Eat 3-5 small nutritious meals per day
• Eat serving sizes that fall within the food pyramid guidelines
• Avoid “vending machine” snacks
• Eat a variety of “healthy” foods
• Don’t skip meals (breakfast)
• Eat as a family
• Media (magazines, TV, etc.)
Appendix C: MyPyramid

MyPyramid

STEPS TO A HEALTHIER YOU

MyPyramid.gov

<table>
<thead>
<tr>
<th>GRAINS</th>
<th>VEGETABLES</th>
<th>FRUITS</th>
<th>MILK</th>
<th>MEAT &amp; BEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make half your grains whole. Eat at least 3 oz. of whole-grain cereals, breads, crackers, rice, or pasta every day. 1 oz. is about 1 slice of bread, about 1 cup of breakfast cereal, or 1/2 cup of cooked rice, cereal, or pasta.</td>
<td>Eat more dark-green veggies like broccoli, spinach, and other dark leafy greens. Eat more orange vegetables like carrots and sweetpotatoes. Eat more dry beans and peas like pinto beans, kidney beans, and lentils. Vary your veggies.</td>
<td>Eat a variety of fruit. Choose fresh, frozen, canned, or dried fruit. Go easy on fruit juices.</td>
<td>Go low-fat or fat-free when you choose milk, yogurt, and other milk products. If you can’t or can’t consume milk, choose lactose-free products or other calcium sources such as fortified foods and beverages. Get your calcium-rich foods.</td>
<td>Choose low-fat or lean meats and poultry. Bake it, broil it, or grill it. Vary your protein routine - choose more fish, beans, peas, nuts, and seeds. Go lean with protein.</td>
</tr>
</tbody>
</table>
Appendix E: Somatotyping Worksheet

Somatotyping Worksheet

NAME: ____________________________ CLASS: ____________________________

Somatotyping is a method of classifying body types. Most people have some characteristics of each body type to some degree. This worksheet will help you determine which body type you have.

Directions: Review the lists under each of the three somatotypes shown below. Place a check in the space next to each characteristic you have. When completed, add up the total number of checks under each somatotype or body type. You should end up with three numbers - one for Endomorph, one for Mesomorph and one for Ectomorph. Remember, most people are a combination of at least two body types. For example, a wrestler might have a 3-5-1 somatotype, which means his body type is a combination of Endomorph and Mesomorph. Since he has more characteristics of a Mesomorph, he would be considered a Meso-Endomorph.

Endomorph 1 2 3 4 5 6 7

Mesomorph 1 2 3 4 5 6 7

Ectomorph 1 2 3 4 5 6 7

- high percentage of body fat
- short neck
- large abdomen
- wide hips
- round, full buttocks
- short, heavy legs
- under-developed muscles

- firm, well-developed muscles
- large bones
- broad shoulders
- muscular arms
- trim waist
- muscular buttocks
- powerful legs

- small bones
- thin muscles
- slender arms & legs
- narrow chest
- round shoulders
- flat abdomen
- small buttocks

Based on this worksheet, my personal Somatotype rating is ____________________________ which means I have a ____________________________ body type.

(this can be one or a combination of body types)
Appendix F: Caloric Imbalance Poster