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Effects of a School-Based Education Intervention on BMI and Physical Activity

Lauren M. Panner
Valparaiso University

EFFECTS OF A SCHOOL-BASED EDUCATION INTERVENTION ON BMI AND PHYSICAL ACTIVITY

by

LAUREN M. PANNER, BSN, RN, DNP STUDENT

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DEDICATION

This paper is dedicated to my grandmother, “Amma.” Thank you for always encouraging me and believing in me. I could never have done this without your love, support, and perfectly timed pick-me-ups. The world is better because you are in it. Thank you, also, to the rest of my family without whom I could not have completed this project. Finally, to my husband Jon, my best friend and encourager–thank you for pushing me when I needed it most.

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ABSTRACT

In 2011, the CDC reported that there are 12.5 million obese children and adolescents living in the United States (U.S.). The financial burden of childhood obesity in the U.S. is estimated to be 14 billion dollars. The objective of this evidence-based practice (EBP) project was to answer the question: In school-aged children, how does school-based, structured, family-oriented physical activity education affect body mass index (BMI) compared to usual education over an eight-week time period? The Stetler Model of EBP and the health belief model were used to guide this project in a rural, Northwest Indiana elementary school. For eight weeks, fourth and fifth grade students received an additional 30 minutes of classroom education per week about the importance of physical activity and suggestions for increasing daily physical activity using the "Wellness, Academics, and You" (WAY) program as well as other evidence-based materials. Students also participated in brief exercises led by the project facilitator in the classroom each week. Pre- and post-intervention BMIs were measured and compared. BMI data were analyzed using paired *t*-tests. Although no statistically significant differences in BMI were found (p=0.936), 18.02% (n=20) students lost more than one pound over the eight-week intervention period and 8.12% (n=9) students lost four pounds or more. Future projects with similar objectives to this EBP project may benefit from a longer intervention period.

Keywords: childhood obesity, school-aged children, physical activity education

CHAPTER 1

INTRODUCTION

Evidence-based practice (EBP) is imperative to the delivery of high quality healthcare and positive patient outcomes (Melnyk & Fineout-Overholt, 2011). The first step in the EBP process is cultivating a spirit of inquiry (Melynk & Fineout-Overholt, 2011). The advanced practice nurse (APN) who has a spirit of inquiry seeks to cultivate this characteristic in his or her surroundings and thus has the potential to influence practice change. Cultivating a spirit of inquiry and inspiring practice change is a monumental task, one that is not easily undertaken. Successful organizational change requires that the APN have a clear vision, a strategic plan, and great persistence in seeing the plan through (Melnyk & Fineout-Overholt, 2011). Using the EBP process, the APN incorporates external evidence found through a systematic search and appraisal of relevant research, clinical experience, and patient values to inform decisions (Melynk & Fineout-Overholt, 2011).

It is clear that in Northwest Indiana and throughout the nation, an evidence-based change is necessary with regards to childhood obesity. The proposed change for the small, rural elementary school was the incorporation of school-based, family-oriented physical activity education.

Background

According to the World Health Organization (WHO; 2012), “Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health” (para. 1). At its most basic level, overweight and obesity are preventable conditions caused by an imbalance of calories taken in and calories expended (WHO, 2012). The WHO (2012) stated that overweight and obesity are the fifth leading risk for death internationally with more than 2.8 million adult deaths caused annually. The Center for Disease Control and Prevention (CDC) (2012) noted that 35.7% of U.S. adults are

obese. In the state of Indiana, it was estimated that 29.4% of adults were obese in 2010 (CDC, 2012). Obesity in adults can lead to heart disease, stroke, and diabetes and in 2008 cost approximately 147 billion dollars in the United States (CDC, 2012). On average, the medical costs for an obese person in 2008 were approximately $1,500 higher than the medical costs for an individual whose weight was within a healthy range (CDC, 2012). According to Taylor, Mazzone, and Wrotniak (2005), 9.5% of healthcare costs in the United States can be attributed to obesity and inactivity.

Overweight in childhood is defined by the National Heart, Lung, and Blood Institute (2010) as “Having extra body weight from muscle, bone, fat, and/or water” (para. 1) and obesity is defined as “Having a high amount of extra body fat” (para. 1). Measurement of body mass index (BMI) is the most common measurement of overweight and obesity. A child is considered overweight when his or her BMI is between the 85th and 94th percentile and is considered obese when his or her BMI is between the 95th and the 98th percentile (Childhood Obesity Action Network, 2007). Levels of obesity and overweight in children have now reached epidemic proportions. According to the WHO (2012), there are more than 40 million overweight children in the world with approximately eight million overweight children living in developed countries such as the United States. The CDC (2011b) reports that there are 12.5 million obese children and adolescents ranging in age from 2 to 19 years old. This number has nearly tripled since 1980 (CDC, 2011a). In the state of Indiana, it is estimated that 29.9% of children are overweight or obese (National Initiative for Children’s Healthcare Quality, n.d.). Given the growing numbers of overweight and obese children in the United States, the time to intervene is now.

Statement of the Problem

For a proper perspective of the childhood obesity epidemic to be formed, one must first understand the potentially detrimental effects of being obese as a child. Upon

reading the abundance of information found throughout the literature, one can see the need for an intervention, like that found in this EBP project, to combat rising levels of obesity in children.

Data from the literature supporting the need for the project. Being obese as a child places the child at risk for a number of ailments–both throughout childhood and as an adult. Taylor and colleagues (2005) stated, “Significant consequences are associated with childhood obesity that affects multiple body systems and the child’s overall health and well-being” (p. 180). Shaya, Flores, Gbarayor, and Wang (2008) noted that overweight and obesity in childhood and adolescence can persist into adulthood. This is supported by Freedman, Dietz, Srinivasan, and Berenson (1999) who found that obese children ranging in age from 2 to 5 years old were more than four times as likely to be overweight or obese in adulthood.

Heart disease is commonly cited throughout the literature as a condition which obese children are predisposed to due to their weight (CDC 2011a; Daniels et al., 2005; U.S. Department of Health and Human Services, 2010; U.S. Preventative Services Task Force, 2009). According to Daniels and colleagues (2005), overweight and obese children are more likely to suffer from hypertension, obstructive sleep apnea, left ventricular hypertrophy, and perhaps even atherosclerosis. In fact, Shaya and colleagues (2008) noted that the leading cause of hypertension in pediatrics is obesity. Freedman and colleagues (1999) found, “Even among 7- to 8-year-olds, overweight is consistently related to several CVD risk factors” (p. 1181).

Children who are overweight or obese are also more likely to have type 2 diabetes than children who maintain a healthy weight (CDC 2011a, Daniels et al., 2005, Nihiser et al., 2007; Taylor et al., 2005). Taylor and colleagues (2005) stated that among new patients diagnosed with type 2 diabetes, more than 90% had a BMI higher than the 90th percentile. Daniels and colleagues (2005) said, “Type 2 diabetes mellitus had been

primarily a disease of adulthood; however, type 2 diabetes now occurs in adolescents" (p. 2002). The authors went on to discuss the risk associated with type 2 diabetes in adolescence. They said, "If adolescents with type 2 diabetes mellitus do have risk for CVD that is similar to that in adults, then it means that they may experience adverse cardiovascular outcomes in the third or fourth decade of life" (Daniels et al., 2005, p. 2003).

In addition to physical risk factors, there are emotional risk factors associated with being overweight or obese as a child. Luzier, Berlin, and Weeks (2010) stated that these psychological conditions may persist in adulthood. They said, "There are also links between childhood obesity and the increased likelihood of depression and low self-esteem in adulthood" (Luzier, Berlin, & Weeks, 2010, p. 314). Goodman and Whittaker (2002) noted that there is an association between depression and overweight in childhood. In their prospective study of 9,374 adolescents, it was noted that depression scores based on the Center for Epidemiologic Studies Depression Scale were highest in children whose BMI had shown the greatest increase over the past year. Low self-esteem is a common psychological consequence of overweight and obesity in childhood (Luzier et al., 2010). According to Luzier and colleagues (2010), among obese girls, 34% had significantly low self-esteem compared to only 8% in their peers who maintained a healthy weight.

The school setting is an environment in which BMI reduction interventions can successfully be implemented. Spiegal and Foulk (2006) examined 1013 children from 69 different fourth and fifth grade classes and found that their program was well-received by teachers and students and had a positive influence on changes in BMI and physical activity. Furthermore, Nihiser and colleagues (2007) called for an increase in the number of studies which examine the effectiveness of collecting BMI data in schools. They stated, "A stronger research base could provide states, school districts, and schools with

critical information they need to determine whether to implement a school-based BMI measurement program" (Nihiser et al., 2007, p. 667).

Family involvement is imperative to the success of BMI reduction efforts in school-aged children. Kitzmann and Beech (2006) reviewed 31 family-based intervention programs and determined that family-based interventions targeting childhood obesity were more effective than comparison, child-only intervention programs. Luzier and colleagues (2010) stated that family interventions are common and effective, even more so when multiple family members become involved. Golan and Weizmann (2007) said, "All educational efforts are with the parents to assist them in making changes in their parenting behavior and in changing the environment to assist the obese child in developing better eating and activity habits" (p. 103). The reason for the success of interventions involving obese children's parents is, according to Budd and Hayman (2006), due to the fact that "The parent or primary caregiver is a major influence on children's early patterns of dietary intake and physical activity" (p. 341). Knowing this, it becomes clear that the parent or primary caregiver should be directly involved in interventions targeted at weight loss in children.

Data from the clinical agency supporting the need for the project. The total number of students in the fourth and fifth grade classes included in the EBP project was 140. Of these 140 students, 111 participated in the measurement arm of the project. At baseline, the average height was 57.29 inches, the average weight was 87.90 pounds, and the average BMI was 18.62, which is considered a healthy BMI. Baseline BMIs of the participants ranged from 12.07 to 31.10, meaning students ranged from slightly underweight to obese. Slightly more than 7% (n=8) of the participants were underweight at baseline, 70.27% (n=78) maintained a healthy weight, 14.41% (n=16) were overweight, and 8.12% (n=9) were obese. Thus, of the 111 participants, 22.53% were considered overweight or obese, which is very near to the National Initiative for

Children's Healthcare Quality (n.d.) estimate of the number of overweight and obese children in the state of Indiana.

Purpose of the EBP Project

The purpose of this EBP project was to reduce the BMI scores of overweight and obese children using school-based, family-oriented education. Additionally, it was hoped that the project would increase the amount of time children spend engaging in physical exercise.

Identifying the compelling clinical question. The compelling clinical question to be answered by this EBP project was: In school-aged children with a BMI at or above the 85th percentile, does school-based, structured, family-oriented physical activity education compared to usual education affect BMI over an eight-week time period? The project incorporated: a) familial involvement, b) structured physical activity lessons to decrease levels of inactivity among families, and c) evaluation of the feasibility and effectiveness of the project.

PICOT format. The EBP question asked in the proposed project was developed using the PICOT format. Using this format requires consideration of the essential components of a compelling clinical question. In developing a PICOT question, the population of interest (P), the issue or intervention of interest (I), the comparison group (C), the outcome to be measured (O), and the time frame of the intervention (T) must be clearly articulated (Fineout-Overholt & Stillwell, 2011). The clear articulation of each of these imperative components is demonstrated by the following:

P – The population of interest for the EBP project was school-aged children with a BMI greater than the 85th percentile (Johnston et al., 2010; Taylor, Mazzone, Wrotniak, 2005). School-aged children were targeted in accordance to the division of age groups set by the U.S. Department of Health and Human Services (2011). It was believed that children in this age group would be able to

communicate effectively with their caregiver(s) and to participate meaningfully in the intervention.

I – The intervention of interest was formal education directed towards children and their caregiver(s) which focused specifically on physical activity. A variety of physical activities and learning strategies were incorporated into the intervention program. Physical activity interventions were identified throughout the literature. Those which contributed most significantly to BMI reduction were retained (Caballero et al., 2003; Hopper et al., 1992; Johnston et al., 2010; Sahota et al., 2001; Salmon et al. 2008; Shaya et al., 2008; Spiegel & Foulk, 2006; Taylor et al., 2005; Verstraete et al., 2006).

C – The comparison of interest is baseline data collected before students were exposed to the intervention.

O – The primary outcome of interest was BMI, which was calculated using measures of height and weight. An additional outcome of interest was time spend engaging in physical activity per day.

T – The EBP project took place over eight week's time during the second quarter of the 2012 fall semester.

Significance of the Project

This EBP project included the implementation and evaluation of an evidence-based education program to reduce the BMI of overweight and obese school-aged children. It was hoped that the implementation of the proposed program would also lead to an increase in levels of physical activity in children. Ultimately, it was anticipated that the successful implementation of formal education about exercise would contribute to healthier children, caregiver(s), and the school community as a whole.

With successful implementation of this program, it was anticipated that support for the incorporation of physical activity courses into school curriculums will grow. It is a

Healthy People 2020 goal to reduce the proportion of children and adolescents who are considered obese from a baseline of 16.2% to a target goal of 14.6% (U.S. Department of Health and Human Services, 2011). In children ages 6 to 11 years old, the goal is to reduce the number of obese children from 17.4% to 15.7%, representing a 10% improvement in this population (U.S. Department of Health and Human Services, 2011). The implementation of school-based, family-oriented interventions has the potential to contribute to these Healthy People 2020 goals.

Not only would the successful implementation of this project benefit the children, caregiver(s), and school system involved, it would also benefit school administrators and healthcare providers by providing further support for family-based interventions that target childhood obesity. In addition to the tremendous amount of literature on the consequences of obesity in childhood, literature concerning the effectiveness of family-oriented therapy and behavior modification abounds. Pamaiahgari (2010) said, "Decisions regarding strategies to improve the weight status of children should include multiple stakeholders (families, school environments) and aim for behaviour change in physical activity, sedentary behaviour, and healthier food choices" (p. 2). This practice recommendation (given an effectiveness grade B) from the Joanna Briggs Institute (JBI) points to the importance of including both caregiver(s) and schools in childhood obesity interventions. Implementation of this EBP project followed this recommendation and provided further support for childhood obesity interventions occurring outside of the primary care setting.

CHAPTER 2

FRAMEWORKS AND REVIEW OF LITERATURE

Theoretical Framework: Health Belief Model (HBM)

The health belief model (HBM) was developed by Rosenstock, a social psychologist, in the 1960s (Carpenter, 2010). According to Carpenter (2010), the original focus of the HBM was on "The efforts of those who sought to improve public health by understanding why people failed to adopt a preventative health measure" (p. 661). Since the HBM's origination, it has been deemed a useful tool for assessment and management of health promotion and illness prevention (Roden, 2004a). It is now perhaps an even more useful tool as it has been revised for application to young families (Roden, 2004a).

To best understand the revised version of the HBM, a brief discussion of the original model is necessary. The key constructs of the HBM include: a) perceived susceptibility, b) perceived severity, c) perceived benefits, d) perceived barriers, e) cues to action, and f) self-efficacy (Champion & Skinner, 2008). Perceived susceptibility in this EBP project was assessed with students in the classroom through discussion and a lesson from the WAY curriculum. Perceived severity was assessed to determine student's feelings about the seriousness of being overweight or obese. To determine this, knowledge of the risks and consequences of obesity was assessed. Additionally, it was noted by Champion and Skinner (2008) that potential social consequences must be considered as a component of severity. In the case of obesity, such consequences include lost work, lost productivity, and social stigma. Perceived benefits to losing weight and maintaining a healthy weight, and engaging in regular physical activity were discussed in the classroom. Students also received a handout with information about the many benefits of physical activity and were encouraged to share this information with their families. Champion and Skinner (2008) said, "Whether this perception [of threat]

leads to behavior change will be influenced by the person's beliefs regarding perceived *benefits* of the various available actions for reducing the disease threat" (p. 47). Perceived barriers may include not having adequate space to exercise, not having the financial ability to afford a gym membership, or feeling unsafe exercising outside of the home environment. Perceived barriers to adopting healthy exercise habits were assessed during discussion and lessons with the students and included not having enough time and bad weather outside without ample space inside to run and play.

Cues to action and self-efficacy were important variables to consider in the development and implementation of the EBP project. Champion and Skinner (2008) suggested providing how-to information and using appropriate reminder systems to cue subjects to take action. In this EBP project, this was achieved by using specific how-to information directed towards students and their families. The how-to information that was used was sent home with the students and parents were encouraged to review this information with their child and to use it in their homes. Self-efficacy refers to the belief one has about his or her ability to successfully change behavior so as to achieve desired results. In this EBP project, self-efficacy was defined as the belief one has that he or she is able to adopt and sustain healthy physical exercise habits. Finally, Champion and Skinner (2008) discussed the importance of consideration of other variables that may influence behavior. These variables can be demographic, sociopsychological, and structural in nature (Champion & Skinner, 2008).

The revised health-belief model. The revised HBM "Takes into account the integral part that parents play in the development of a child's health behaviors and values" (Garrett-Wright, 2011, p. 436). Furthermore, the model is specifically designed for application to young families (Garrett-Wright, 2011). The three main components of the revised HBM are: a) parental perceptions, b) modifying factors, and c) likelihood of action (Roden, 2004b). The concept of parental perceptions refers to the caregiver(s)'s

perceived behavioral control (PBC) over health behaviors. PBC is a concept that was borrowed from Azjen's theory of planned behavior, which was developed in an attempt to address the common criticism that the HBM does not account for the notion of not always being in control (Roden, 2004a). In this EBP project, PBC was defined as the caregiver(s)'s perceived control over a child's exercise habits. The caregiver(s)'s PBC is dependent upon the environment, economics, competence, and time and organization (Roden, 2004b).

Modifying factors include demographic variables, sociopsychological variables, structural variables, perceived notion of health, and cues to action (Roden, 2004a). Demographic and sociopsychological variables include things such as age, ethnicity, personality, and peer groups (Roden, 2004a). In the EBP project, these variables were assessed using the demographics form found in Appendix A which was completed by all consenting caregivers. Structural variables are concerned with one's knowledge of health or disease and one's prior contact with health and disease (Roden, 2004a). In this EBP project, structural variables were assessed and briefly discussed with the students. This concept lends itself to the concept of perceived notion of health. Unlike the original HBM, perceived threat of disease is not emphasized here (Roden, 2004a). Instead, the focus is placed on participant's idea of positive health and mechanisms to ensure health awareness. Finally, and of particular relevance to this EBP project, is the key concept of cues to action. The focus of this key concept is caregiver(s)'s internal and external personal perceptions. For example, do parents perceive their child's weight accurately? How does this intervention correlate or conflict with mass media messages? In this EBP project, many media efforts directed towards healthy eating and exercise, such as the National Football League's (NFL) *Play 60* campaign (NFL, 2012) and First Lady Michelle Obama's *Let's Move campaign*, were taken into consideration. Nearly all students were familiar with these national initiatives. Likelihood of action depends on behavioral

intention and the perceived benefits and barriers of taking a given action (Roden, 2004a). Determining likelihood of action requires assessing one's perceived benefits of and barriers to the intended health related behavior (Roden, 2004a). The concept of likelihood of action requires the consideration of bodily and environmental events (Champion & Skinner, 2008) and thus it was necessary to gain a basic understanding of the environmental setting in which the majority of participants live. Environmental factors which were considered include a) is the home area safe enough for outdoor exercise, b) what kind of facilities (e.g. gyms, playgrounds, etc.) are available in the area? Environmental factors should also be considered as they relate to the school: At the school, do children have adequate time and space to exercise? It was determined through demographic assessment and conversations with the student nurse and teachers that the area in which the project was completed is generally safe, there are few gyms but many playgrounds that are easily accessible, and that the students have adequate time and space to exercise at school. Students have two 45-minute physical education classes per week and two recesses per day during which a majority of the students engage in moderate to vigorous physical activity outdoors.

The revised HBM is very applicable to this EBP project. In fact, Roden (2004b) suggested that the revised HBM would be useful in working with families with obese children. She said, "A revised HBM for young families would assist nurses to develop educational programs for promoting family exercise or for promoting family nutrition" (Roden, 2004b, p. 247). The HBM has been used to guide research and intervention implementation in the area of childhood obesity. Jacobson Vann and colleagues (2011) used the HBM to guide their pilot study of perceived barriers to healthy eating and activity levels in children. Garrett-Wright (2011) used the revised HBM in her descriptive cross-sectional study which measured parental perception of their child's weight. The goal of this EBP project was to develop and deliver an educational intervention that

would encourage healthy exercise habits in families with young children in an effort to decrease childhood obesity rates. Using the revised HBM, appropriate education was developed for implementation in the school setting. Knowledge of common perceived benefits and barriers, demographic and sociopsychological variables, and perceived control over health was essential for creating an efficacious intervention.

A strength of the revised HBM as it applies to the EBP project is its unmistakable application to childhood obesity in the literature. Jacobson Vann and colleagues (2011) used the HBM with two additional theoretical frameworks to guide the development of the Starting the Conversation screening tool which is focused on healthy eating and physical activity. The developers of this tool used the HBM to identify perceived barriers to making behavior changes in the areas of nutrition and exercise. Identifying these barriers, they said, “Is an important first step in helping families develops plans of action” (Jacobson Vann et al., 2011, p. 405). The revised HBM was also used by Garrett-Wright (2011) in her descriptive, correlational, cross-sectional study. Garret-Wright’s (2011) goal was to assess and measure parents’ perception of efficacy, their level of health literacy, their perception of their child’s weight, and their level of concern for the child’s weight. The revised HBM, she says, “Allows nurses to incorporate ‘positive’ health messages into the care of families and children in an attempt to increase the overall effectiveness of health promotion activities” (p. 436). Using the revised HBM as a guide, Garret-Wright (2011) found that 17.5% of children in the sample population were overweight according to the CDC guidelines, but only 6% of parents in the sample population perceived their child as overweight. Using the revised HBM to guide her work, Garret-Wright (2011) identified this important component in the battle against childhood obesity.

While the revised HBM provided a solid framework upon which to build the EBP project, it did not come without limitations. The revised HBM has been applied to

childhood obesity, but its use in this area has been limited. In a search of the major databases Academic Search Premier, CINAHL, ERIC, Health Source: Nursing/Academic Edition, MEDLINE, PsycARTICLES, PsycINFO, and PubMED, Jacobson Vann and colleagues' (2011) and Garret-Wright's (2011) studies were the only childhood obesity studies in which the revised HBM was applied. Roden (2004a) stated:

> Before nurses can accept and use the revised HBM for young families in their health promotion practice it needs to undergo rigorous testing and re-testing… Many validation studies are needed with appropriate samples of different and varied young families, including low and high socio-economic background families; single and two-parent families, and families from different ethnic backgrounds (p. 7).

The revised HBM's limited use with varying types of families is certainly a limitation of its application. However, in this EBP project, a variety of families were represented. This provided an opportunity to develop support for this theoretical framework in the area of childhood obesity.

Evidence-Based Framework: The Stetler Model of Evidence-Based Practice

There are a number of evidence-based models which would be suitable for use in conjunction with this EBP project. While the models differ in detail, all are comprised of common steps or phases: a) identification of a problem with current practice which needs to be addressed, b) searching for and appraising relevant literature, c) applying high-quality evidence to a specific practice setting, d) appropriately disseminating information, and e) thoroughly evaluating the EBP process used (Ciliska et al., 2012). Upon completion of an EBP project, processes to sustain practice change should be identified and implemented (Ciliska et al., 2012). Seven models for EBP were considered and reviewed and it was determined that the Stetler model of evidence-based practice provided the best fit for the EBP project.

The Stetler model originated in 1976 and has since been revised three times (Ciliska et al., 2012). The model “Reflects a practitioner-oriented approach, that has been updated within the context of EBP” (Stetler, 2001). At the core of the Stetler model are the ideas of critical thinking and the use of research (Ciliska et al., 2012). The model consists of five phases which are used to assess and determine appropriate uses for research findings in evidence-based nursing practice: a) preparation, b) validation, c) comparative evaluation and decision making, d) translation and application, and e) evaluation (Ciliska et al., 2012).

Preparation. The first phase of the Stetler model is the preparation phase and it is in this phase that the problem is defined, desired outcomes are determined, and the search for relevant evidence is started (Ciliska et al., 2012). It is during the preparation phase that one must consider internal factors, such as personal beliefs of the subjects, and external factors, such as politics or organizational priorities, which may influence the research process (Stetler, 2001). This EBP project began with the definition of a problem and the determination of desired outcomes. The identified problem was high rates of childhood obesity in the state of Indiana and the desired outcome was BMI reduction for children participating in the EBP intervention. Internal factors considered included the personal beliefs of the child and caregiver(s) involved and how these beliefs contributed to or interfered with the EBP project. For example, do the child and his or her caregivers believe that increasing physical activity will benefit their health? If not, motivation to participate may be lower than in a child who believes increasing daily physical activity will be beneficial. Another internal factor considered was the child and caregiver’s personal beliefs about exercise: Do they believe exercise must be formal and include an instructor or do they believe exercise can be incorporated seamlessly into daily life and made fun? These beliefs were important to consider in relation to this EBP project and were addressed by demonstrating how exercise could be incorporated into one’s daily

routine in a simple manner. External factors considered were the school system's priorities: Was this the right time to implement the project or did the school board have a different agenda for their fall semester? Furthermore, an external factor that was important in the designing of this project was the imposed deadline given by the University.

Validation. In the second phase, the validation phase, gathered evidence is reviewed and critiqued (Ciliska et al., 2012). Ciliska and colleagues (2012) noted that evidence should be critiqued with a specific use in mind. For this EBP project, evidence was critiqued with the knowledge that a similar school-based, family-oriented program would be developed and used in the intervention. Upon completion of critiques, the evidence was summarized in a way that related to the problem identified in the preparation phase. In this phase, evidence must be rated for quality and the level of evidence. Poor quality evidence is eliminated during the validation phase (Ciliska et al, 2011). In this EBP project, Melnyk and Fineout-Overholt's (2011) rating system for the hierarchy of evidence was used as well as Melynk and Fineout-Overholt's (2011) rapid appraisal checklists.

Comparative evaluation and decision making. In phase three of the Stetler model, the evidence must be synthesized in a logical and organized manner (Ciliska et al., 2012). This allows for decisions to be made as to what evidence will be used or not used in the specific EBP project (Stetler, 2001). Deciding whether or not evidence will be used depends on a number of factors including: a) feasibility of the practice change, b) fit of the change to the setting and qualifying factors, c) current practice including the urgency of the need and the risks of the intervention, and d) personal practitioner-level decisions (Ciliska et al., 2012). In this EBP project, the evidence was scrutinized to determine whether or not its use in the chosen school system was feasible. The urgency of the intervention compared to its risks must be considered as well. Given the relatively

low level of risk associated with this EBP project, a feasible intervention that fit well with the project setting was found in the literature.

Translation and application. Phase four of the Stetler model is the translation and application phase and it is in this phase that findings and decisions are applied in practice (Ciliska et al., 2012). In the translation and application phase the type, method, and level of the project must be determined followed by a review of the operational details of the proposed change (Stetler, 2001). In this EBP project, the type, method, and level of the intervention were determined by the evidence. The project was a direct, instrumental, individual project. According to Ciliska and colleagues (2012), this means that the aim was to change individual behavior using a formal, evidence-based instrument. The decision made to use evidence in phase three translates into designing evidence-based documents to be used for dissemination of results and sustaining the practice change if positive results are seen (Ciliska et al., 2012).

Evaluation. The final phase of the Stetler model involves assessing the completed project's success and evaluating whether or not outcome goals were achieved (Ciliska et al., 2012). When evaluating the success of a practice change, one must consider the costs and benefits of the change (Ciliska et al., 2012). Stetler (2001) noted that formative and summative data must be included in the evaluation phase. Formative data give clues as to whether the findings are being used in their proper context while summative data allows for assessment of the desired outcomes (Stetler, 2001). In this EBP project, formative and summative data was disseminated as part of the evaluation process. Summative data was focused on BMI scores before and after the intervention was implemented. Formative data included information on the subjects, setting, and intervention techniques to provide assurance that findings were disseminated in their proper context.

The Stetler model was an appropriate choice for this EBP project. The model was used to guide the process of EBP and to organize evidence, decisions, and findings along the way. The Stetler model is especially applicable to a doctoral EBP project because it “Reflects a practitioner-oriented approach” (Stetler, 2001, p. 272). Furthermore, the Stetler model promotes critical thinking and the safe application of evidence into practice. Stetler (2001) said, “Specifically, this model formulated a series of critical-thinking and decision-making steps designed to facilitate safe and effective use of research findings” (p. 273). A final reason that the Stetler model was chosen to guide this EBP project was the level of detail included in the model. Stetler (2001) included a detailed table of activities which must take place during each phase of the model. In the comparative evaluation and decision making phase, for example, Stetler (2001) noted that deciding what evidence to use can be a personal-practitioner decision or a recommendation. The strength of this decision must then be judged, and, in the case of formal recommendations, the degree of stakeholder consensus must be considered. It was these details that made the Stetler model the best choice for guidance of this EBP project.

Literature Search

Upon determination of an appropriate PICOT question, a review of the literature was undertaken. According to the Stetler model, which was used to guide development of the EBP project, this task is part of the validation phase (Stetler, 2001). A complete description of the search process, search results, and appraisal of the literature follows.

Search engines and key words. A search of the literature was conducted after the development and refinement of the PICOT question. Computer-based, electronic databases were searched followed by a hand search of relevant references. Ten electronic databases were searched, including: Academic Search Premier, Cochrane Collaboration and Library, Cumulative Index to Nursing and Allied Health Literature

(CINAHL), Education Resources Information Center (ERIC), Health Source Nursing/Academic Edition, Joanna Briggs Institute Clinical Online Network of Evidence for Care and Therapeutics (JBI ConNect), MEDLINE via EBSCO, ProQuest, PsycARTICLES, and PsycINFO. The following keywords were used to search these databases: obese and obesity separated with the Boolean operator OR; family therapy, behavior therapy, behavior modification, cognitive therapy, and cognitive behavior therapy each separated with the Boolean operator OR; and school and classroom, again separated with the Boolean operator OR. These key words were searched for within the abstracts of articles from scholarly, peer-reviewed journals found in Academic Search Premier, CINAHL, ERIC, Health Source, MEDLINE, ProQuest, and PsycInfo. The same keywords were searched in entire articles in the PyscARTICLES database. In the case of the Cochrane Library and JBI the title, abstract, and keywords were searched using the keywords obese and obesity separated with the Boolean operator OR and the keywords school and classroom separated by the Boolean operator OR.

Inclusion and exclusion criteria. To narrow the search to a manageable number and to ensure that the literature discovered addressed the specific PICOT question, strict inclusion criteria were used when searching the databases. To be included in the literature review, an article had to meet the following criteria: a) peer reviewed, b) research, c) written in the English language, d) involving the school setting, e) focused on school-aged children, and f) published after the year 2000. One article written in 1992 was included as it is considered a seminal article that is still referred to throughout the literature today. This article was acquired through a hand search of a literature review reference list.

References that were excluded in the literature review were ones which: a) focused on preschoolers, b) focused on adults or adolescents, c) focused on pharmaceutical or surgical interventions for childhood obesity, d) focused on only one

gender of school-aged children or e) focused on only students who were already considered obese. After establishment of these criteria, fitting abstracts were reviewed for their potential use within the literature review. A hand search of the reference lists of the literature review and the Cochrane review was undertaken to identify articles not identified in the previous database searches due to publication date criteria.

Initial results identified 20 references for potential use in this EBP project. The abstracts of these 20 references were reviewed and 12 articles were considered relevant to the proposed project. Full-text versions of each of the 12 articles were obtained and the articles were reviewed in full and critically appraised. Of these 12 articles, 10 were considered useful to this EBP project: one Cochrane review, one literature review, seven randomized control trials (RCTs) and one case-control study. The 10 articles which were not included were determined to violate inclusion criteria or fulfill exclusion criteria. Many of the articles which were not included, for example, focused on adolescents rather than on school-aged children.

Levels of evidence. Melnyk and Fineout-Overholt's (2011) rating system for the hierarchy of evidence was used to determine the level of evidence for each article obtained from the literature search. Level I evidence is evidence obtained from a systematic review or a meta-analysis of relevant RCTs. Level II evidence comes from well-designed RCTs. Level III evidence is obtained from controlled trials without randomization. Level IV evidence is obtained from a well-designed case-control or cohort study. Of the 10 articles gathered from the literature, two are Level I evidence, seven are level II evidence, and one is level IV evidence. The levels of evidence of the accepted literature are presented in Table 2.1 and a summary of the evidence is presented in Appendix B.

Appraisal of relevant evidence. Research about childhood obesity interventions in the school setting has been completed in a variety of ways. Evaluation of

these different methods of delivery has demonstrated the effectiveness of integrating targeted education about physical activity in the classroom, particularly with children in fourth, fifth, and sixth grade. Melnyk and Fineout-Overholt's (2011) rapid critical appraisal checklists were used to appraise the obtained literature.

***Level I evidence*.** Waters and colleagues (2011) used the Cochrane Collaborative review criteria to systematically review intervention literature for preventing obesity in children. The authors stated that they sought to determine "The effectiveness of evaluated interventions intended to prevent obesity in children, assessed by change in Body Mass Index (BMI)" (Waters et al., 2011, p. 1). Waters and colleagues (2011) reviewed literature found by searching CENTRAL, MEDLINE, EMBASE, PsychINFO, and CINAHL in March of 2010. Search terms and additional literature retrieval methods were clearly identified by Waters and colleagues (2011). In total, 55 references were found that met the authors' criteria: controlled trial with or without randomization, minimum intervention duration of 12 weeks, with the goal of studying an intervention designed to prevent obesity. Waters and colleagues (2011) stated, "Studies with interventions that included children who were already obese were included to reflect a public health approach that recognises the prevalence of a range of weight within the general population of children" (p. 5). It should also be noted that the studies included in Waters and colleagues' (2011) review were not exclusively school-based, representing community, home, childcare, and preschool or nursery interventions in addition to school-based interventions. Studies were organized based on age group studied and were reviewed independently by two review authors. Review authors used the PROGRESS checklist to collect data from the obtained articles. Individual patient data were not used in Waters and colleagues' (2011) review. Waters and colleagues (2011) determined that while there is strong evidence supporting programs which aim

Table 2.1

Levels of Evidence

Author (s)	Level of Evidence
Caballero et al. (2003)	II
Hopper et al. (1992)	II
Johnston et al. (2010)	II
Sahota et al. (2001)	II
Salmon et al. (2008)	II
Shaya et al. (2008)	I
Spiegel & Foulk (2006)	II
Taylor et al. (2005)	IV
Verstraete et al. (2006)	II
Waters et al. (2011)	I

to prevent childhood obesity through BMI reduction or stabilization, there also exist measures of heterogeneity and small study bias and thus, their findings must be carefully interpreted. Publication bias was determined using a funnel plot which showed an uneven distribution. This indicates that the studies included in Waters and colleagues' (2011) review may contain small study bias which could lead a heightened interpretation of the effectiveness of the intervention.

Of the 55 intervention studies included in Waters and colleagues' (2011) review, 39 targeted 6 to 12 year old children. Among these 39 studies, only 27 included BMI or standardized BMI (*z*BMI) data and were included in the meta-analysis. Analysis of these 27 articles yielded a statistically significant mean effect size of -0.15 (CI=95%: -0.23 to -0.08). Waters and colleagues (2011) also analyzed interventions which took place in an education setting and found that these had a similar effect size: -0.17 (CI=95%: -0.25 to -0.09; $P < 0.001$). Data from multiple settings and data from studies which took place outside of the school (n=7) were analyzed and produced a non-significant mean effect size of -0.07.

Shaya and colleagues (2008) conducted a literature review of school-based obesity interventions targeting children between the ages of 7 and 19 years of age. The authors searched OVID Medline and PubMed databases for articles meeting their inclusion criteria: an intervention targeting obesity, study population between the ages of 7 and 19 years old, pre- and posttest measures, and intervention implementation in the school setting (Shaya et al., 2008). Controlled studies were not required to be randomized to be included in Shaya and colleagues' (2008) review. A detailed description of the key words and search process was included. In total, 51 articles were found which met the authors' inclusion criteria. Of these 51 articles, 15 studied physical activity-only interventions, 16 studied education-only interventions, and 20 studied combination interventions. No individual patient data were used in this review. Results

were consistent across studies of the same intervention type with 13 of the 15 physical activity only studies (86.7%) having statistically significant results, 12 of the 16 education only studies (75%) having statistically significant results, and 15 of the 20 combination studies (75%) having statistically significant results.

***Level II evidence*.** Caballero and colleagues (2003) conducted a school-based RCT with third to fifth grade students in which the primary objective was to determine the efficacy of a school-based intervention designed to reduce percentage body fat. The three-year study took place in 41 schools which served American Indian communities in three states: Arizona, New Mexico, and South Dakota. The study population consisted of 1,704 students who were randomly assigned to an intervention group (n=879) or a control group (n=825). Attrition accounted for the loss of 152 intervention group students and 143 control group students leading to 727 intervention group students and 682 control group students being included in data analysis. Parental consent was obtained from all of the 1,409 students included in final data analysis. At baseline, the mean age of the students was 7.6 ±0.6 years.

Children in the intervention group of Caballero and colleagues' (2003) study received a multicomponent intervention involving classroom curricula, food service, physical activity, and family involvement. In third and fourth grade, intervention group students received two 45-minute lessons each week on healthful eating behaviors and increasing physical activity for 12 weeks. In the fifth grade, students received lessons for eight weeks to allow time for post-intervention measurements. Food services staff at intervention schools was given nutrition guidelines and other tools for helping to reduce the fat content of meals served at school. Food service staff members also received annual training in accordance with the Pathways Behavioral Guidelines and were visited regularly by licensed and experienced Pathways instructors. The Sports, Play and Active Recreation for Kids (SPARK) Program was used to increase physical activity in the

school setting at intervention schools. Three 30-minute sessions of moderate-to-vigorous activity were required per week at intervention schools. Additionally, 2 to 10-minute classroom exercise breaks were included in the intervention. The final component of Caballero and colleagues' (2003) intervention was family involvement. The Pathways program was used to encourage families to create a healthy environment and to promote healthy behaviors in the home. Take-home materials and family events at the schools made up this component of the intervention. Families were taught about healthy snack choices, healthy cooking options, and activities for developing a healthy lifestyle.

The primary outcome of Caballero and colleagues' (2003) study was percent body fat; other variables which were measured included weight, height, BMI, triceps skinfold thickness, and subscapular-skinfold thickness. The authors found no significant differences between male and female participants. Furthermore, the intervention and control groups were found to be similar at baseline or at follow-up. Caballero and colleagues (2003) found no significant differences in percent body fat between intervention and control groups at follow-up (p=1.81). The authors did, however, find statistically significant differences between the two groups in other areas. Children in the intervention schools consumed an average of 265 fewer calories and an average of 2.5% less fat compared to children in the control schools (P=0.003 and P=0.001, respectively). Food services interventions resulted in intervention schools' lunches having an average of 4.2% less fat than control schools' lunches (P=0.001). Finally, Caballero and colleagues (2003) noted a significant difference in knowledge that was targeted by Pathways curricula. At baseline, both intervention and control group third graders averaged 0.46 in knowledge of Pathways concepts. At follow-up, the intervention group third graders averaged 0.77 in knowledge compared to the control group average of 0.65 (P=0.001). Similar results were noted upon the completion of fifth

grade with the intervention students averaging 0.55 and the control students averaging 0.48 (*P*=0.001).

Hopper, Gruber, Munoz, and Herb (1992) completed a RCT with fifth and sixth grade students and their parents to determine the effect of involving parents in a family-oriented, school-based program about nutrition and exercise. The study population was composed of 132 fifth and sixth graders whose six classes were randomly assigned to a school-and-home (n=43), school-only (n=43), or control (n=44) group. Parents of the children in the school-and-home group participated with their children and were asked to complete informed consent forms for both themselves and their children. In total, 24 families participated in the study. The mean age of the children in the study population was 11.6 years and the mean age of the parents in the school-and-home group was 37.8 years. All groups were determined to be similar at pre-test. Children in the control group received no instruction about nutrition and exercise beyond what was normally provided by the school's curriculum.

Children in Hopper and colleagues' (1992) school-only and school-and-home intervention groups received nutrition and physical activity education and were involved in completing activities designed to aid in developing healthy habits in these areas. While the children of the school-and-home intervention group received the same in-school education and participated in the same in-school activities, their parents, who had been contacted by letter and by phone to participate in this project, were asked to engage their family in specific nutrition and exercise activities in the home setting. Additionally, the children were sent home weekly with a packet of information for their parents. These packets contained information on the specified nutrition and exercise activities and also provided a number of suggestions for the family. Hopper and colleagues (1992) used an incentive program to encourage families' continued participation. For each week nutrition goals were completed, the family received points.

Points were also received when exercise activities were completed, with aerobic exercises earning more points than anaerobic exercises.

Children in the intervention groups of Hopper and colleagues' (1992) study took part in 40-minute sessions during school time three times per week for a total of six weeks. These sessions were taught by their classroom teachers along with a physical education specialist. In these sessions, children also received education on different physical activity concepts such as pulse rate. Children in the intervention groups also received nutrition education from their classroom teacher, in conjunction with a nutrition education specialist, twice a week for thirty minutes each session for a total of six weeks. Preparing heart-healthy meals, reading food labels, and selecting high-energy foods were examples of topics covered in these sessions. In the school-and-home intervention group, families used the packets of information that their children brought home. These packets assisted families in setting goals for the week and provided education on healthy habits. The families completed a weekly score card to be turned in to the child's teacher. Follow-up phone calls were placed to families who did not turn in a weekly scorecard. Stickers and balloons were used to reward children whose families completed and turned in their score card each week.

Hopper and colleagues (1992) found that the school-only and school-and-home groups demonstrated statistically significant improvement while the control group did not. When focusing on single variables, such as nutrition knowledge, it was evident that the school-and-home group had improved significantly more than the school-only group. Students in the school-and-home group scored significantly higher than both the school-only and control groups on posttest exercise knowledge. The mean scores were as follows: 14.4 (SD=3.3) for students in the school-and-home group, 14.9 (SD=3.8) for students in the school-only group, and 11.7 (SD=3.3) for students in the control group. Improvement was also seen in nutrition knowledge with the school-and-home group

scoring an average of 11.2 (SD=2.6) and the control group scoring an average of 10.2 (SD=3.0). Furthermore, parents who participated benefited from the project as well. Hopper and colleagues (1992) noted that participating parents improved on flexibility from pretest (M=30.1) to posttest (M=33.9; $p<0.01$) and timed sit-ups from pretest (M=26.9) to posttest (M=33.9; $p<0.05$), and significantly reduced the amount of saturated fat in their diet from a pretest (M=38.5) to posttest (M=27.3; $p<0.05$).

Johnston and colleagues (2010) conducted a RCT in which children between the ages of 10 and 14 years of age were randomly assigned to a self-help (SH) group or an instructor-led intervention (ILI) group. In this study, 181 children were included in the sample population, but only the data of overweight and obese children were analyzed (n=60). Of the sample population, 40 of the obese and overweight children, 21 boys and 19 girls, were in the ILI group and 20 children, 12 boys and eight girls, were in the SH group. All participating students were Mexican-American and were recruited from the same charter school in Houston, Texas. The mean age of the children was 12.3 years old (SD=0.7). Both groups focused on learning about and developing healthy nutrition and exercise plans. Children in the SH group received a manual which was intended to promote weight loss. This 12-week manual was parent-guided. Children in the ILI group participated in daily, instructor-led interventions for a total of 24 weeks. ILI classes took place during school hours.

The primary outcome measures of Johnston and colleagues' (2010) study were height and weight. These measures were assessed at baseline, one year, and two years. Measurements of height and weight were used to calculate BMI, which was then standardized (*z*BMI) based on age and gender. Jonston and colleagues (2010) also measured tricep skinfold, cholesterol (total, triglycerides, high density lipoproteins, and low density lipoproteins), blood pressure, and heart rate during physical activity. Although these outcomes were important to Johnston and colleagues' (2010) research,

they are not applicable to the proposed EBP project and will not be discussed further. Johnston and colleagues (2010) found that children in the ILI group significantly reduced their *z*BMI compared to children in the SH group ($p<0.001$). Of note is that children in the ILI group were sent home with flyers and memos for their parents so that they were aware of the program and the changes their children were learning to make. Thus, parental involvement, although indirect, was apparent in the ILI group.

Spiegel and Foulk (2006) conducted a RCT of classes in four states: Delaware, Florida, Kansas, and North Carolina. In their study, 69 fourth and fifth grade classes representing 1,013 students were divided into an intervention group (n=35 classes, 534 students) and a control group (n=35 classes, 479 students). Classes were selected based on teachers' applications and assigned randomly to intervention or control groups, with both groups being represented at all schools involved.

Teachers of classes who were assigned to the intervention group in Spiegel and Foulk's (2006) study attended workshops which were offered at local sites in each state. These workshops educated the teachers on ways to incorporate the WAY program into their curriculum. Teachers were instructed to regularly incorporate 20 minutes or more of nutrition and physical exercise education and activities into their classroom for an entire school year. Teachers integrating the WAY program into their classrooms used reflective journaling and classroom discussion to help their students recognize their beliefs and attitudes about healthy food and exercise habits. The WAY program consists of seven modules through which the trained teacher advances throughout the school year. Additionally, these classes took part in a 10-minute aerobic exercise routine every day. This routine built in intensity throughout the year. Finally, parents of children in the intervention classes were included. Children were sent home with information for parents and also led interviews and discussions of meal and exercise planning with their family.

Parents were also given a WAY program website which contained valuable resources for both them and their children.

Spiegel and Foulk (2006) saw a significant reduction in BMI in the intervention group compared to the control group. In the intervention group, the *t* test mean of the students was 0.16 (SD=0.89) while the control group students had a *t* test mean of 0.52 (SD=1.02; *p*=0.01). At baseline, 17.1% of students in the intervention classes were considered overweight (BMI greater than 85% but less than 95%). After the intervention, only 15.6% of these students were considered overweight. In the comparison group, there was a 0.5% increase in the number of overweight students. In addition to the BMI reduction seen in students in the intervention group, Spiegel and Foulk (2006) found these students increased their physical activity levels at home by 15.08 minutes per day.

Sahota and colleagues (2001) designed a group randomized controlled trial to examine the effectiveness of a school-based intervention in reducing risk factors associated with obesity. The study took place in Leeds, England in 10 primary schools. Ten schools were selected based on a power analysis which indicated that the study would have 80% power to discover differences if five schools served as intervention schools and five schools served as control schools. The study population was made up of 636 children ranging in age from 7 to 11 years old; the average age of participating students was 8.4±0.63 years. Schools were randomly placed in a group using a coin toss for a total of 314 students in the intervention group and 322 students in the control group. Sahota and colleagues (2001) determined that baseline characteristics between groups were similar.

The Active Programme Promoting Lifestyle Education in Schools (APPLES) was implemented in intervention schools. This program involved training of teachers in the intervention schools, modifying school meals in the intervention schools, and designing school action plans which were intended to promote healthy lifestyle choices. School

action plans were a major component of the APPLES initiative and targeted parents, teachers, food services staff, and the general school environment (Sahota et al., 2001). School action plans were developed by each intervention school based on the perceived needs of that school. The intention of the action plans and the APPLES initiative as a whole was to not only increase students' knowledge, but to influence their dietary and physical activity habits. The APPLES initiative was in place in the intervention schools for one academic year. Control schools made no changes to their health curricula.

The main outcomes of Sahota and colleagues' (2001) study were BMI, diet, physical activity, and psychological factors. Diet was assessed using three day food diaries and 24 hour recall and a questionnaire was used to assess physical activity. Sahota and colleagues (2001) stated that three tools were used to determine the effect of their intervention on psychological factors, "The self perception profile for children; a measure of dietary restraint that has been used in children aged 8; and the adapted body shape perception scale" (p. 1030). The authors found that there was no difference in weight between the intervention schools and the control schools after one year of the APPLES intervention (mean overall weight difference 0 (-0.1 to 0.1)). Sahota and colleagues (2001) also determined that there was no significant difference between the two groups in physical activity and sedentary behaviors. However, two positive changes were seen in the intervention schools. First, students in the intervention schools demonstrated increased vegetable intake compared to students in the control schools with the weighted mean difference being 0.3 (CI=95%, 0.2 to 0.4); this represented an increase of 50% from baseline vegetable consumption. Second, students in the intervention schools increased knowledge and understanding of health issues, including an increase in self reported healthy behaviors.

Salmon, Ball, Hume, Booth, and Crawford (2008) conducted a group-randomized controlled trial with 311 fifth-grade students in poor areas of Australia. A convenience

sample of 17 classes from three different schools was recruited for this trial. Students were randomized to one of four groups: a) control group, b) behavior modification (BM) group, c) fundamental movement skills (FMS) group, and d) combined BM /FMS group. BMI, physical activity level and enjoyment of physical activity, screen time, fundamental movement skills, and food intake were assessed as outcome measures. Students in the BM, FMS, or combined BM/FMS groups received a total of 19 lessons. Students in the BM group had lessons incorporated in the classroom. Their lessons were focused on behavior modification techniques such as decision-making, self-monitoring, and health benefits of physical activity. Students in the FMS group had lessons in physical activity facilities at their school. Six FMS were included: running, throwing, striking, dodging, kicking, and jumping. Games and activities teaching these skills were incorporated into these lessons. Students in the combined BM/FMS group received 19 lessons in BM and 19 lessons in FMS.

Salmon and colleagues (2008) found that an unintended increase was seen in screen-time of students in the BM group ($p<0.05$). On average, children in the BM group reported watching TV 229 minutes per week more than the control group. Despite this increase in screen time, Salmon and colleagues (2008) did see significant positive changes in all intervention groups. In the BM group, students spent nearly three minutes more per day participating in vigorous physical activity compared to control group students. This did not, however, result in a significant difference in BMI from baseline to follow-up. In the FMS group, students reported engaging in nearly eight minutes more vigorous physical activity than controls at post-intervention ($p<0.001$) and nearly seven minutes more at the 12-month follow-up ($p<0.001$). The same students also reported engaging in moderate physical activity ten minute more per day than controls at post-intervention ($p<0.01$) and baseline ($p<0.05$). Furthermore, students in the FMS group reported significantly more enjoyment of physical activity compared to controls ($p<0.05$).

The combined BM/FMS group was the only intervention group in which a significant change in BMI could be seen post-intervention and at the 12-month follow-up. From baseline to post-intervention, these students decreased BMI by approximately 1.30 (p<0.05). At the 12-month follow-up, BMI reduction remained at 1.30 (p<0.01).

Verstraete, Cardon, De Clercq, and De Bourdeaudhuij (2006) conducted a RCT in Belgium to study the effects of the provision of game equipment at recess on students' physical activity levels. The study population was made up of 235 fifth and sixth grade students at seven schools. One hundred twenty two children at four schools were randomly placed in the intervention group and 113 children at three schools were randomly placed in the control group. The mean age of the intervention group students was 10.8±0.6 years and the mean age of the control group students was 10.9±0.7 years. All of the intervention group schools had an equal number of recesses: morning, lunch, and afternoon. The average total length of recess time per day among all four intervention schools was 82±10 minutes. At baseline, no play equipment was provided to students during recess at intervention or control group schools.

Students in the intervention schools received game equipment as well as activity cards which gave examples of games and activities that correlated with the provided game equipment. Verstraete and colleagues (2006) stated,

> The set of game equipment for each class group included two jump ropes, two double dutch ropes, two scoop sets, two flying discs, two catchballs, one poco bal, one plastic bal, two plastic hoops, two super grips, three juggling scarves, six juggling rings, six juggling beanballs, one diabolo, one angel-stick, four spinning plates, two sets of badminton racquets and two sets of oversized beach paddles (p. 416).

Teachers at the intervention schools were instructed to encourage children to play with the equipment. The equipment provided to each class at the intervention schools was to be used by only one class to prevent arguments over materials.

The main outcome of Verstraete and colleagues' (2006) study was physical activity level. Activity was measured using accelerometers at baseline and three months after the game equipment had been distributed. The authors noted that two student participants had a malfunction of their accelerometer and were consequently not able to be included in the final study population. Accelerometers were worn during morning recess and during the lunch break. After distribution of play materials, children in the intervention group spent significantly more time engaging in moderate intensity play. At baseline, children in the intervention group engaged in moderate intensity play 41% of the time compared to 45% of the time at posttest ($P<0.01$). While Verstraete and colleagues (2006) found that time spent engaging in moderate to vigorous intensity play decreased in both intervention and control group students, they found that control group students experienced a greater decrease compared to intervention group students ($P<0.01$). During the longer lunch recess, Verstraete and colleagues (2006) found similar results. Children in the intervention group increased the amount of time spent in moderate intensity activity ($P<0.01$) and demonstrated a lesser decrease in time spent engaging in vigorous and moderate to vigorous intensity play compared to control group students.

***Level IV evidence*.** Taylor and colleagues (2005) completed a case-control study using a pre- and posttest design lasting eight weeks. Overweight children (BMI 85th percentile) ages 8 to 15 years old were recruited for this study. The number of children included was 41 and the mean age of the children was 10.5 years old. While their study setting was not in a school, Taylor and colleagues (2005) recruited children from schools with the help of school nurses and thus was considered relevant to this EBP project.

Children in this study participated in 60-minute sessions twice a week for eight weeks. These sessions included an exercise and an educational component. Aerobics, stretching, and strengthening routines were included in the exercise component of the sessions. Lessons about the food pyramid, reading food labels, serving sizes, and eating out comprised the educational component. While only the children's data were examined in Taylor and colleagues' (2005) study, parents and the subjects' siblings were encouraged to attend and participate in the sessions. In addition to BMI a number of other outcome measures were assessed. While important to Taylor and colleagues' (2005) work, these measures were included here as they do not relate to this EBP project. Among the 41 students who completed the intervention, a significant decrease was seen in BMI ($p<0.0001$). BMI was decrease by approximately 1.0 in this study population.

Construct Evidence-Based Practice

The appraised literature provided a base upon which the best-practice recommendation was built. A synthesis of the literature organizes the evidence so that one may recognize the core components of the best practice for addressing childhood obesity in the school setting. Finally, implementation of the best practice recommendation, as in this EBP project, will answer the clinical question.

Synthesis of critically appraised literature. In synthesizing the appraised literature, it became apparent that focused, family-oriented education in the school setting provides a means by which to aid young students in lowering an unhealthy or maintaining a healthy BMI. Taylor and colleagues (2005) said, "Childhood obesity is a pressing issue, yet few intervention programs exist for children as they struggle to manage their weight" (p. 187). As childhood obesity rates rise, it is clear that action must be taken, and the appraised literature provided a foundation upon which to build.

***School*.** The school setting provides ample opportunity for providing structured education about physical activity. Unlike a healthcare office setting, children encounter the school setting on a regular basis and this lends itself to repeated exposure to key concepts and behaviors which might aid in combating childhood obesity. Johnston and colleagues (2010) found that instructor-led education interventions in the school setting contributed to a significant decrease in BMI compared to self-led interventions ($p<0.001$). Spiegel and Foulk (2006) found that in students whose teachers incorporated specific physical activity education using WAY module 3 had a significant reduction in BMI compared to their peers whose teachers did not incorporate any additional material into their curriculum ($p<0.01$). Verstraete and colleagues (2006) noted that introducing play equipment into the school recess setting increased time spent engaging in moderate intensity physical activity ($P<0.01$). Finally, Waters and colleagues (2011) found in their review that interventions completed in the school setting resulted in an average of a 0.17 decrease in BMI (CI=95%).

***Family*.** Inclusion of the family in childhood obesity interventions is crucial to the success of such interventions. In the population of interest, parents or caregivers play a critical role in the child's life because they greatly influence their child's dietary intake and time spent engaging in physical activity (Budd & Hayman, 2006). Hopper and colleagues (1992) found that children included in a school-and-home intervention group gained a significant amount of knowledge about physical exercise when compared to their peers in school-only groups ($p<0.05$). Spiegel and Foulk (2006) found that use of the WAY program, which involves parents through take-home assignments and information packets sent home with students, contributed to increased time spent engaging in physical activity in the home. In this same group of students, a significant decrease in BMI was seen when compared to peers whose teachers did not use the WAY program ($p<0.01$).

***Physical activity*.** It is clear that structured, family-oriented education in the school setting is a key component to childhood obesity interventions. The subject of that education, however, must be clarified. Physical activity education, which differs from physical education, is perhaps the most important component of these education interventions. Physical activity education goes beyond the typical physical education course in that it is focused on teaching students why physical activity is important, how much physical activity one should engage in daily, and how vigorous the activity must be to be effective. Salmon and colleagues (2008) found that groups of students who participated in behavior modification interventions combined with fine motor skills interventions focused on physical activity significantly reduced their BMI ($p<0.01$). In their review of the literature, Shaya and colleagues (2008) found that physical activity interventions alone were more effective at lowering BMI than both nutrition alone interventions and combination interventions.

Nurses and teachers alike are expected to be involved in health promotion and teach their patients or students how to promote their own health. Indeed, the very first objective identified by the Indiana Standards for Health Education (2002) for fourth graders states that these students should "Develop knowledge of the relationship between health behaviors and health" (p. 26). School-based, family-oriented education has the potential to increase students' time spent engaging in physical activity, increase students' enjoyment of physical activity, promote healthy nutritional intake through better ability to read and understand food labels, reduce BMI, and prevent increases in BMI (Hopper et al., 1992; Salmon et al., 2008; Spiegel & Foulk, 2006; Taylor et al., 2005; Verstraete et al., 2006). Rooting education in evidence-based programs such as the WAY program will provide school-aged children with necessary resources for making health lifestyle decisions. It is in this way that developing targeted, school-based, family-

oriented education programs for school-aged children provides a means to fight in the battle against childhood obesity.

Best practice recommendation. Appraisal and summary of the relevant evidence indicated that the best practice recommendation is to provide school-aged children with structured, school-based, family-oriented education. This education program should include lessons about physical activity and exercise. The goals of this EBP project were to reduce BMI in overweight and obese children and to increase time spent engaging in physical activity. Based on these goals and the relevant literature, education was constructed from the WAY program and other evidence-based materials and was implemented in fourth and fifth grade classrooms once a week at a small, rural elementary school. Furthermore, the use of this evidence-based program afforded school-aged children the opportunity to develop healthy habits that could benefit them both as children and as adults.

Answering the clinical question. The best practice recommendation helped to answer the clinical question: Will school-based exercise and nutrition education contribute to healthier BMI levels in school-aged children? Using an education program which is supported in the literature allowed the project facilitator to discover the answer to this question through the implementation of this EBP project. Using evidence-based pre- and post-intervention measurements of height and weight allowed the project facilitator to assess changes in BMI and to determine if the best practice recommendation answered the clinical question. Furthermore, the use of pre- and post-intervention measurements of time spent engaging in physical activity each day allowed the project facilitator to assess the effect of an educational intervention on physical activity levels in school-aged children. One expects the relationship between time spent engaging in physical activity and BMI to be inverse; an increase in daily time spent in

physical activity should lead to a decrease in BMI. Thus, measurements of daily physical activity time served to further answer the clinical question.

CHAPTER 3

IMPLEMENTATION OF PRACTICE CHANGE

Method

The EBP project was evaluated with a case-control study design. Baseline data was used as control data and post-intervention data from the same subjects was used as case data. The children included in the sample population were followed from baseline over a period of eight weeks. The following sections provide details of this EBP project intervention including: sample and setting, outcomes, intervention, planning, recruitment, data management and analysis, and protection of human subjects.

Sample and setting. This EBP project was initiated at a rural elementary school in Northwest Indiana. The student body at the school is made up of approximately 420 students with each grade being composed of approximately 60 students (B. Milanowski, personal communication, July 23, 2012). Each grade is divided into three classes with approximately 20 students in each class. The student population at the elementary school is noted to be 95% white (B. Milanowski, personal communication, July 23, 2012). The school nurse, having earned a bachelor of science in nursing degree and being a registered nurse in the state of Indiana, works full time and oversees all students enrolled in grades kindergarten through 12th at the chosen school system (B. Milanowski, personal communication, July 23, 2012). This position has been held by the same school nurse since the spring of 2008. The chosen school setting provided access to the convenience sample targeted for the project.

Outcomes. This EBP project incorporated family-oriented physical activity education to increase time spent engaging in physical activity and ultimately to reduce BMI in overweight and obese school-aged children. A pre-test/posttest design was used to assess self-reported physical activity (see Appendix C) as well as the effectiveness of the provided education. Consistent with the reviewed literature, the primary outcome

measure was BMI of all children participating in the intervention (Johnston et al., 2010; Spiegel & Foulk, 2006; Taylor et al., 2005). BMI was measured using a Health-O-Meter® 402KL Physician scale and height was measured using the Seca 206 roll-up measuring tape with wall attachment. Also consistent with the reviewed literature, a secondary outcome measure was the amount of time spent engaging in physical activity for all students (Hopper et al., 1992; Salmon et al., 2008; Spiegel & Foulk, 2006). This outcome was measured using the SAPAC tool (see Appendix C).

Intervention. In this EBP project, an educational program was implemented in an effort to decrease BMI of overweight and obese students and to contribute to the development of healthy habits for all students and their families. The project facilitator, in conjunction with the school nurse, provided evidence-based education to six classes of fourth and fifth grade students. While education was provided to all students, measurement of BMI was obtained only from those students whose parents gave informed consent using the consent form found in Appendix D. BMI measurements of all students were collected by the student nurse independent of this EBP project, and after obtaining informed consent, the project facilitator used this data as baseline data for each participant.

Module three from the WAY program was used by the project facilitator to provide physical activity education in the classroom. This was based on Spiegel and Foulk's (2006) findings that use of the WAY program in fourth and fifth grade classrooms contributed to significant BMI reductions ($p<0.01$) as well as increased levels of physical activity in students receiving WAY education. Module three, entitled "Let's Get Physical," is focused on physical activity in the classroom. Included in this module are lesson plans, which were used by the project facilitator, student handouts, and an exercise DVD. This module contributed to the education provided to students about practical

ways to incorporate physical activity into their daily routine. Additional evidence-based literature was used as supplemental material to the WAY program education.

Beginning the first week of the second school quarter, the project facilitator visited each classroom one time per week for eight weeks. The duration of the intervention was based in the literature (Caballero et al., 2003; Taylor et al., 2006). Each week, a different lesson was provided in conjunction with the WAY module. Because additional educational was needed, materials were obtained from reputable sources such as the American Heart Association (AHA). The WAY program is designed to be teacher initiated and incorporated on a regular basis (Spiegel & Foulk, 2006). The project facilitator spent approximately 30 minutes with each class per week. This allowed for adequate time to interact with the students and provide the weekly lesson. Materials were sent home periodically with each student and students were encouraged to share what they learned with their family so that education might be carried on in the home. All fourth and fifth grade parents received a detailed description of the project during the first week of implementation (See Appendix D).

During the first week of the education intervention, the project facilitator spent approximately 45 minutes with each class to get to know the students and to administer pre-tests. During this time, the project facilitator explained her role and what would happen during the time she spends in the classroom throughout the remaining weeks. There was time for students to ask questions about the program and to become comfortable with the project facilitator. It was also during this time that students were given an information packet and an assent form (See Appendix E) to sign if they were willing to participate in the measurement arm of the project.

The AHA's activity IQ quiz and physical activity pyramid were used during week two of implementation. The goal of week two was to introduce the concept of intensity in exercise. Students were given five minutes to complete the activity IQ quiz and answers

were then reviewed as a class with the project facilitator. The physical activity pyramid was distributed to all students. The project facilitator explained the concept of intensity and what constitutes low, medium, and high intensity exercise. Students were encouraged to take the physical activity pyramid home and explain what they had learned to their parents. Students were also encouraged to display the pyramid in a place at home where family members would see it on a daily basis. To teach pulse rate, step three of the AHA's "How can you stay fit?" lesson plan was used. Students were taught what pulse means, where to feel their pulse, and how to calculate their pulse. All students and the project facilitator took their resting pulse for 15 seconds and then calculated their pulse per minute. The three minute exercise burst was then introduced. Consistent with the WAY program, the project facilitator led three minutes of high intensity exercise involving the entire class. Students chose three exercises (e.g. jumping jacks, running in place, sit-ups, etc...) and completed each exercise for one full minute. Students were encouraged to work themselves at a high intensity to see that short burst of exercise throughout the day can still be difficult and drive pulse rate up. After completing the exercise burst, students took their pulse for 15 seconds, calculated their pulse per minute, and compared this number to their resting pulse number.

The focus of the third week of the intervention was adding bursts of exercise throughout the day. On the day the project facilitator appeared in the classrooms, teachers received an email educating them about the positive effects of including exercise in the classroom. Included in this email was an article about physical activity in the classroom and its relationship to on-task behavior (Mahar et al., 2006). Mahar and colleagues (2006) found that brief, in-classroom exercise bursts were positively linked with on-task behavior among third and fourth grade students ($P<0.017$). The authors noticed that with the addition of exercise bursts into classroom curricula increased on-task behavior by 8%. Teachers were also provided with a log on which to record

classroom exercise (see Appendix F). To assist teachers in incorporating exercise bursts into their daily schedule, students were given a tennis shoe cut-out and were asked to write down an exercise which could be used during exercise bursts. Students were encouraged to be creative in choosing their exercises. The tennis shoes were then bound by class and given to each teacher. Although the tennis shoes were meant to be a helpful aid for the teachers, they were also used by the project facilitator during weeks three through eight to lead exercises in the classroom.

Weeks four and five had to be delivered during week five due to a snow day on the project facilitator's scheduled visiting day followed by a holiday break. Because two lessons were combined into one during week five, the project facilitator was allowed 45 minutes with each class rather than 30 minutes in order to accommodate the delivery of two lessons. The WAY program F.I.T.T. study was used for education during weeks four and five. F.I.T.T. stands for frequency, intensity, time, and type. Initially, week four was going to be focused on frequency and intensity and week five was going to be focused on time and type, but all four concepts were included together as a result of combining the two lessons into one week. Each of these concepts was introduced and explained to the students and the WAY program F.I.T.T. handout was distributed. To further the students' understanding of frequency and intensity and their relationship to each other, an activity from the CDC's Body and Mind (BAM) website was used. Using this activity, students were asked to pick one specific exercise to perform each day for one full minute for one week. Students were asked to record the number of repetitions of the exercise they chose on the log found in Appendix G which was distributed in the classroom and to then create a graph using that data on the graph paper that was provided. It should be noted that both grades were studying the scientific process, data collection, and reporting in their science classes during this time. The idea behind the graph was that students would see that as frequency increases, intensity often increases

as well. If a student were only able to do five push-ups on day one, theoretically by day seven he or she would be able to do more than five and would have seen a slight increase in number of repetitions throughout the week. Students were very enthusiastic about this activity and many returned completed graphs to the project facilitator. The F.I.T.T. study was used again in week six to teach the benefits of physical activity.

The focus of week seven was again on pulse rate and introduced and taught target pulse. Using the WAY curriculum, students were taught how to calculate their target maximum heart rate. Students were then taught how to calculate their target heart rate for high intensity and low intensity physical activity. Using the exercise cards designed in week three, students engaged in high intensity exercise and calculated their pulse before and after.

Week eight, the final week of the intervention, was used to review all topics taught throughout the previous seven weeks. The project facilitator led students through a handout covering the main topics which they had learned as part of the intervention. The project facilitator then led a three minute exercise burst with each class. During this final week, the project facilitator also weighed and measured all student participants and distributed the SAPAC tool for post-intervention data assessment.

Planning. Consistent with the Stetler model of evidence based practice, phase one of planning included identifying sources of evidence, consideration of influential factors, affirmation of priority, and definition of purpose, outcomes, and the issue being examined. The literature was searched for relevant evidence that would be used to support the EBP project. Influential factors such as classroom scheduling, availability of resources (e.g. play equipment, P.E. classes, etc.) were considered and worked into the intervention. Priority was established using existing data from the literature and the clinical setting and the purpose and outcomes of the project were definitively stated (See Chapter 1). In phase two of planning, the literature was critically appraised and study

details were identified. If applicable to the EBP project, the study was retained for use. Findings were then synthesized for use and accepted for planning the intervention. In phase three, current practice, fit of the setting, and feasibility were considered and based in the accepted literature. In this phase, comparative evaluation and decision making, the details of the intervention were finalized using the synthesis of the accepted literature. The intervention was adjusted to fit the clinical setting and to be made feasible within the existing classroom schedules. In the next stage, the project facilitator began translating and applying methods based in the literature to the intervention stage of the EBP project. It was determined that an instrumental, direct approach would be used for the EBP project. According to the Stetler model (Stetler, 2001), a direct instrumental used of literature is the correct approach to use when the goal is to change individual behavior. Planning in this phase also included obtaining permission to implement the educational intervention from the school superintendent and school principal as well as from the University Institutional Review Board (IRB). After this was obtained, planning of the educational component was completed with the collaboration of the school nurse. The school nurse provided guidance to the project facilitator in selecting an educational program that best fit the chosen school and the WAY program was chosen for the intervention. In collaboration with the school nurse and the classroom teachers, the project facilitator planned a weekly schedule for her time in the classroom throughout the second quarter of the school year. This allowed for adequate time for education to be provided. Finally, evaluation methods were planned to complete phase five of the Stetler model for evidence based practice. Stetler (2001) stated that evaluation of the implementation process as well as the outcomes and goal results determined in phase one of planning should be evaluated. The project facilitator evaluated the implementation process upon its completion and used statistical analysis to evaluate phase one outcomes and goal results.

Recruiting Sample. Students were recruited during the first week of intervention for measurement at the conclusion of the intervention. This process was explained and each student received written information as well as an assent form. If the student was willing to participate in the project, the student was instructed to sign and date the assent form and turn it in to their teacher between the first and second weeks of the intervention. All students were sent home with a detailed packet of information and a consent form for their parents. Parents received an introductory letter explaining the intervention and the measurements that were to be taken should they consent for their child to participate. This letter explained in detail the goals of and necessity for the EBP project, the intervention that took place in the classroom, and the necessary measurements which were associated with the project. Parents were given the option to opt out of the project, and those students whose parents opted out were not included in the BMI measurement arm of the project intervention.

No additional recruitment for the educational intervention was necessary because the intervention took place during regular school hours in the classroom. However, parents of all fourth and fifth grade students received information on the additional education which their child received. Parents were encouraged to take part in at-home activities and to integrate new information into home life (e.g. by allowing their child to lead a three minute exercise burst). All students were included in the education arm of the intervention, regardless of their participation status for the measurement arm of the intervention. This was to protect any student from being singled out or bullied based on their participation status.

Data. Data in this EBP project was collected from various pre and posttest questionnaires. This data was analyzed to determine the effectiveness of the intervention. This process, as well as the reliability and validity of the items that were used in data collection, is detailed in the following discussion.

***Reliability and validity of measures*.** The Self-Administered Physical Activity Checklist (SAPAC) was used for data collection in this EBP project. Reliability and validity for the SAPAC is well documented throughout the literature. McMurray and colleagues (2004) studied the test-retest reliability, the convergent validity, and the feasibility of using SAPAC for gathering self-reported data of physical activity. Sallis and colleagues (1996) also studied the reliability and validity of the SAPAC. To test self-reports of physical activity, data must be compared to data obtained using accelerometers and heart-rate monitoring (McMurray et al., 2004). Sallis and colleagues (1996) found that the SAPAC demonstrated moderate correlation with the accelerometer (r=0.33-0.54) and moderate correlation with heart-rate monitoring (r=0.30) when used with fifth grade students. Sallis and colleagues (1996) said, "These measures can be considered to be moderately valid measures of relative levels of physical activity" (Discussion section, para. 14). McMurray and colleagues (2004) achieved similar results, noting that when compared to the Previous Day Physical Activity Recall tool, the SAPAC demonstrated slightly higher validity ($p<0.05$). This may be due to the fact that the SAPAC tool allows for the recall of shorter active periods, an important component of a self-report tool in this age group (McMurray et al., 2004). In their conclusion, McMurray and colleagues (2004) noted that the SAPAC is useful for obtaining self-report data on vigorous physical activity, but that results must be viewed as a crude estimate of activity levels due to the recall abilities of this age group. Further support for the use of this tool is that the well-known Child and Adolescent Trial for Cardiovascular Health (CATCH) program, a large school-based trial sponsored by the National Institutes of Health (Perry et al. 1997), used the SAPAC in their work (Sallis et al., 1996).

***Collection*.** BMI data was collected independent of the proposed EBP project and, after consent was granted, was used as baseline data for the project. At the conclusion of the intervention period, BMI data was collected again for all students

whose parents gave consent for the collection of this data. Height and weight were measured using the school nurse's Seca 206 roll-up measuring tape stadiometer and Health-O-Meter® 420KL scale. With the Seca 206 securely fixed to the wall, the student against the wall, and the measuring tape resting on the student's head, the accuracy of the measurement is better than ±5mm (Seca, 2011). A properly calibrated scale is accurate within one fourth of a pound (Health-o-meter®, n.d.). The scale was sent to the manufacturer for calibration immediately prior to obtaining baseline measurements. The students were weighed with their shoes off and wearing lightweight clothing (no sweatshirts, jackets, etc…). This collection procedure is consistent with what is found in the literature (Hopper et al., 1992; Johnston et al., 2010; Salmon et al., 2008; Taylor et al., 2005). BMI data was recorded by the project facilitator.

The SAPAC was used to assess the students' pre- and post-intervention physical activity levels. The pre-test was administered by the project facilitator during the first week of interaction with the students after the project facilitator had been introduced and had been given time to interact with and get to know the students. The project administrator was available for assistance during the time the students completed the questionnaire. The SAPAC has been used in a number of research endeavors as both a pre- and post-test measure of physical activity (McMurray et al., 2004; Laris, Russell, & Potter, 2007), including the well-known, high-profile CATCH study (Perry et al., 1997). The SAPAC consists of a list of 21 physical activities with additional space for students to add up to four activities not already included on the list. Students were asked to recall their physical activity from the day prior to SAPAC administration. The day is divided into three sections: before school, during school, and after school. The project facilitator explained to students that to be qualified as activity, the task must be one which caused the child to breathe hard or feel tired and one which they engaged in for more than five minutes at one time.

***Management and analysis*.** The impact of the educational intervention on the students' time spent engaging in physical activity was measured using pre- and post-tests. Use of this method allowed the project facilitator to compare data before and after the education intervention had been implemented to determine whether or not the intervention contributed to a change in physical activity levels. Using data obtained from the demographic form completed by each consenting parent (see Appendix C), descriptive statistics were used to describe the sample population. Additionally, *t*-tests of mean were calculated to determine the relationship between BMI and exposure to the proposed educational intervention. Data was analyzed using the SPSS 18.0 statistics software program.

Protection of human subjects. A number of steps were taken to protect the rights of the subjects in this EBP project. First, before development of the project took place, the project facilitator completed National Institutes of Health training on the protection of human subject research participants. Second, permission to implement the proposed intervention was granted from the school superintendent and principal. The school nurse, with information provided to him by the project facilitator, presented the proposed project to the superintendent and the principal. The next step was obtaining permission from Valparaiso University's IRB. With the IRB's approval, a letter of introduction and a consent form was sent to parents of all fourth and fifth grade students (see Appendix C). The project facilitator's contact information was included on the consent form and parents and students were encouraged to contact the project facilitator with any concerns or questions. This form was approved by the school superintendent before being sent home to parents.

Confidentiality was made certain by the assignment of a code number to each student. This code allowed the project facilitator to compare individual results pre- and post-intervention. The key including the subjects' names, code number, and personal

data was kept in a separate file which was stored in a locked drawer in a secure location; the project facilitator was the sole party with access to this list. Height and weight were collected for each student whose parent or caregiver gave consent for their participation in this arm of the intervention. Again, the students' code was placed on the list of measurements so as to ensure confidentiality. Upon completion of the EBP project and dissemination of findings, all data was destroyed.

CHAPTER 4

FINDINGS

The purpose of this EBP project was to reduce the BMI scores of overweight and obese children using school-based, family-oriented education. Additionally, it was hoped that the project would increase the amount of time children spent engaging in physical exercise. The intervention helped to answer the identified clinical question and to determine the effectiveness of implementing physical activity and physical activity education in the classroom. The findings associated with this intervention will be discussed in this chapter.

Sample Characteristics

The following section will provide characteristics of the student participant population as well as characteristics of the parents who returned completed demographics forms.

Size. In total, parental consent and child assent was received for 111 students to participate in the BMI measurement arm of this EBP project. This means that out of the 140 fourth and fifth grade students, 79.3% (n=111) assented to participate and returned a signed consent form to participate. Of these 111 students, 107 returned completed parental demographic forms with their consent form. The SAPAC was used as an anonymous tool, and all 111 students completed the checklist at baseline and post-test.

Characteristics. Student demographics were less detailed than family demographics and included only gender and grade. Detailed characteristics of the participating students' families were collected using the parental demographic form found in Appendix A.

***Student characteristics*.** Of the 111 students who participated in the BMI measurement arm of this EBP project, 44.1% (n=49) were in fourth grade and 55.9% (n=62) were in fifth grade (See Table 4.1). Females made up 46.8% (n=52) of the

Table 4.1

BMI Measurement Student Participant Demographics

Characteristic	Frequency (n) Results
Grade	55.9% (n=62) Fifth grade 44.1% (n=49) Fourth grade
Gender	53.2% (n=59) Male 46.8% (n=52) Female

participants and 53.2% (59) were male. Again, to protect the anonymity of the student participants, no further demographics were collected for this arm of this EBP project.

Family characteristics. One hundred seven parental demographic forms were completed and returned to the project facilitator and the sample characteristics are described here. Of the 107 forms that were returned, 15.9% (n=17) were completed by a male and 84.1% (n=90) were completed by a female. Ninety-two and a half percent (n=90) of parents who responded reported that they were white, 5.6% (n=90) reported that they were White, non-Hispanic, and 1.9% (n=2) reported that they were Hispanic. Additional basic demographic information including level of education, age, level of income, and marital status was collected and can be seen in Table 4.2.

Parental health habits. In addition to basic demographic income, parents were asked about their comfort level with using a computer, frequency of internet use, and the amount of time both they and their child spend engaging in physical activity and screen time on a daily basis (See Table 4.2). Sixty-four and a half percent (n=69) of parents reported that they were very comfortable using the computer, 34.6% (n=37) reported that they were somewhat comfortable using the computer, and 0.9% (n=1) reported that they were not very comfortable using the computer. Parents also reported high daily use of the internet with 80.4% (n=86) of parents reporting that they use the internet once or more per day and 15.0% (n=16) reporting that they use the internet a few times per week. The majority of parents who completed the demographics form reported engaging in 30 minutes or less of physical activity daily. Forty three percent (n=46) responded with “Less than 30 minutes” and 2.8% (n=3) responded by answering that they engaged in no daily physical activity. Thirty-eight point three percent (41) reported engaging in one to two hours of daily physical activity and 15.0% (n=16) reported engaging in greater than two hours of daily physical activity. Most parents (62.6%) reported spending two or fewer hours in front of a screen each day. Eleven point two percent (n=12) parents reported

Table 4.2

Family Characteristics

Characteristic	Frequency (n) Results
Gender	84.1% (n=90) Female 15.9% (n=17) Male
Education	6.5% (n=7) Master's degree 17.8% (n=19) 4-year BA, BS 21.5% (n=23) 2-year Associates 30.8% (n=33) Some college 21.5% (n=23) High school/GED 0.9% (n=1) Less than high school 0.9% (n=1) No answer
Age	1.9% (n=2) 22-25 years old 5.6% (n=6) 26-30 years old 56.1% (n=60) 31-40 years old 33.6% (n=36) 41-50 years old 2.8% (n=3) 51-60 years old
Income	1.9% (n=2) Less than 10,000 3.7% (n=4) 10-19,999 4.7% (n=5) 20-29,999 5.6% (n=6) 30-39,999 4.7% (n=5) 40-49,999 5.6% (n=6) 50-59,999 16.8% (n=18) 60-69,999 7.5% (n=8) 70-79,999 14.0% (n=15) 80-89,999 7.5% (n=8) 90-99,999 15.0% (n=16) 100-150,000 2.8% (n=3) 150,000+ 10.3% (n=11) No answer
Marriage	2.8% (n=3) Single, never married 82.2% (n=88) Married 5.6% (n=6) Separated 8.4% (n=9) Divorced 0.9% (n=1) Widowed
Race	92.5% (n=99) White 5.6% (n=6) White, non-Hispanic 1.9% (n=2) Hispanic

(Cont.)

Table 4.2 cont.

Family Characteristics

Characteristic	Frequency (n) Results
Computer use	64.5% (n=69) Very comfortable 34.6% (n=37) Somewhat comfortable 0.9% (n=1) Not very comfortable
Internet use	80.4% (n=86) Once/day+ 15.0% (n=16) Few times/week 2.8% (n=3) Few times/month 0.9% (n=1) Hardly ever 0.9% (n=1) Never
Perception of child weight	10.3% (n=11) Below average or skinny 79.4% (n=85) Average or healthy 8.4% (n=9) Overweight 1.9% (n=2) No answer
Parental physical activity	2.8% (n=3) None 43.0% (n=46) Less than 30 minutes 38.3% (n=41) 1-2 hours 15.0% (n=16) Greater than 2 hours 0.9% (n=1) No answer
Parental screen time	1.9% (n=2) None 14.0% (n=15) Less than 1 hour 48.6% (n=52) 1-2 hours 20.6% (n=22) 3-4 hours 3.7% (n=4) 4-5 hours 11.2% (n=12) Greater than 5 hours
Child physical activity	0.9% (n=1) No answer 25.2% (n=27) Less than 30 minutes 57.0% (n=61) 1-2 hours 16.8% (n=18) Greater than 2 hours
Child screen time	0.9% (n=1) None 15.0% (n=16) Less than 1 hour 60.7% (n=65) 1-2 hours 21.5% (n=23) 3-4 hours 0.9% (n=1) 4-5 hours 0.9% (n=1) Greater than 5 hours

(Cont.)

Table 4.2 cont.

Family Characteristics

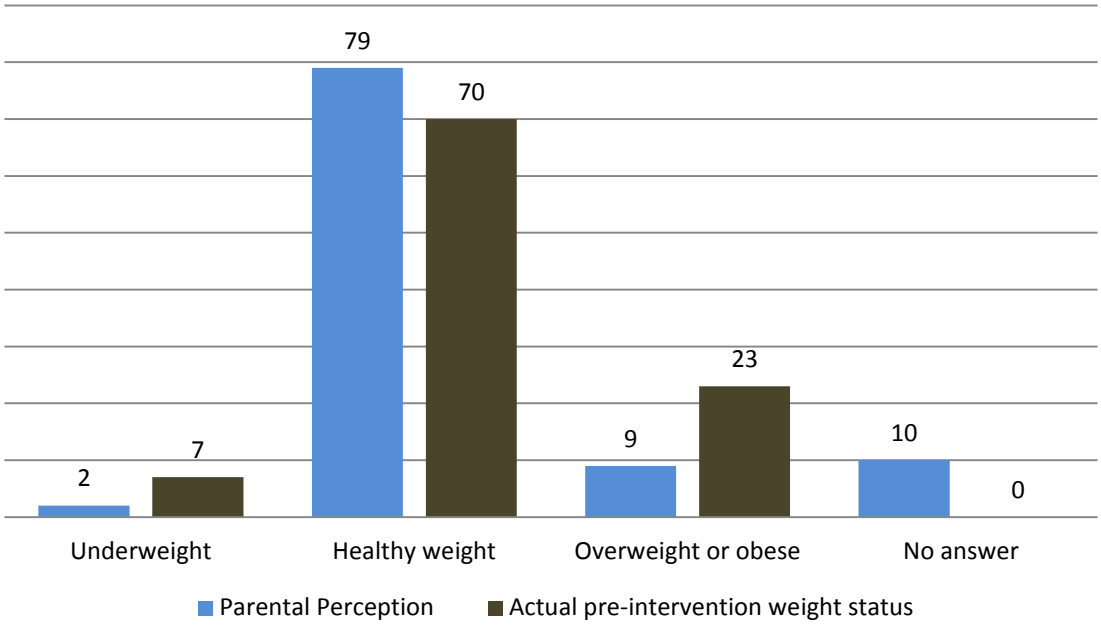
Trait	Frequency (n) Results
Health education setting	7.5% (n=8) School 43.9% (n=47) Home 4.7% (n=5) After school sport or club 2.8% (n=3) Other 24.3% (n=26) School, home, and after school 16.8% (n=18) Home and school

spending more than five hours in front of a screen each day.

Child health habits. Finally, parents were asked about how they perceive their child's weight, how much time their child spends engaging in physical activity each day, how much time their child spends in front of a screen each day, and where they believe their child's education about healthy habits should be taught. When asked how they perceive their child's weight status, 79.4% (n=85) of responding parents reported that they perceived their child's weight as healthy. Ten point three percent (n=11) perceived their child's weight as below average or skinny, 8.4% (n=9) perceived their child's weight as overweight, and 1.9% (n=2) did not answer the question. No parents reported perceiving their child's weight as obese. A comparison of parental perception of child weight status and actual child weight status can be found in Figure 4.1. Twenty five point two percent (n=27) of parents reported that their child engaged in less than 30 minutes of physical activity per day, 57.0% (n=61) reported that their child engaged in one to two hours of physical activity per day, and 16.8% (n=18) reported that their child engaged in more than two hours of physical activity per day. When asked about their child's daily screen time, 15.0% (n=16) of parents reported less than one hour, 60.7% (n=65) reported one to two hours, 21.5% (n=23) reported three to four hours, 0.9% (n=1) reported four to five hours, and 0.9% (n=1) reported greater than five hours. Finally, parents were asked to report whether they believe their child should receive healthy habit education in school, at home, in an after school sport or club, or in some other setting. Seven and a half percent (n=8) of parents responded that this education should take place at school, 43.9% (n=47) responded that it should take place in the home, 4.7% (n=5) responded that it should happen in an after school sport or club, and 2.8% (n=3) responded that it should take place in some other setting but did not specify what setting that would be. Additionally, 24.3% (n=26) responded that physical activity

Figure 4.1

Perceived weight status versus actual weight status



education should take place in all three settings: at school, in the home, and in after school programs. 16.8% (n=18) responded that this education should take place both at home and at school.

Changes in Outcomes

The primary outcome of this EBP project was BMI of student participants. At baseline, the school nurse weighed and measured each student and calculated his or her BMI. This data was recorded in an Excel spreadsheet, deidentified, and shared with the project facilitator. After completion of the intervention, the project facilitator weighed and measured each student participant using the same scale and stadiometer which were used at baseline. BMI was calculated and entered into the existing spreadsheet. All data was then compiled in SPSS software for analysis.

Statistical Testing and Significance

Using SPSS 18.0 software, paired *t*-tests were calculated to compare mean BMI of the study population at baseline and post-intervention. Analysis of the following sub-populations was also performed: females, males, fourth grade students, and fifth grade students. It was established that statistical significance for all analyses would be $p<0.05$.

Findings

No statistically significant changes were found between baseline BMI and post-intervention BMI among the student population (see Table 4.3). Mean BMI at baseline was 18.62 (SD=3.67) and post-intervention mean BMI was 18.61 (SD=3.53; $p=0.936$). Average BMI among female participants increased by 0.005 ($p=0.982$) and average BMI among fourth graders increased by 0.12 ($p=0.326$). The greatest reduction in BMI over the intervention period was among fifth grade participants with the mean difference being 0.11 ($p=0.550$). In summary, no significant changes in BMI of the study population occurred as a result of the intervention.

Table 4.3

BMI Results

Population	Mean baseline BMI	Mean post-intervention BMI	Mean difference	Significance (2-tailed)
All participants	18.62 (SD=3.67)	18.61 (SD=3.53)	-0.01	0.936
Male participants	18.62 (SD=3.57)	18.60 (SD=3.57)	-0.02	0.810
Female participants	18.61 (SD=3.79)	18.62 (SD=3.53)	0.005	0.982
4th grade participants	17.76 (SD=3.39)	17.89 (SD=3.39)	0.12	0.326
5th grade participants	19.29 (SD=3.77)	19.18 (SD=3.57)	-0.11	0.550

CHAPTER 5

DISCUSSION

The purpose of this EBP project was to reduce the BMI scores of overweight and obese children using school-based, family-oriented education. This chapter explains the findings presented in chapter four. It also evaluates the theoretical framework used in this EBP project, identifies strengths and limitations of this EBP project, and discusses implications for the future based on the findings of this EBP project.

Explanation of Findings

Data was collected using pre and post-intervention measurements of height and weight as well as parent and student demographic forms. Analysis was completed using SPSS software. Changes in participants' BMI measurements over the eight week intervention period as well as descriptive statistics of the study population were examined.

Of the 140 fourth and fifth grade students, 111 completed the BMI arm of the intervention for a total participation rate of 79.3%. After data collection was completed, paired *t*-tests were used to compare the mean BMI and mean weight of student participants at baseline and upon the completion of the eight-week intervention. Unfortunately, no statistically significant changes were found between baseline and post-intervention BMI (p=0.936) or mean weight (p=0.224) in this population. However, over the course of the eight week intervention, 27 students lost weight. Of these 27 students, 20 lost more than one pound and nine of these 20 students lost four pounds or more. An incidental finding occurred through the use of the parent demographic form (see Appendix A). It was determined that while 26 students' BMIs indicated that they were overweight or obese, only nine parents perceived their child's weight as overweight.

The PICOT question, in school-aged children, how does school-based, structured, family-oriented physical activity education affect body mass index (BMI)

compared to usual education over an eight-week time period, was answered by this EBP project. Unfortunately it was not the answer that the project facilitator was hoping to receive. According to the results of this EBP project, school-based, structured, family-oriented physical activity education does not affect body mass index more than usual education over an eight-week time period. Sahota and colleagues' (2001) noted that, "Body mass index is reliably measureable but could not be expected to change significantly over such a short time" (p. 1032) and this was likely the case in this EBP project. Although no statistically significant changes were found in this project, the clinical weight loss findings suggest that with a longer intervention period, statistically significant BMI changes and weight reduction may have been demonstrated.

Applicability of the Theoretical Framework

Roden's (2004a) revised health belief model was chosen as the guiding theoretical framework for this EBP project. This model was based off of Rosenstock's HBM and revised for application to young families (Roden, 2004a). The HBM has been used for assessment and management of health promotion and illness prevention since its origination and became an even more useful tool upon its revision (Roden, 2004a). The main components of the revised HBM include parental perceptions, modifying factors, and likelihood of action (2004b).

Fit of the theoretical framework. The revised HBM was very applicable to this EBP project. The concept of parental perceptions is used in the revised HBM to assess the amount of control a parent perceives they have over the actions of the child. In this EBP project, the action of interest was physical activity. Perceived control is dependent on a number of variables including the environment, economics, competence and time and organization (Roden, 2004b). The parental demographic questionnaire addressed a number of these variables, but did not sufficiently address the amount of control parents felt they had over their child's weight or physical activity. This, however, should be seen

as a limitation of the project design rather than a limitation of the fit of the revised HBM to this EBP project.

Modifying factors include demographic variables, sociopsychological variables, structural variables, perceived notion of health, and cues to action (Roden, 2004a). Demographic and sociopsychological variables were adequately addressed in this EBP project through the use of the parental and student demographic forms (see Appendix A). Júlíusson and colleagues (2010) found that certain demographic factors including parental education level are associated with childhood overweight and Gunderson, Mahatmya, Garasky, and Lohman (2010) found that family socioeconomic status was associated with childhood overweight. Based on this evidence, it was recognized that family demographics would be important to this EBP project. Cues to action were especially important in this EBP project. Using the revised HBM as a guide allowed the project facilitator, in her development of the project, to consider various cues to action and to build these in to the demographic forms to be filled out by the parents of student participants. A particularly valuable cue to action was assessed through question eight of the parental demographics form. This question asked parents to describe how they perceive their child's weight status. Parents' answers to this question provided valuable information that suggested that parents may have incorrect perceptions of their child's weight status and consequently this important factor does not serve as a cue to action the way it should.

The final concept, likelihood of action, took into account perceived benefits of and barriers to physical activity. An environmental assessment was conducted through conversations with the school teachers and the school nurse as well as through the use of the demographics form and it was determined that the area in which the project was completed is generally safe, there are few gyms but many playgrounds that are easily accessible, and that the students have adequate time and space to exercise at school.

Assessment of likelihood of action is an important variable in childhood obesity interventions and further supports the use of the revised HBM in EBP projects which are similar to this. Students' excitement levels and the willing participation on the part of families suggested a high degree of likelihood of action in this EBP project. While the data did not confirm this, interactions between the project facilitator and the study participants as well as the teachers supports the notion that there was great interest in the project, which would likely translate into high likelihood of action.

While the revised HBM was an excellent fit to this EBP project, it was not used to its fullest in the development of the project. With more time and experience, the project facilitator could have composed questions that more adequately assessed concepts such as parental perception over their child's physical activity level. Furthermore, more in-depth investigation into likelihood of action would have benefited this EBP project. This may have required face-to-face interaction with parents and students, perhaps through the use of qualitative study techniques such as focus groups. This would have allowed the project facilitator to better understand participants' perceived benefits of and barriers to physical activity. It would have also allowed for a better understanding of the environmental factors which may affect this particular community.

Strengths and weaknesses of the theoretical framework. As previously stated, the greatest strength of the revised HBM in guiding this EBP project was its prior use in similar projects. This allowed the project facilitator to gain a clear understanding of the fit to the project and the benefits of using the theory as a guide. Roden (2004a) stated that further use of the theory with young families would help in its development and in its gaining support in the field of childhood obesity. The use of the theory in this childhood obesity EBP project had the potential to contribute to further development and strengthening of the theory. Strength of the use of the revised HBM theory in this EBP project was demonstrated through its guidance in developing an appropriate parental

demographics form. Using the concepts of the theory allowed the project facilitator to draw up applicable questions for participants' parents to answer. These questions provided valuable insight into what factors might contribute to childhood obesity. The core concepts of the revised HBM could also have been used to assess similar factors among the student participants but due to time constraints in the classrooms, this was not possible in this EBP project. Future EBP project developers should incorporate these core concepts into their projects. Doing so will not only strengthen their project but will also provide detailed evidence of the applicability of this model in childhood obesity interventions. Finally, the attention to detail found throughout the revised HBM gives strength to its application to this and future EBP projects addressing childhood obesity. The level of detail found throughout the revised HBM sparked many ideas throughout the development of this EBP project and more still were missed due to time limitations and inexperience of the project facilitator. Future project leaders who employ the use of the revised HBM should take advantage of and pay special attention to the details of the model as this will strengthen their project and likely will provide valuable information about childhood obesity.

One weakness of using the revised HBM to guide this EBP project is that many of the concepts of the model are difficult to measure quantitatively. Parental perception of control, for example, is difficult to describe numerically and thus makes it difficult to assess. In this project, parents were asked questions only through the use of forms which were sent home with students, making it even more difficult to adequately assess such factors. In a qualitative format, this may have been easier to accomplish. This, however, would have required that parents make time in their busy schedules to meet with the project facilitator for discussion of these topics and given the proximity of the project facilitator's home to the project site, this would have been very difficult to arrange and likely would have yielded little information. Carpenter (2010) noted that there are

time limitations that constitute a weakness of the use of the HBM. He noted that if more time passed between measurement of HBM variables and the measurement of the behavior of interest, the likelihood of discovering effects on behavior decreased. Furthermore, he discovered that while benefits and barriers were the strongest predictors of behavior, susceptibility to disease was generally not related to behavior at all. At its best, said Carpenter (2010), "The HBM constructs vary in their effectiveness as predictor of behavior" (p. 668). Even so, the HBM and the revised HBM are useful tools in the development of EBP projects. While behavior may not be completely predictable, using the HBM as a guide in EBP projects similar to this one has the potential to uncover valuable information that may allow for progress to be made in the battle against childhood obesity.

Applicability of the EBP Framework

The Stetler model of evidence-based practice was chosen to be used as a guide in the design and implementation of this EBP project. The Stetler model "Reflects a practitioner-oriented approach" (Stetler, 2001, p. 272) and has at its core the concepts of critical thinking and the use of research (Ciliska et al., 2012). The five phases of the Stetler model include: a) preparation, b) validation, c) comparative evaluation and decision making, d) translation and application, and e) evaluation (Ciliska et al., 2012).

Fit of the EBP framework. The five phases of the Stetler model guided the project facilitator through the development, implementation, and evaluation of this EBP project. In phase one of the Stetler model, sources of evidence, consideration of influential factors, affirmation of priority, and definition of purpose, outcomes, and the issue of importance were determined. In this phase, the literature was searched for relevant and reliable sources of evidence which allowed the project facilitator to determine the purpose and desired outcomes of this EBP project. This search also reaffirmed the project facilitator's notion that the problem of childhood obesity is one

which is in need of great attention. In this phase, the project facilitator drafted the PICOT question, defined specific outcomes for the EBP project, and gathered data that would support the importance of the project.

Phase two of the Stetler model guided the project facilitator through critical appraisal of the evidence discovered in phase one. Using Melnyk and Fineout-Overholt's (2011) rapid appraisal checklists, the retrieved evidence was critically evaluated and 10 sources were retained for further use in the EBP project. Non-credible sources were eliminated and the level of evidence of each source was determined. In phase three, the project facilitator synthesized the findings from the literature. The findings were then analyzed for their fit to the study population and the risk the intervention posed on participants. Decisions made in this phase were research-based. It was in this phase of the model that the project facilitator defined the change in practice. The decision to change practice was based on three critical components of childhood obesity interventions found throughout the literature: a) family oriented education, b) school-based physical activity education, and c) physical exercise in the classroom.

In phase four, the project facilitator designed the eight-week intervention based upon the three components discovered in the synthesis of the literature. Change strategies were planned based on the relevant evidence which had been obtained and evaluated in the previous stages of the model. Local barriers such as lack of physical resources for exercising were taken into consideration. It was in this phase that it was determined that a full review by the University IRB was necessary for this project. When approval was obtained, the intervention which had been developed throughout phases one through four was implemented. Upon completion of the intervention, the project facilitator completed evaluation of the intervention; this was consistent with phase five of the model. During this phase, the project facilitator evaluated the method and type of evaluation and used research utilization to strengthen the findings of the project. As part

of this phase, the project facilitator completed a formative evaluation which delineated the implementation process well as the progress towards end goals.

Strengths and weakness of the EBP framework. The Stetler model of EBP was useful in guiding the project facilitator throughout this EBP project. The model allowed the project facilitator to remain organized and provided tangible steps to take throughout the progression of the project. The level of detail provided in the Stetler model is a strength of the framework and it ensured that the project facilitator incorporated all the necessary components of EBP into the project. Another strength of the Stetler model is that the model can be applied to a variety of practice settings, including educational settings (Melnyk & Fineout-Overholt, 2011). A weakness of the applicability of the framework to the EBP project is the inability of the project facilitator to fully evaluate the intervention as part of routine practice. Because the intervention period was short and the changes were not carried on at the school, it was not possible to evaluate what effects the intervention may have had long-term. Another weakness of the fit can be found in phase one of the model in which it is suggested that the formation of a team take place. The project facilitator worked closely with the school nurse, but the teachers were not involved in the planning and developing of the intervention. Perhaps with their input early on there would have been better teacher adherence to the intervention throughout the eight week implementation period.

Strengths and Weaknesses of the EBP Project

Evaluation of this EBP project allowed the project facilitator to identify a number of strengths and weakness of the project. It is imperative to identify both the strengths and weaknesses of the project so that future EBP projects can correct mistakes and build on strengths to further contribute the literature about childhood obesity.

Strengths. The convenience of the intervention conducted in this EBP project represents a strength of the project. The intervention took place in the classroom which

allowed for all students to participate and did not require extra work for parents. Students were not required to make extra time for an after-school activity and all students were given equal opportunity to be involved. While the teachers were arguably the most inconvenienced party involved in the implementation of this project, even they found the method of implementation convenient. In the fifth grade classrooms, the intervention was delivered during their science and health class period and thus fit nicely with the daily routine. Fourth grade teachers had no difficulty setting aside the necessary 15 to 30 minutes each week. Many of the teachers commented that they enjoyed the brief break and were encouraged by how much their students seemed to enjoy the change in their usual schedule.

A second strength of this EBP project was the enthusiasm it generated amongst those involved. The teachers were enthusiastic about incorporating additional health education into their weekly schedules and were unbelievably welcoming of the project facilitator. The teachers encouraged students to be involved each week and many participated in the exercises themselves. Some teachers went so far as to make assignments for the students to bring completed paperwork back to the project facilitator. The students communicated the most enthusiasm of anyone involved in the project. The project facilitator was greeted with cheering, clapping, and even hugs from the students each week and received very positive feedback from the students throughout the intervention. For the most part, parents were also enthusiastic about the project. While some did not wish for their child to participate in the project, most readily agreed and promptly completed the necessary consent form to make this possible. The project facilitator received emails from a handful of parents who were especially excited about the progress their child had made.

The relevance of the topic, the amount of evidence supporting the intervention, and the ease with which the project could be replicated represent three additional

strengths of the project. Childhood obesity is a current and popular topic in the news and throughout the literature. The effects of childhood obesity on the child and on society as a whole are well documented and there is a push to make a difference in this area. This is demonstrated through multiple initiatives including First Lady Michelle Obama's "Let's Move" campaign and the NFL's "Play 60" campaign and through government goals such as those identified in the U.S. Department of Health and Human Service's Healthy People 2020 objectives. Such a relevant topic calls for action, and this project put an evidence-based plan into action in six school classrooms. The amount of available literature and data about childhood obesity gave strength to the project as well. This project was firmly grounded on reliable and valid data and the intervention was built on quality evidence which lends a certain degree of credibility to the project. Although significant results were not demonstrated, the evidence upon which the project was designed suggests that with minor changes, similar projects could be successful in the future. Finally, the ease with which the intervention can be implemented has the potential to allow for replication of the project. Detailed note keeping as well as a relatively simple intervention make this EBP project one that could be completed again in the future.

Weaknesses. The greatest weakness of this EBP project was the inability to measure the secondary outcome. The SAPAC was used to assess physical activity level as this was noted throughout the literature to be a valid and reliable tool for this age group. The SAPAC was administered to students during the first week of the intervention and again upon completion of the intervention. The project facilitator explained how to use the SAPAC according to the specific SAPAC directions and was on hand for questions while students completed the forms. While the SAPAC was deemed an appropriate tool for measuring physical activity levels among school-aged children, this was not found to be the case in this EBP project. A majority of students grossly

exaggerated the amount of time they spent engaging in physical activity on a daily basis with some students recording upwards of 10 hours of daily physical activity. Because of this, it was determined that the data was not useful and that consequently, the secondary outcome measure would not be evaluated. This is considered a great weakness of the project as it was thought that physical activity levels would increase among students even if BMI and weight status were not altered.

Another weakness was the lack of ongoing commitment of the teachers to the classroom exercise component of the intervention. Teachers were asked to lead short bursts of exercise similar to that which was completed by the project facilitator each week and to keep a record of any exercises they did as a class. Teachers were given a log with which to keep this record (see Appendix F), but none of the teachers completed the record. While this is understandable given the hectic and busy schedules which teachers maintain, engaging in regular classroom exercise for the duration of the eight-week intervention may have led to more significant changes in BMI among participants.

A second weakness of this project was the poor design of the familial involvement component of the intervention. A complex familial involvement component was beyond the scope of this EBP project and likely would not have resulted in a high level of involvement. As previously noted, the project was strengthened by the convenience of its setting. Had parents needed to make special arrangements for themselves or their child, the participation rate would very likely have been much lower than it was. However, information sheets that were designed for and directed to parents of student participants may have had more of an effect on familial physical activity than simply sending home student worksheets.

The intervention effect in this project may have been weakened by the lack of tangible incentives provided to the student participants. At the ages of 9 to 11, maintaining good health likely does not serve as a major motivating factor. Perhaps

greater results would have been seen had there been some sort of incentive built into the design of the intervention. This could have been on an individual basis or could have involved a group reward at the end of the intervention period. Future projects should take this into consideration and use an appropriate system of reward to motivate students.

Finally, time constraints created a weakness of this project. Attaining approval from the University IRB took longer than expected. The IRB needed proof of approval from the superintendent of the school system and miscommunications caused this process to take much longer than planned. The superintendent became delayed in reviewing the project and consequently IRB approval from the university was not obtained until late in the fall semester. This limited the intervention duration to only eight weeks rather than the 12 week period the project facilitator had initially planned. Starting earlier in the fall semester, the weather would have been nicer and may have led to more physical activity among participants which in turn could have led to more weight loss and changes in BMI. Because many students were able to lose weight in eight weeks' time, it is likely that even greater weight loss could have been documented over 12 weeks' time and that the amount of weight loss could have changed BMI enough to be considered statistically significant.

Implications for the Future

An important component of evaluation is determining what implications a project has for the future. Using critical thinking skills throughout the evaluation process allowed for the recognition of the implications this EBP project has for practice, theory, research, and education.

Practice. This project has implications for the practice of school nurses. School nurses should make an effort to provide physical activity education to school-aged children on a regular basis. School nurses can encourage teachers to do this as well.

Reaching children and their parents is an important component to addressing the childhood obesity epidemic. As demonstrated through this project, schools and classrooms are an excellent avenue for reaching children and their parents. However, practitioners in clinical settings must also be involved. Practitioners must brave the topic of weight and assess parents' perceptions of their child's weight. In this project, only nine parents perceived their child as overweight when in reality 13 children were overweight and 13 were obese. Practitioners can help parents understand what a healthy weight is and can encourage families to develop healthy physical activity habits. Practitioners are in an especially advantageous position for doing this if he or she has an established and trusting relationship with the family.

Theory. The revised HBM was applicable to this project but could been more heavily relied upon in designing the project. The revised HBM takes into account important factors for assessment in childhood obesity studies and future projects will benefit from its use and applicability to young families. Evaluation of this EBP project revealed that the HBM concepts could have been better measured using qualitative techniques such as focus groups. Future projects should incorporate qualitative methods into their design so as to further explore the concepts of the revised HBM. This study demonstrated the usefulness of the revised HBM and supported its applicability to young families and to the topic of childhood obesity.

Research. The review of literature (ROL) conducted in the planning stages of this project revealed that much research about childhood obesity has been completed and disseminated to health care professionals. However, this research needs to be disseminated to the public, particularly to parents of school-aged children who could benefit from knowledge of efficacious interventions that may contribute to healthier lives for their child. Additional research is needed to determine how much time needs to be spent engaging in in-classroom exercise in order to see changes in BMI and weight

status among school children. Future research should also address the relationship between in classroom physical activity and attention-to-task. Findings from such research could serve as motivation for teachers to increase the amount of activity in their daily schedules and consequently could lead to healthier BMI among school children as well as an increased ability to stay on task. The ROL identified a number of different ways to measure physical activity levels among school children, one of which was the use of the SAPAC. In this project, however, this tool was not reliable or valid and it use resulted in the loss of data and an inability to measure the secondary outcome of interest. More research is needed to determine the best method for measuring this important outcome in the future.

Education. In the future, teachers, school nurses, superintendents, and curricula developers should be educated about the benefits of incorporating physical activity education and physical exercise into the classroom. Teachers should be educated about the evidence-based literature which suggests that physical exercise in the classroom has the potential to promote attention-to-task behavior. Superintendents and developers of curricula should be educated about this as well and should receive education about the effects such interventions can have on weight status and BMI. This is especially important in areas where childhood obesity rates are higher. With the implementation of classroom based physical activity education and exercise in a greater number of schools, the potential to achieve the Healthy People 2020 goal to reduce the proportion of school-aged children who are obese is amplified.

Conclusion

School-based, family-oriented physical activity education and exercise was implemented in fourth and fifth grade classrooms at a rural elementary school. Students' height and weight were collected and their BMI calculated before and after the eight week intervention. The revised HBM and Stetler's model of EBP were used in the

development and evaluation of this project. Twenty-seven students lost weight during the eight-week intervention; 20 students lost more than one pound and nine students lost four pounds or more. No statistically significant changes in BMI were seen in this project. Future studies will benefit from longer intervention periods and increased teacher involvement in classroom exercise.

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BIOGRAPHICAL MATERIAL

Lauren M. Panner

Ms. Panner graduated from Calvin College with a Bachelor of Science in Nursing degree in 2010. She continued her education at Valparaiso University, where she will earn a Doctor of Nursing Practice degree, specializing in family practice. Lauren is expected to complete her degree in May of 2013. Lauren is a member of the Sigma Theta Tau International-Kappa Epsilon chapter. She is also a member of the Illinois Society of Advanced Practice Nurses. Lauren became interested in childhood obesity early in her college career and has continued to study the topic throughout her work on her doctorate degree. She is passionate about caring for children and recognizes childhood obesity is a growing problem in which healthcare providers must be involved. After achieving her DNP degree and becoming a board certified family nurse practitioner, Ms. Panner would like to work in the primary care setting.

ACRONYM LIST

AHA: American Heart Association

APN: Advanced Practice Nurse

APPLES: Active Programme Promoting Lifestyle Education in Schools

BAM: Body and Mind

BM: Behavior Modification

BMI: Body Mass Index

CATCH: Child and Adolescent Trial for Cardiovascular Health

CDC: Center for Disease Control and Prevention

CI: Confidence Interval

CINAHL: Cumulative Index to Nursing and Allied Health Literature

CVD: Cardiovascular Disease

DNP: Doctorate of Nursing Practice

EBP: Evidence-based Practice

ERIC: Educational Resources Information Center

F.I.T.T.: Frequency, Intensity, Time, and Type

FMS: Fine Movement Skills

HBM: Health Belief Model

ILI: Instructor-Led Intervention

IRB: Institutional Review Board

JBI ConNect: Joanna Briggs Institute

M: Mean

NFL: National Football League

P.E.: Physical Education

PBC: Perceived Behavioral Control

PICOT: Patient population, Intervention of interest, Comparison intervention, Outcome, Time

RCT: Randomized Control Trial

ROL: Review of Literature

SAPAC: Self-Administered Physical Activity Checklist

SD: Standard Deviation

SH: Self-Help

SPARK: Sports, Play and Active Recreation for Kids

U.S.: United States

USDHSS: U.S. Department of Health & Human Services

WAY: Wellness, Academic, and You

WHO: World Health Organization

zBMI: Standardized Body Mass Index

Appendix A

Parental Demographics Form

Please answer the following questions and return this survey to school with your 4th or 5th grade student. Please do not include your name or your child's name. Your answers will remain completely anonymous.

1. Are you male or female?
    a. Male
    b. Female

2. What is the highest level of education you have completed?
    a. Less than high school
    b. High school/GED
    c. Some college
    d. 2-year college degree (Associates)
    e. 4-year college degree (BA, BS)
    f. Master's degree
    g. Doctoral degree
    h. Professional degree (MD, JD)

3. What is your age?
    a. 18-21
    b. 22-25
    c. 26-30
    d. 31-40
    e. 41-50
    f. 51-60
    g. 61 or older

4. How comfortable do you feel using a computer?
    a. Very comfortable
    b. Somewhat comfortable
    c. Not very comfortable
    d. Not at all comfortable

5. What is your annual household income?
    a. Less than $10,000
    b. $10,000-19,999
    c. $20,000-29,999
    d. $30,000-39,999
    e. $40,000-49,999
    f. $50,000-59,999
    g. $60,000-69,999
    h. $70,000-79,999
    i. $80,000-89,999
    j. $90,000-99,999
    k. $100,00-150,000
    l. $150,000 or above

6. How often do you use the internet?
    a. Once or more a day
    b. A few times a week
    c. A few times a month
    d. Hardly ever
    e. Never

7. What is your current marital status?
    a. Single, never married
    b. Married
    c. Separated
    d. Divorced
    e. Widowed

8. Does your child maintain a body weight that is
    a. Below average or skinny
    b. Average or healthy
    c. Overweight
    d. Obese

9. What is your race?
    a. White
    b. White, non-Hispanic
    c. African American
    d. Hispanic
    e. Asian-Pacific Islander
    f. Native American

10. In an average day, how much time do you spend engaging in physical activity or exercise?
    a. None
    b. Less than 30 minutes
    c. 1-2 hours
    d. Greater than 2 hours

11. In an average day, how much time do you spend engaging in "screen time," that is at the computer or watching television?
    a. None
    b. Less than 1 hour
    c. 1-2 hours
    d. 3-4 hours
    e. 4-5 hours
    f. Greater than 5 hours

12. In an average day, how often does **your child** engage in physical activity or exercise?
    a. None
    b. Less than 30 minutes
    c. 1-2 hours
    d. Greater than 2 hours

13. In an average day, how much time does **your child** spend in front of the computer, video games, or watching television?
    a. None
    b. Less than 1 hour
    c. 1-2 hours
    d. 3-4 hours
    e. 4-5 hours
    f. Greater than 5 hours

14. Do you believe that most of your child's healthy habit education should take place
    a. At school
    b. In the home
    c. In an after school sport or club
    d. Other: _____

Appendix B
Summary of Appraised Literature

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measures
Caballero et al. (2003) *American Journal of Clinical Nutrition* Pathways: a school-based, randomized controlled trial for the prevention of obesity in American Indian schoolchildren *Level II*	• 41 schools in the American Indian community • 1704 3rd to 5th grade students	• RCT • 4 phase intervention: 1) classroom curriculum, 2) food service, 3) physical activity, 4) family involvement	• No significant changes seen in percentage body fat, weight, BMI, or physical activity • Significant difference in knowledge between intervention and control group (*P*=0.001) • Percentage of energy from fat significantly reduced in intervention group (*P*=0.001)
Hopper et al. (1992) *Research Quarterly for Exercise and Sport* Effect of including parents in a school-based exercise and nutrition program for children *Level II*	• Fifth and sixth grade students • Parents	• RCT of 132 students. Classes were randomly assigned to school-and-home (n = 43), school-only (n = 43), or control groups (n = 44) • Control group received no additional education beyond what was a part of the normal curriculum. The school-only group received in-class instruction and activities about nutrition and exercise.	• Pretest-posttest design measuring twelve variables • School-only and school-and-home groups scored significantly higher than the comparison group on posttest exercise knowledge ($p<0.05$) • The school-and-home group scored significantly higher on posttest nutrition education compared to school-only and comparison groups ($p<0.05$)

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measures
Johnston et al. (2010) *Obesity* Effects of a school-based weight maintenance program for Mexican-American children: results at 2 years *Level II*	• 181 children between the ages 10 and 14 years old, and in 6th or 7th grade • Only 60 overweight and obese children's data were analyzed • All children identified as Mexican-American • Charter school in Houston, Texas	• RCT in which subjects were randomly selected to self-help (SH) or instructor-led interventions (ILI) • Subjects in the SH group used a manual guided by parents for 12 weeks • Subjects in the ILI group attended instructor led classes during the last period of school	• Primary outcome measure was BMI, measured by children's height and weight • Children in ILI group demonstrated greater reduction in BMI compared to the SH group (p<0.001) at 1 and 2 year marks
Sahota et al. (2001) *British Medical Journal* Randomised controlled trial of primary school based intervention to reduce risk factors for obesity *Level II*	• 10 schools • 634 children between ages 7 and 11	• Group-randomized controlled trial • Schools were randomized to control or intervention groups • Intervention school received active programme promoting lifestyle education in schools (APPLES).	• No significant difference in weight status, BMI, physical activity, or sedentary behavior • Children in the intervention group reported a significant increase in vegetable consumption (CI 0.2-0.4) compared to children in the control group

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measures
Salmon et al. (2008) *International Journal of Obesity* Outcomes of a group-randomized trial to prevent excess weight gain, reduce screen behaviours, and promote physical activity in 10-year-old children: Switch-play *Level II*	• Convenience sample of three schools • All fifth grade classes (*n* = 17) • Approximately 400 students invited to participate (ages 10 to 11years old) with final sample totaling 268 students	• Group-randomized controlled trial • Classes were randomized to one of four groups: control (*n* = 55), behavior modification (*n* = 60), fundamental motor skills (*n* = 69), and behavior modification/fundamental motor skills (*n* = 84)	• In the BM/FMS group, BMI was significantly reduced at post-intervention ($p < 0.05$) and 12-month follow-up ($p < 0.01$) measurements • Students in the BM group participated in vigorous physical activity three minutes more per day than control group students ($p < 0.05$)
Shaya et al. (2008) *Journal of School Health* School-based obesity intervention: A literature review *Level I*	• Children and adolescents ages 7 and 19 years old • Anthropometric measures pre- and post-intevention • School setting	• Literature review of 51 intervention studies taking place from June 1986 through June 2006 • 15 intervention programs focused exclusively on physical activity; 16 programs provided education on fitness, behavior modification, and nutrition; 20 programs combined physical activity and education	• No persistence of positive results observed • 86.7% of physical activity programs demonstrated significant results • 75% of education programs demonstrated significant results • 75% of combination programs demonstrated significant results

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measures
Spiegel & Foulk (2006) *Obesity* Reducing overweight through a multidisciplinary school-based interventions *Level II*	• 1,013 4th and 5th grade students from 69 classes at 16 schools in Delaware, Florida, Kansas, and North Carolina	• RCT of classes (*n* = 35 intervention classes, *n* = 534 intervention students; *n* = 35 comparison classes, *n* = 479 comparison students) • Intervention classroom teachers received WAY training and incorporated its contents into classroom activities • The WAY program consists of seven modules designed to engage students in a multidisciplinary way	• BMI, consumption of fruits and vegetables, and physical activity were examined • BMI significantly reduced in intervention groups ($p < 0.01$) • At home physical activity level in intervention group increased; physical activity levels at school increased from 59 min/wk to 102.5 min/wk in the intervention group
Taylor Mazzone & Wrotniak (2005) *Pediatric Physical Therapy* Outcome of an exercise and educational intervention for children who are overweight *Level IV*	• Children ages 8 to 15 years old with BMI >85th percentile	• Pre-test post-test intervention design • Intervention lasted eight weeks and was comprised of two 60-minute sessions per week which were focused on exercise and health and nutrition education	• BMI measured twice before the intervention with no significant differences between weeks • BMI was significantly reduced (p=0.0001) after the eight-week intervention; average BMI was decreased by 0.4 with >25% of participants reducing BMI by one point or more

Author(s), Publication, Level of Evidence	Population, Setting	Design, Intervention(s), Comparisons	Outcomes and Effect Measures
Verstraete et al. (2006) *The Journal of Public Health* Increasing children's physical activity levels during recess periods in elementary schools: the effects of providing game equipment. *Level II*	• Seven elementary schools • 235 fifth and sixth grade children	• RCT with pre-test post-test design • Game equipment was provided to intervention school groups during recesses and lunch breaks • Accelerometers were used to assess physical activity levels before and after play equipment was provided	• In the intervention group, time spent on low, moderate, and moderate to vigorous intensity physical activity increased significantly (*P* <0.05, <0.001, <0.01 respectively). • Time spent on moderate and moderate to vigorous intensity physical activity decreased in the control group
Waters et al. (2011) *Cochrane Collaboration* Interventions for preventing obesity in children (Review) *Level I*	• Children ranging in age from 0 to 18 years old • School-based, community, home, childcare, and preschool interventions included in this review	• Update of previous systematic analysis • Analyses were performed for interventions targeting specific age groups: 0 to 5 years old, 6 to 12 years old and 13 to 18 years old	• In 6 to 12 year olds, there was a mean effect size of -0.15 on BMI (95% CI: -.023 to -0.08) • In studies based in the school setting the mean effects size on BMI was -0.17 (95% CI: -0.25 to -0.09)

Appendix C

Self Administered Physical Activity Checklist

Self-Administered Physical Activity Checklist
Please wait for instructions before starting.

1. Write in the number of minutes you spent in each activity. It only counts if you spent 5 minutes or more on each activity.

2. Put one check mark in one of the "None, Some, or Most" columns for each activity.
   - Put the letter "N" in the box under "N-S-M" if the activity made you breathe hard or feel tired none of the time.
   - Put the letter "S" in the box under "N-S-M" if the activity made you breathe hard or feel tired some of the time.
   - Put the letter "M" in the box under "N-S-M" if the activity made you breathe hard or feel tired most of the time.

Activity	**Before school**		**During school**		**After school**	
	Minutes	N-S-M	Minutes	N-S-M	Minutes	N-S-M
1. Walking						
2. Running						
3. Bicyling						
4. Skating (in-line, roller, ice, skateboarding)						
5. Swimming						
6. Basketball						
7. Baseball/softball						
8. Football						
9. Soccer						
10. Volleyball						
11. Hockey (floor, street, or ice)						
12. Racket sports: Badminton or tennis						
13. Gymnastic or tumbling						
14. Jump rope						
15. Dance (any type)						
16. Fitness activities: push-ups, sit-ups, jumping jacks						
17. Bal playing; four square, kick ball						
18. Running games: chase, tag, hide and seek						
19. Outdoor play: climbing trees						
20. Sledding						

21. Skiing (cross-country or downhill)						
22. Snowshoeing						
23. Outdoor chores: mowing, raking, gardening, shoveling snow						
24. Indoor chores: mopping, vacuuming, sweeping						
25. PE class						
26. Other:						
27. Other:						
28. Other:						
29. Other:						

Appendix D

Parental Consent Form

Informed Consent Form for your 4th or 5th grade student

This informed consent form is for the parents of 4th and 5th grade students enrolled at a rural school in the Midwest during the fall of 2012 and who I am asking to participate in a study of the effectiveness of physical activity education in the classroom.

Lauren Schultze, BSN RN
Valparaiso University
Effects of a school-based education intervention on BMI and physical activity

This Informed Consent Form has two parts:

- **Information Sheet (to share information about the study with you)**
- **Certificate of Consent (for signatures if you agree that your child may participate)**

You will be given a copy of the full Informed Consent Form

PART I: Information Sheet
Introduction
My name is Lauren Schultze and I am a doctorate student at Valparaiso University. I am doing my final project on the effectiveness of physical activity education in the classroom on the body weight of children and the amount of time spent engaging in physical activity each day.

I am going to give you information and invite you to have your child participate in this project. You do not have to decide today whether or not you agree that your child may participate. Before you decide, you can talk to anyone you feel comfortable with.

There may be some sections that you do not understand. Please feel free to contact me and I will take the time to explain. If you have any questions later as the project progresses, you may contact me at any time.

Purpose
Physical inactivity is a problem among many United States children and can lead to health problems in the future. The ways which are used now to teach children about being active may not work as well as we would like. The purpose of this project is to look at a different way of teaching children about physical activity to see if it does a better job of increasing time spent in physical activity.

Type of Research Intervention
Educational intervention

Participant selection
I am inviting your child to take part in this project because it is important that effective ways to teach children about physical activity are known and used in classrooms. Because your child is enrolled in the 4th or 5th grade, he or she was selected for this project and I am asking if you would allow him or her to participate.

Voluntary Participation
Your decision to have your child participate in this study is entirely voluntary. The choice is yours and your child's. If you choose not to participate in this project, your child will still receive the education that is part of the project, but no data about will be collected or used. You may also choose to change your mind later and stop your child's participation in the project.

Description of the Project
At the beginning of the project, your child will be weighed and measured by the school nurse as well as myself and other student nurses. Your child will also be asked to fill out a checklist called the Self-Administered Physical Activity Checklist. This is a simple form that will allow me to gain a rough estimate of the amount of physical activity your child engages in on a daily basis. During this first week, I will also introduce myself to your child and explain my presence in their classroom as well as my project. Your child will receive a form similar to this and be asked whether or not he or she would like to participate in the project. This decision is ultimately up to your child. Even if you give your permission, your child may choose not to participate. Any child who chooses not to participate in the project will not be measured at the end of the project. Preliminary measurements of height and weight will still be collected by the school nurse alone independent of this project.

Over the course of the remaining eight weeks, I will visit your child's classroom once a week for approximately one half to one hour at a time. During this time, I will provide education about the importance of physical activity and will also share fun and easy ways for your child to be active each day. Some weeks, I will engage your child and his or her classmates in a brief exercise routine, similar to what your child takes part in during P.E. classes at school. Additionally, I will be sending home information each week–either with your child or via email–that will provide more detail about what we learned each week. It is my hope that you and your child might review this information together and might think of ways to increase physical activity at home or in the neighborhood. I will ask that if your child is a participant in this project, you track any activity that you engaged in or developed based on the weekly project information. This will allow me to study the effectiveness of including the family in this way.

Finally, I will be discussing with your child's teacher the importance of integrating physical activity into classroom activities on a regular basis. It is my hope that your child's teacher will then include physical activities in the classroom, at least for the duration of this project. I will be using the "Wellness, Academics, and You" program for education in the classroom and in discussion with the teachers.

Duration
The program will take place over nine weeks, or approximately three months in total. During that time, your child will participate in light to moderate physical activity in his or her classroom on most days of the week with their teacher or the project facilitator. At the end of the nine weeks, your child will be weighed and measured. He or she will also complete a self-administered physical activity checklist; the same checklist they filled out at the beginning of the nine weeks.

Side Effects
There are no unwanted side effects associated with this education. The physical activity that is a part of this project is no more vigorous than the activities your child engages in during his or her physical education classes or at recess.

Risks
You child will not be at risk as a result of participation in this project. Your child will learn to recognize ways to increase physical activity in his or her daily routine and will notice that this may cause some weight loss. If this is concerning to you or your child, the project facilitator is available to discuss a healthy weight as it pertains to your individual child.

Discomforts
There are no discomforts associated with this project except for any mild discomfort that your child may experience with exercise.

Benefits
If your child participates in this project, he or she will benefit in that knowledge of the importance of physical activity will be gained. Your child may also benefit by reaching or maintaining a healthy body weight.

Reimbursements
You and your child will not be provided any incentive to participate in this project.

Confidentiality
The information collected from this project will be kept confidential. Information about your child that will be collected during the project will be kept by and seen by only the project facilitator. Any information about your child will have a number on it instead of his or her name. Only the project facilitator will know what your child's number is and that information will be kept by the project facilitator only. Information will not be shared with or given to anyone except the project facilitator's advisor. The school nurse will receive no additional information other than what he would collect on his own independent of the project.

Sharing of the results
The knowledge that is gained from this project will be shared with all parents of 4^{th} and 5^{th} graders via email before it is made widely available to the public. If you wish to know your own child's progress over the nine weeks, I will email you that information after the conclusion of the project. However, no confidential information will be shared with the public or with other parents, teachers, or the school nurse. After the results of the project have been shared with parents, they will be submitted for publication and presentation at academic conferences so that others might learn from the project.

Right to Refuse or Withdraw
You do not have to agree to your child taking part in this project if you do not wish to do so. Your child will still be included in the classroom education and physical activities, but will not be measured at the conclusion of the nine weeks of education. Your child will not be treated differently as a result of his or her participation status. You may withdraw your child from participation in this project at any point during the nine weeks by simply contacting the project facilitator.

Alternatives to participating
If you do not wish your child to participate in this project, your child will receive the same education as his or her classmate's.

Who to Contact
If you have any questions you may ask them at any time. If you wish to ask questions, you may contact: Lauren Schultze via phone (616.558.0143) or email (lauren.schultze@valpo.edu). This proposal has been reviewed and approved by the Valparaiso University Institutional Review Board, which is a group of people whose task it is to make sure that project participants are protected from harm.

PART II: Certificate of Consent
Certificate of Consent
I have been invited to have my child participate in a project about the effectiveness of physical activity education on body weight and average time spent each day engaging in physical activities.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily for my child to participate as a participant in this study.

Print Name of Participant_____

Print Name of Parent or Guardian_____

Signature of Parent or Guardian _____

Date _____
Day/month/year

An Informed Assent Form will be completed. If you choose to allow your child to participate in this project, please complete this page and return it to your child's teacher.

Appendix E

Informed Assent Form

Informed Assent Form for 4th and 5th grade Students

This informed assent form is for children between the ages of 6 and 12 years old who attend a rural school in the Midwest and who are being invited to participate in the physical activity project.

Lauren Schultze, BSN RN, DNP student
Valparaiso University
Effects of a school-based education intervention on BMI and physical activity

This Informed Assent Form has two parts:

- **Information Sheet (gives you information about the study)**
- **Certificate of Assent (this is where you sign if you agree to participate)**

You will be given a copy of the full Informed Assent Form

Part I: Information Sheet
Introduction

My name is Lauren Schultze and I am a doctorate student at Valparaiso University. For my final project, I am studying physical activity and how it can help achieve or maintain a healthy body weight. I want to know if providing more classroom education about physical activity will lead to more students having and keeping a health body weight.

I am going to give you information and invite you to be a part of this project. You can choose whether or not you want to be included. Your parents have already received an information sheet about this project and they know that we are asking for your to participate. If you are going to be a part of this project, your parent(s) or guardian(s) also have to agree. If you do not want to be a part of this project, you do not have to, even if your parents have agreed.

You can talk about anything in this form with your parents, friends, teachers, or anyone else you feel comfortable talking to. You can decide if you want to be a part of the project or not after you have talk it over. You do not have to decide right now.

There might be words or sections of this form that you do not understand. If you have any questions, please ask me at anytime.

Purpose: Why are you doing this research?

I want to find a way to help children reach and maintain a healthy weight. I have a program that I am hoping might help you and your peers understand the importance of regular physical activity and might increase the amount of time you spend being physical each day. I hope that this will lead to a healthy lifestyle and body weight. To find out if this program is effective I have to deliver it and study the results.

Choice of participants: Why are you asking me?

I am using this program with children who are your age and who regularly attend school. I am trying this program with children your age because in past trials, this is the age group that has demonstrated great progress in this area. Your age group was also

chosen because you are at a point in life where you are beginning to make your own choices as they relate to your health. I want to help you make healthy choices that will benefit you in the years to come.

Participation is voluntary: Do I have to do this?
You do not have to be a part of this project if you do not want to be. If you decide not to be, you will still be involved in the education that is provided in your classroom, but you will not have to be weighed and measured at the end of the education. You will not be treated any differently if you decide not to be a part of this project. Even if you say you want to participate now but change your mind later that is okay.

Procedures: What is going to happen to me?
At the beginning of the project, you will be weighed and measured by the school nurse, myself, or another student nurse. You will also be asked to fill out a checklist called the Self-Administered Physical Activity Checklist. This is a simple form that will allow me to gain a rough estimate of the amount of physical activity you do on a daily basis. During this first week, I will also introduce myself to you and explain my presence in their classroom as well as my project. Your parent(s) or guardian(s) will receive a form similar to this so that they know about this project and, together with you, can decide whether or not you will participate. This decision is ultimately up to you. Even if your parents give their permission, you may choose not to participate. If you choose not to participate in the project you will not be measured at the end of the project. The first measurements of height and weight will still be collected by the school nurse alone independent of this project.

Over the course of the remaining eight weeks, I will visit your classroom once a week for approximately one half to one hour at a time. During this time, I will provide education about the importance of physical activity and will also share fun and easy ways for you to be active each day. Some weeks, I we will do a brief exercise routine, similar to what you do during P.E. classes at school. Additionally, I will be sending home information each week–either with you or to your parent's email address–that will provide more detail about what we learned each week. It is my hope that you and your parent(s) or guardian(s) might review this information together and might think of ways to increase physical activity at home or in the neighborhood.

Finally, I will be discussing with your teacher the importance of including physical activity in the classroom on a regular basis. It is my hope that your teacher will then include physical activities in the classroom, at least for the duration of this project. I will be using the "Wellness, Academics, and You" program for education in the classroom and in discussion with your teachers.

Risks: Is this bad or dangerous for me?
This program is considered safe. It has already been used with children your age and is no more dangerous than your P.E. classes or playing outside at recess. If you are worried about exercising in the classroom for any reason, you may talk to me or to your teacher.

Discomforts: Will it hurt?
There should be no discomfort because of your participation in this program. We will exercise together in the classroom, will learn about exercise together, and you will be weighed and measured at the end of the project. You may experience discomfort while

exercising at first, such as being short of breath, but this is a normal response to increased exercising and will fade as you become more in shape. If you feel you are too uncomfortable to continue, simply sit down and take a break or you may talk to me or your teacher about how we can help you feel comfortable.

Benefits: Is there anything good that happens to me?
The benefit of participating in this program is that you will learn the importance of including exercise in your daily routine. If you participate in this program, you will get to see how exercising more changed your weight or helped you keep your weight at an already healthy level. You might also learn that it is not too hard to include exercise in your daily routine. It is my hope that you will also have a lot of fun learning and exercising at school and at home.

Reimbursements: Do I get anything for being in the research?
You will not get any prizes or money rewards for participating in this project.

Confidentiality: Is everybody going to know about this?
I will not tell other people what your height and weight are at the beginning or the end of this project. Your information will be seen only by me. I will give you a number so that your name does not have to be on anything we use in the project. Only I will know which name matches which number and that list will be kept locked in my desk drawer so that no one else may see it. Your school nurse will know your measurements from the beginning of the project because he is collecting this information for his own purposes.

Sharing the Findings: Will you tell me the results?
When we are finished with this project, I will email your parent(s) or guardian(s) and I will tell them what I learned from this project. If you or your parent(s) or guardian(s) would like to know your individual progress during the project, I will make that information available to you and them. After I have shared results with you, I will be telling more people about the project through science journals and conferences. None of your personal information will be included in anything that I share.

Right to Refuse or Withdraw: Can I choose not to be in the research? Can I change my mind?
You do not have to be a part of this project. No one will be upset with you if you say no. It is your choice whether or not you want to be included. You can think about this and tell me later or you can tell me now that you would like to be included. If you say “yes” now and change your mind later, that is okay and you will not have to keep being a part of the project. Remember, even if you say you do not want to be in the project, you will still be receiving the education and exercising with us in the classroom but I will not measure you at the end of the project.

Who to Contact: Who can I talk to or ask questions to?
You can ask me questions now or at any time during this project. You can also ask your school nurse questions. I have written a number and email address you can use to reach me or you can see me any time that I am at your school. If you would like to talk to someone else that you know like your teacher or doctor, that is okay too.

If you choose to be part of this research I will also give you a copy of this paper to keep for yourself. You can ask your parents to look after it if you want.

You can ask me any more questions about any part of the research study, if you wish to. Do you have any questions?

PART 2: Certificate of Assent
This section can be written in the first person. It should include a few brief statements about the research and be followed by a statement similar to the one identified as 'suggested wording' below. If the child is illiterate but gives oral assent, a witness must sign instead . A researcher or the person going over the informed assent with the child must sign all assents.

I understand that the project is about physical activity and a health body weight and that my height and weight will be measured once at the beginning and once at the end of the project. I understand that I will also be asked to fill out a checklist about my physical activity at the beginning and the end of the project.

I have read this information (or had the information read to me) I have had my questions answered and know that I can ask questions later if I have them.

I agree to take part in the research.

OR

I do not wish to take part in the research and I have <u>not</u> signed the assent below._____(initialed by child/minor)

<u>Only if child assents:</u>

Print name of child _____

Signature of child: _____

Date:_____
day/month/year

Appendix F

Teacher Led Classroom Exercise Log

Please use this form to record exercise breaks taken in your classroom over the next nine weeks. You may use the WAY to Smile exercise guides that were provided to you or you may use your own routine (i.e. jumping jacks, toe touches, etc.). The important thing is that you try to include 10 minutes of classroom exercise each day.

Date	Length of break	Exercise/Activity

Appendix G

Week 4 Child Exercise Repetition Log

Day	Exercise	# of Reps
Wednesday		
Thursday		
Friday		
Sunday		
Saturday		
Sunday		
Monday		