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Effects Of Parental Support On Physical Activity Levels In Children

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EFFECTS OF PARENTAL SUPPORT ON PHYSICAL ACTIVITY LEVELS IN CHILDREN

by

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This dissertation, submitted by Julie Ann Caspers, in partial fulfillment of the requirements for the Degree of Doctor in Philosophy from the University of North Dakota, has been ready by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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ABSTRACT

Introduction: The literature is mixed regarding behavioral methods that may effectively motivate children to increase physical activity levels. Because some research has shown parental influence can affect children's behavior, it is hypothesized that trained parental support may increase children's physical activity.

Purpose: The purpose of this study was to examine the effects of parental support on children's physical activity. Pender's Health Promotion Model (HPM) served as a guide. The theoretical underpinnings of this model are based on the assumption that individuals are influenced by interpersonal factors such as parental support.

Design and Sample: For this pre-test/post-test interventional study, 30 children ages 8 to 12 years were recruited from a rural Midwestern Boys and Girls Club. Determined physical activity levels, perceived support, and perceived motivation were determined before and after implementation of a parental support intervention.

Methods: Physical activity levels were objectively measured by accelerometers. Perceived levels of physical activity, motivation, and support were measured using the Perceived Activity Questionnaire-Child, Social Support and Exercise Scale, Physical Activity Motivation Scale, and Amherst Health and Activity Adult Survey. Intervention parental support strategies included encouragement, praise, transportation, and participation with the child in physical activities. Parent and child survey scores,

accelerometer scores, demographics, and anthropometric measures were analyzed using paired t-tests.

Results: Results showed that after the intervention, both children (*paired t*= 7.43, p= 0.001) and their parents (*paired t*= 3.04, p= 0.001) perceived significantly greater parental support and motivation (*paired t*= 9.65, p= 0.001) to be physically active. Children were also significantly more physically active following the parental support intervention (*paired t*= 2.60, p= 0.01). Parental support may affect children's physical activity levels, but other confounding factors need to be studied in the future.

Implications: Results of this study has implications for improving the health and fitness of children through increased physical activity levels. Nurses are in a key position to influence parental behaviors through education, research, and policy as a means of improving children's physical activity levels.

CHAPTER I

INTRODUCTION

Only one-third of children in the United States are estimated to be physically active enough to promote cardio-metabolic health and maintain optimal weight patterns (Taylor, et al., 1997; Wilson, Lawman, Segal, & Chappell, 2011). This generation of children is considered to be the least physically active group in US history. Therefore, obesity has become an epidemic for the current generation of children (Cole, Bellizzi, Flegal, & Dietz, 2000; Ogden, Carroll, Kit, & Flegal, 2012).

Low physical activity levels are a major risk factor for developing obesity and coronary artery disease in children. Studies have attributed increased obesity in children to poor diet, lack of daily physical activity, and an increase in sedentary lifestyle choices including television, computer, and gaming (Al-Nakeeb, Duncan, Lyons, & Woodfield, 2007; Dollman, Norton, & Norton, 2005; Eather, Morgan, & Lubans, 2011; Nyberg, Nordenfelt, Ekelund, & Marcus, 2009). Research has shown that increased physical activity is a key behavioral determinant of physical fitness and obesity prevention (Brockman, Jago, & Fox, 2011; Perry & Hoffman, 2010).

However, less than 40% of US children ages 6 to 19 years meet the US Centers for Disease Control and Prevention (CDC) recommendation of 60 minutes of moderate to vigorous physical activity daily (Colley, Janssen, & Tremblay, 2012). Failure in meeting CDC recommended daily physical activity levels in children suggests that a

reconsideration of the role of support strategies in addressing this problem is necessary. The literature is mixed regarding which behavioral methods can effectively motivate children to keep physically active and meet the CDC's daily physical activity recommendations. Therefore the purpose of this study was to identify the effects of parental support on children's physical activity levels and whether perceived parental support increases children's motivation for physical activity.

Parental support has been noted as a key factor for motivating children in making physical activity choices (Bentley et al., 2012; Davison & Jago, 2009; Rutten, Boen, & Seghers, 2013; Zhao, Gao, & Settles, 2013). Parents present the first behavioral learning environment for children and are most influential with young children in teaching socialization interactions (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2010). Parental support has shown to be a significant indicator in determining how physically active children ages 7 to 10 years will be where family skills and beliefs can shape attitudes and physical activity behaviors (Edwardson & Gorely, 2010). However, research has also shown parental support to be poorly associated with or have no association with physical activity levels in children ages 3 to 12 years (Ferreira, van der Horst, Wendel-Vos, Kremers, van Lanthe, & Brug, 2007; Prochaska, Rogers, & Sallis, 2002; Sallis, Alcaraz, McKenzie, Hovell, Kolody, & Nader, 1992).

A recent qualitative study by de la Haye, de Heer, Wilkinson, and Koehly (2013) showed that children are more inclined to participate in physical activities if their parents support them in doing so. Even so, a review of the literature indicated that parental support measures influencing children's physical activity levels also resulted in mixed outcomes. Several studies measuring the influence of supportive measures on children's

physical activity levels have been inconclusive, identified weak correlations between parental support and children's physical activity levels, and had limited generalizability (Gustafson & Rhodes, 2006; Rutten, Boen, & Seghers, 2013; Van der Horst et al., 2007).

Cong, Feng, Liu, and Esperat (2012) indicated that parental participation increases the time that children spend being physically active but that parental encouragement did not have the same impact. Sallis, Prochaska, and Taylor obtained similar results in 2000 when they studied parental influence on physical activity in children and found no determinant cause-and-effect relationship. Beets, Pitetti, and Forlaw (2007) analyzed effects of peer and parental support on physical activity levels of children and reported mixed outcomes. Peer support was found to be a consistent predictor for physical activity, but parental support was not directly related to physical activity. The authors suggested that lack of effect might be explained by the way parental support was measured as a total concept rather than as separately analyzing specific support mechanisms including encouragement, observation, participation and praise. Trost, Kerr, Ward, and Pate (2001) reported parental modeling as a positive predictor in raising physical activity levels in children, but similar to Beets, Pitetti, and Forlaw (2007), other authors have also found that peer support is more highly associated with physical activity behavior compared to parental support (Anderssen & Wold, 1992). Springer, Kelder, and Hoelscher (2006) identified peer encouragement as the only social support factor that significantly predicted vigorous levels of physical activity ($r = 0.11$, $p < 0.005$). In addition, Trost, Sirard, Dowda, Pfeiffer, and Pate (2003) completed a study that compared physical activity between overweight and non-overweight preschool

children and found no significant effects of parental influence on physical activity behaviors.

Parental support has been cited as key in some studies in promoting physical activity in children, although evidence has been weak. Many studies carry limitations including cross-sectional design and restrictive samples, and many depend on self-report measures and non-experimental design (Bauer, Nelson, Boutelle, & Neumark-Sztainer, 2008; Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006; Kleges, Malott, Boschee, & Weber, 1986; Trost et al., 2003).

Gender and BMI as Factors

Previous studies on parents as support agents in promoting physical activity in children have shown varied results when analyzed relationships with gender and body mass index (BMI). Boys have been reported to participate in more physical activity compared to girls when feeling supported by their parents (Fisher et al., 2011; Lau, Engelen, & Bundy, 2013; Zhao, Gao, & Settles, 2013). Similarly, girls were noted to have a steady decline in physical activity once approaching puberty when compared to boys (Bastos, Araujo, & Hallal, 2008; McWhorter, Wallmann, & Alpert, 2003; Zhao, Gao, & Settles, 2013).

On the other hand, Bradley et al. (2100) report that parental support has been a more significant factor in predicting physical activity levels of boys compared to girls, but the rate of decline of physical activity is greater in boys, resulting in less difference by late adolescence (Bradley et al., 2011). Even so, Edwardson and Gorely (2010) found no gender difference in mean level of physical activity in relation to parental support. According to Adkins, Sherwood, Story, and Davis (2004), parent reported support for

physical activity was associated with girls' physical activity levels. Furthermore, several studies have shown that parental support influences the activity levels of girls significantly more than boys (Davison, Cutting, & Birch, 2003; Fogelholm, Nuutinen, Pasanen, Myohanen, & Saatela, 1999; Myers, Strikmiller, Weber, & Berenson, 1996; Ward et al., 1997).

The effects of parental support on children's physical activity levels are also mixed when looking at children's BMI. Nolan, Cottrell, and Dino (2013) found that more parental support was associated with higher than 50th percentile BMI levels of girls. In comparison, Corder et al. (2010) reported that parents of children with healthy BMI levels tended to be more supportive of physical activities, even though they overestimated the level of physical activity their children participated in. This finding is consistent with the work of Zhao, Gao, and Settles (2013) showing that parents of overweight children were less prone to promote physical activity behaviors in children compared to parents who perceived their children as having a healthy weight.

Community Factors Influencing Children's Physical Activity Levels

Community-wide approaches to train parents as role models and physical activity support agents are necessary, considering the multifaceted lifestyles children are accustomed living to, including home, school, and extracurricular activities or free-play. Also, numerous physical activity interventions for children have been implemented in the school system with limited success in sustaining physical activity levels in children despite parental involvement (Bentley et al., 2012; Lau, Engelen, & Bundy, 2013). Children are not engaging in adequate physical activity during the school day; therefore, the afterschool period is an opportunity for children to participate in an array of

unstructured physical activities. This opening allows parents to have a direct role in monitoring and facilitating physical activity behaviors (Lau, Engelen, & Bundy, 2013).

Rationale for Study and Impact on Children's Physical Activity

There is a real need for a more thorough understanding on how perceived parental support can motivate children to increase physical activity levels in order to inform empirical inquiries and ensure that the most successful physical activity interventions are implemented. Despite previous research on effects of parental support on children's physical activity levels, there continues to be no concrete evidence that parental support can significantly influence children's physical activity levels. Because of the lack of empirical evidence for the effects of parental support on children's physical activity and the mixed results regarding how it can affect children's behavior, the purpose of this study was to determine whether parental support can motivate children to increase their physical activity levels. With increased rates of childhood obesity and cardiovascular disease, identifying methods that are effective for improving children's physical activity behaviors is needed. The attainment of increased physical activity levels through parental support may decrease the devastating impact of obesity by improving physical fitness, mental wellbeing, and maintenance of optimal weight patterns. The hypotheses for this work are that (1) children's perceived motivation for physical activity will improve following receipt of a trained parental support intervention; and (2) children's physical activity levels will improve following a trained parental support intervention

Statement of Problem

The rate of obesity in children has alarmingly increased by 45% in the last decade, leading to obesity-related health problems such as type II diabetes,

cardiovascular disease, and reduced psychological well-being (Craig, Tudor-Locke, Cragg, & Cameron, 2010; Edwards, 2005; Power, Bindler, Goetz, & Daratha, 2010).

Physical activity is a major determinant in preventing obesity and its consequences (Zhao, Gao, & Settles, 2013). Physical inactivity in childhood has been linked to chronic co-morbidities and increased sedentary time in adulthood (Bozzola, Bozzola, Abela, & Amato, 2010), yet children's physical activity levels continue to decline, and childhood obesity has become an epidemic. Only 36% of US children met the Healthy People 2000 goal for daily moderate to vigorous physical activity, and current figures from Healthy People 2010 indicate that less than 3% of children are meeting recommended daily moderate to vigorous physical activity (Davison, Cutting, & Birch, 2003; Pate, Macera, Bailey, Bartoli, & Powell, 1992). The Minnesota Department of Health (2013) reported the percentages of obesity in the study county at 23.1% and at 25.4% in the state. The US Department of Health and Human Services reported that approximately 22.8% of the study's county population does not exercise compared to 21% of the state population (US Department of Health and Human Services, 2012).

Parental support and its effects on physical activity levels in children are not well defined because of a lack of empirical evidence, generalizability, study design, heterogeneous sampling, and valid, objective measures (Cong, Feng, Liu, & Esperat, 2012; Pfeiffer, Mciver, Dowda, Almeida, & Pate, 2006; Springer, Kelder, & Hoelscher, 2006). Because physical inactivity is a risk factor for many diseases and conditions, making physical activity an integral part of the daily routine is critical.

Evidence has shown that parents can be a significant motivator for physical activity in children, but subjective monitoring of physical activity in combination with

objective measurement has not been adequately supported in previous research studies despite steady declines in physical activity among children (Pelclova, El Anasari, & Vasickova, 2010). Validating findings with objective feedback may have a significant impact on education and community organization policies as well as on pedagogical and parenting practices by raising awareness in parents, educators, and community leaders of the importance of parental involvement in implementing physical activity programs.

Statement of Purpose

Therefore, the purpose of this study was to determine the effects of parental support on physical activity levels of children. The specific aims addressed in this study were as follows:

1. Analyze for differences in accelerometer counts before and after children received parental support to encourage physical activity.
2. Analyze for differences in children's motivation scores before and after they received parental support to encourage physical activity.
3. Analyze for differences in parents' perceived support scores before and after their child received a parental support session to encourage physical activity.

Definition of Terms

The following operational definitions were used in this study:

Accelerometer Scores: The accelerometer scores were determined by using lightweight, portable physical activity and energy expenditure monitoring system worn on the wrist called the Actical accelerometer. The device measures dimensionless gross motor physical activity accelerations including walking, running, and jumping and estimates time spent in light, moderate, and vigorous activity (Crouter et al., 2010).

Children: For this study, children were considered to be a boy or girl ages 8 to 12 years and enrolled in the Boys & Girls Club.

Physical Activity: Physical activity was any bodily movement produced by the contraction of skeletal muscles and requiring a moderate to large amount of effort resulting in increased heart rate, respiratory rate, and possible sweating (WHO, 2013). Physical activity is any voluntary, unstructured movement of the body including running, free play, or physical chores versus exercise that is planned out and structured repetitive movement including yoga or an aerobics class (National Institute on Aging, 2013).

Perceived Parental Support: The child's believe that parental support is available through encouragement, praise, parent observation, parent participation, and transportation t0 physical activities through communication or actions with the goal that the receiving child will develop health promoting behaviors

Perceived Motivation: A child's belief that he or she feels desire to participate in physical activity; a guiding force in the decision-making process that induces a will to perform a behavior or action (Rutten, Boen, & Seghers, 2013).

Theoretical Framework

This study was designed to test the applicability of Nola Pender's Health Promotion Model (HPM) in explaining the effects of parental support on increasing physical activity levels in children. Pender's HPM, in a previous study has been found useful in implementing physical activity interventions among children (Wu, Pender, & Yang, 2002). Pender's HPM portrays how people interact with their interpersonal and physical environments in the pursuit of health (Polit & Beck, 2007). Not merely the absence of disease, health is considered to be a dynamic state that is continuously

evolving and dependent on interactions within one's own environment in the pursuit of health and wellness. The health-promoting behavior is the final outcome, which improves overall health because the actions of the person engaged in activities are seen as personally beneficial.

Three main components make up the HPM and influence behavior change. These include 1) individual characteristics and experiences; 2) behavior-specific cognitions and enjoyment (perceived self-efficacy and interpersonal influences such as parents); and 3) immediate behavioral contingencies (commitment to a plan of action) (Robbins, Gretebeck, Kazanis, & Pender, 2006).

The HPM recognizes that each person has unique individual characteristics and actions that affect behavioral choices. The core belief identified in Pender's philosophy of health promotion is that health promoting behaviors should result in the improvement of health and enhanced functional ability at all stages of development and that this process can be positively or negatively influenced by the multidimensional nature of individuals and how they interact with their environment.

Basic assumptions of Pender's HPM are as follows:

1. Individuals seek to actively regulate their own behavior.

2. Individuals in all of their bio-psychosocial complexity interact with the environment, progressively transforming the environment and being transformed over time.

3. Health professionals constitute a part of the interpersonal environment, which exerts influence on persons throughout their lifespan.

4. Self-initiated reconfiguration of person environment interactive patterns is essential to behavior change (Marriner & Raile, 2005, p. 15).

The core belief identified in Pender's health promotion philosophy of nursing is that individuals interact with their environment and that the experiences they have affect their subsequent actions. A positive effect from the person environment interaction increases the likelihood of a health promoting behavioral outcome. This basic premise of Pender's model further predicted that individuals are more in favor to commit to and participate in health promoting behaviors when significant others model the behavior, expect the behavior, and support the actual performance of a behavior (Marriner & Raile, 2005).

Theoretical Underpinnings of the Health Promotion Model

The theoretical underpinnings of the model include the assumption that prior behavior and inherited characteristics influence beliefs and action of a health-promoting behavior. Individuals will commit to enacting a behavior if they personally feel valued benefits. Actual or perceived barriers can hinder the commitment to action or the actual behavior. In this study, gender, age, race, and BMI were condition factors analyzed with perceived level of parental support to identify any differences in demographic and anthropometric characteristics.

Another proposition in Pender's HPM is that perceived self-efficacy to perform a certain behavior increases the chance that of an individual will actually enact the behavior. Also, if there is a greater self-efficacy to perform an action, there will be less perception of barriers to commit to an action. Self-efficacy is a self-regulatory mechanism which requires self-assurance and personal agency. Coping skills of children

are underdeveloped and they are vulnerable to relapse in previous behavior without the needed guidance and reassurance from those with established cognitive effort and independent in learning tasks (Bandura, 1982). In this study, the researcher hypothesized that if children felt motivated by parental-support, then their physical activity levels would then increase (Pender, 1982; Polit & Beck, 2007).

Pender also conceptualized that when there is a positive effect toward a behavior, the result will be greater perceived self-efficacy, which will then increase the positive affect. Positive reinforcement of a behavior will lead an individual to the associated behavior, and the probable enactment of the action is greater (Pender, 1982). In this study, parental support interventions included parental support of physical activity in children through praise and encouragement.

The HPM also proposes that individuals are more inclined to participate in a behavior when others significant to them model the desired behavioral outcome. Pender notes that family, peers, and healthcare providers are major sources of influence that can increase the engagement of a health-promoting behavior. This study determined whether parental support activities including observing children being physically active and parents engaging in physical activity would increase children's motivation and level of physical activity.

Another notion in Pender's HPM is that situational influences in the external environment can affect participation in health-promoting behavior (Pender, 1982; Polit &Beck 2007). This study incorporated parental support measures including observing children in physical activity and transporting children to environments that promote physical activity to determine the effect on their physical activity levels.

The health-promoting system explored in this study is the parental supportive motivation system related to parent-perceived support, child-perceived support, and child-perceived motivation to increase physical activity levels in children. According to the HPM, the greater the commitment to action, the greater the chances for a health-promoting behavior. This study conducted an intervention to determine whether children would be more physically active if their parents gave more support to promote that behavior. The HPM states that a desired action is unanticipated to occur if other competing demands take control over the preferred target behavior (Pender, 1982). The day-to-day demands of children may pose barriers for their participation in physical activities. Parents can be supportive agents by prioritizing physical activities into children's activities of daily living.

Pender also theorizes that commitments to a plan of action are less known to happen if other actions are more desirable over a specific health behavior. As a result, this study focused on parental support of child-chosen activities to assist in promoting an increase in those activities. The HPM proposition that individuals can modify cognition, affect, and physical environment is a major underlying concept in this study. It was hypothesized that parental support would motivate children facilitate self-efficacy, and make them feel more supported, which would increase their physical activity levels (Polit & Beck, 2007).

Major Concepts of the Health Promotion Model

The model describes how individual characteristics and experiences can shape a health-promoting behavior. Personal biological characteristics then can influence the enactment of a behavior include BMI, motivation, race, age, and gender (Marriner &

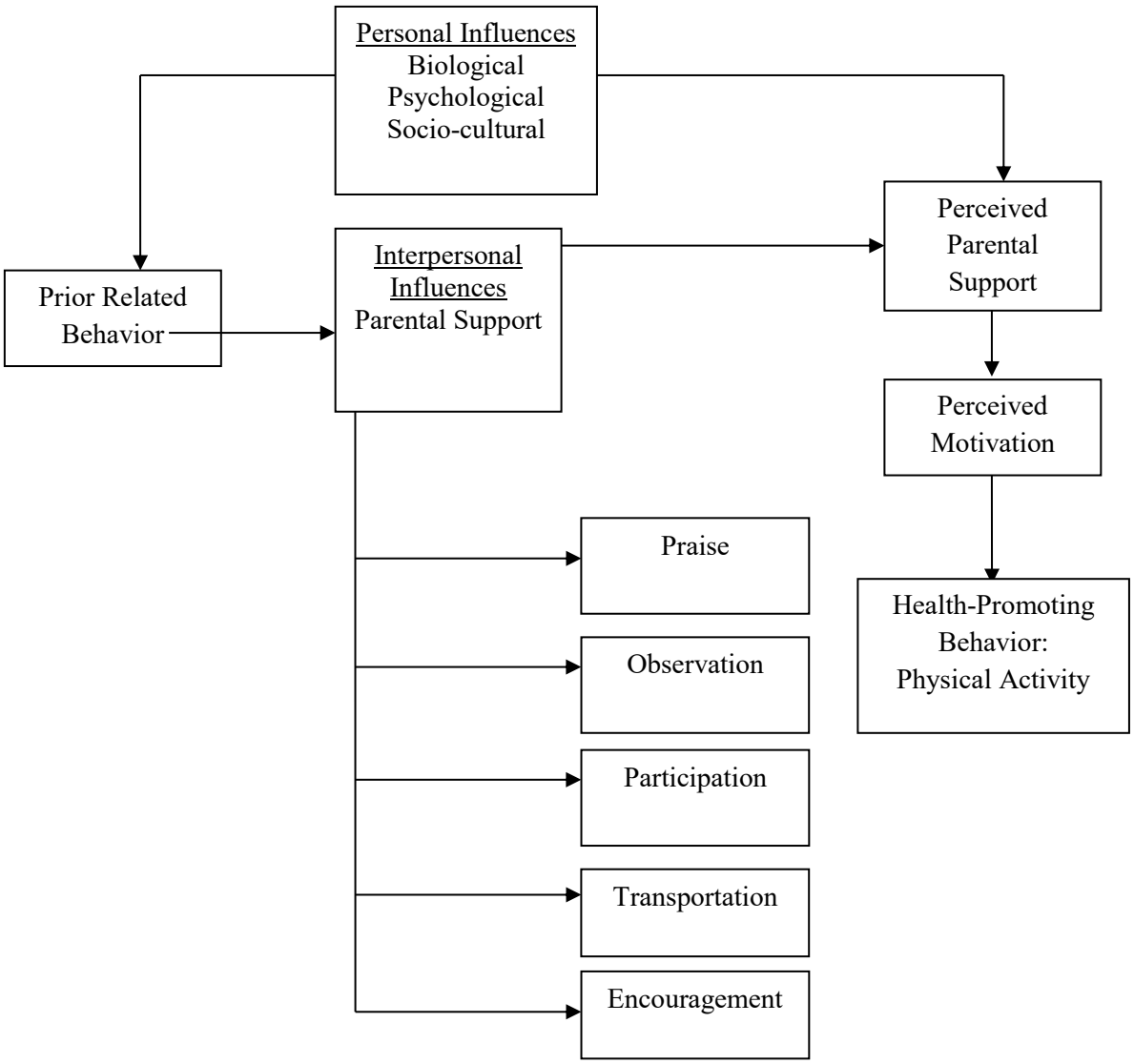
Raile, 2005). Major concepts of Pender's HPM are perceived benefits and barriers to action. If positive results are anticipated to occur from a health-promoting behavior, the individual will perform the action, but if there are some foreseen barriers to engaging in a given behavior, the likelihood of carrying out that behavior is limited (Marriner & Raile, 2005).

Children are not born with a sense of self-efficacy. The exploratory experiences they experience through repeated observations and participation of events instills the first basis of self-efficacy. Growing personal and social experiences children have with the guidance of their parents facilitates the formation of themselves as distinct selves. See Figure 1 for an illustration of Pender's HPM as it relates to effects of parental support on physical activity levels in children. Parents are responsive agencies to assist children gain self-knowledge and capabilities to function using cognitive and social skills (Bandura, 1994, Marriner & Raile, 2005).

Therefore, the intervention of this study was developed to provide the parents education on the positive health benefits of physical activity aside from obesity prevention, and children were given the freedom to choose the activities they desired to participate in when they felt motivated from support in doing so. There were no additional costs, time, or environmental constraints to performing the health-promoting behaviors.

Marriner and Raile (2005) reflect on Pender's concept of interpersonal influences. As mentioned above, influential sources for promoting health behaviors include family, peers, and healthcare providers. Their interpersonal influence is derived from social support, emotional encouragement, and modeling behaviors through observation and

Pender's Health Promotion Model Related to Parental Support of Physical Activity



Source: Adapted from Marriner and Raile (2005). Nola Pender's Health Promotion Model (HPM) (p. 455).

Figure 1. Pender's HPM as it Relates to Parent Support on Physical Activity in the Study.

participation. This component of the model is directed at motivating individuals to participate in health-promoting behaviors and is an important determinant for physical activity (Sallis, Prochaska, & Taylor, 2000).

According to Pender, variables that determine behavioral choices and outcomes have significant motivational actions (Polit & Beck, 2007). Personal perception is the situational influence affected by the personal influence, which can either impede or facilitate a health-promoting behavior. The influence of interpersonal factors, such as parental support, can have direct effects on children's physical activity levels (Wu & Pender, 2005). This study is particularly driven by the behavioral-specific cognitions of the HPM including interpersonal influence of parental support.

Another construct of the HPM that shaped this study is the influence of commitment to action. Motivation for sustaining physical activity can be prompted indirectly and directly through social support and self-efficacy. Social support is defined by the HPM as instrumental to the persistence of a behavioral action through encouragement. Parents are an important source of motivation and support (Shin, Hur, Pender, Jang, & Kim, 2006). These aspects of the HPM are critical areas to target when assessing interventions directed at increasing physical activity levels through motivation. Individuals are more inclined to sustain behaviors when they are provided encouragement and interpersonal support. Furthermore, they are more prone to engage in and continue a behavior if it is associated with a positive effect and expectations from others delivered through assistance and supportive mechanisms.

In promotion of physical activity behaviors, situation-specific changes in the environment can increase the commitment to engaging in health-promoting activities

(Guedes, Moreira, Cavalcante, de Araujo, & Ximenes, 2009). Positive feedback and interpersonal expectations are instrumental for change and regulation of behavior. The process of motivating individuals to act can in turn influence positive subjective feelings, which means greater self-efficacy to drive that behavior (Wu & Pender, 2002). The HPM guided this study through components of interpersonal influence and commitment to action by parental support and encouragement and analysis of the effects on perceived parental support, perceived motivation, and measure of accelerometer validation of children's physical activity levels following a parental support intervention.

Assumptions

The following assumptions were made for this study:

1. Parents and children who participate in the study will be open and honest in their responses.
2. Education provided to parents by nursing, as part of the parental support intervention program, prepares them to understand the benefits of physical activity, the role of parental support, and various means of providing support to increase children's physical activity levels.

Limitations

The limitations for this study include:

1. Self-report questionnaires were used to determine children's perceived level of parental support. The ability of children to use recall or self-report measures is limited by their ability to understand questionnaires and accurately recall past events and experiences. There is the potential for recall bias in self-reporting behavioral methods.

2. Parents and children might have social-desirability bias when using self-report measures because of possible foreseen pressure to report increases in perceived support, motivation, or physical activity levels.
3. Because of the homogeneous population in the study community, the sample lacked cultural diversity.
4. Hawthorne effect cannot be ruled out for children could have increased their physical activity by virtue of having known that they were being monitored by an accelerometer. The two week washout period was implemented in order to avoid any reactivity effects of wearing an accelerometer.
5. Two-thirds of the study sample was comprised of boys. This is a limitation of the study that there was not a 50/50 gender split, which has an effect on the analysis results regarding perceived support and physical activity levels. This study did not specifically focus on one gender; therefore, gender specific differences on weight were not analyzed.

Significance of the Study

Although physical activity is associated with positive cardio-metabolic health, less than 10% of children actually meet recommended CDC guidelines of 60 minutes of vigorous physical activity a day (Lawman, Wilson, Van Horn, Resnicow, & Kitzman-Ulrich, 2011). Research has shown that physical activity begins to decline after the age of six, and by age nine, children only participate in only 3 hours of physical activity per week, with levels dropping sharply to 35 to 49 minutes per week by age 15 (Centers for Disease Control and Prevention, Convergence Partnership, 2010; Lazaar et al., 2007).

In the last 30 years, the prevalence of childhood obesity for children ages 6 to 11 years has tripled from 6.5% in 1980 to 19.6% in 2008 (CDC, Childhood Obesity, 2010). Since 2010, no US state has fallen below 20% occurrence in childhood obesity rates (CDC, Overweight and Obesity, 2011). Within the United States, the rate of childhood obesity is expected to reach 40% in the next two decades, and type II diabetes is expected to affect 300 million people worldwide (Allender, Cowburn, & Foster, 2006).

In 2003, the US medical expenses that were attributable to obesity-related medical conditions were approximately 75 billion dollars (US Department of Health and Human Services, 2008). With the national costs and health consequences of childhood obesity, methods to prevent obesity and promote cardiovascular fitness are imperative. The attainment of increased physical activity levels through motivational factors may decrease the devastating impact of obesity and sedentary lifestyles on children by improving physical fitness and maintenance of optimal weight patterns. By educating parents, nurses can help decrease the climbing rate of childhood obesity and help parents understand the impact of support to motivate children to be physically active. The information that results from this study will provide nurses with new knowledge that they can use when working with parents to increase physical activity levels in children.

This study, conceptualized with Pender's HPM, examined whether children perceived that they were given support to participate in physical activities, their perception of whether they felt more motivated to be physically active following parental support, and the relationships among Pender's personal factors, personal influences, and the behavioral outcome of increased physical activity in children. The relationship among Pender's personal factors, children's perceived parental support, and actual

determined physical activity levels was explored through participants' completion of questionnaires. Personal factors for this study included child age, gender, race, and BMI.

The effect of parental support on the parents' perceived support they provided to children promote physical activity in children was also explored. This aspect was explored by parents completing the Amherst Health and Activity Adult Survey. Findings from this survey helped identify parental perceptions of their children's physical activity habits as well as household influences that support physical activity behaviors.

The information obtained from this study resulted in new nursing knowledge related to the impact of parental support, children's perceptions of feeling supported to participate in physical activity, and actual physical activity levels in children. The aim of this study was to determine whether parental support would improve children's perceptions of parental support and children's motivation to be more physically active, thus increasing the children's physical activity levels.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

This chapter contains a review of the literature that focuses on a description of the state of knowledge related to childhood obesity, benefits of physical activity for children, measures of physical activity in children, and an examination of the effects of motivation and parental support as they relate to children's physical activity levels. The review also describes previous findings about children's physical activity as it relates to age, gender, race, and BMI. The purpose of this study, as presented in the previous chapter, was to determine the effects of parental support on physical activity levels in children. The specific aims addressed in this study were as follows:

1. Analyze for differences in accelerometer counts before and after children received parental support to encourage physical activity.

2. Analyze for differences in children's motivation scores before and after they received parental support to encourage physical activity

3. Analyze for differences in parents' perceived support scores before and after their child received a parental support session to encourage physical activity.

State of Knowledge of Physical Activity

This chapter contains a description of the state of knowledge related to physical activity in children and focuses on several areas. These areas are objective measures of physical activity, benefits of physical activity in children, socio-cultural factors influencing physical activity, motivational factors to promote physical activity (Intrinsic/Extrinsic), perceived parental support, parental support as motivation for physical activity, environmental factors, and ambiguous findings related to parental support on children's physical activity levels.

Objective Measures of Physical Activity

The use of accelerometer-based physical activity monitoring has become more common in physical activity research (Crouter et al., 2010). The advantages of using objective methods to measure physical activity levels over traditional self-report methods includes the avoidance of recall bias and a more accurate estimate of the total daily volume of physical activity (Craig, Tudor-Locke, Cragg, & Cameron, 2010; Crouter et al., 2010; Schneider, Crouter, & Bassett, 2004). The use of accelerometers may also help research participants overcome the challenges of language barriers and literacy that can exist with self-report surveys (Pulsford et al., 2011). Research has indicated that 3 to 5 days are needed to obtain a reliable account with intraclass correlation coefficient (ICC > .8) of children's habitual physical activity routine (Duncan, Schofield, & Duncan, 2006; Eather, Morgan, & Lubans, 2011).

Accelerometers are a method of objective measurement of physical activity. First developed in the 1980s, they have advanced to gain prominence in objective physical activity measurement (Dinesh & Freedson, 2012). This form of objective measurement

can capture the frequency, duration, and intensity of physical activity and categorize time spent in light, moderate, and vigorous physical activity (Crouter et al., 2010; Pfeiffer, Mciver, Dowda, Almeida, & Pate, 2006). With the ability to divide physical activity into different levels of measure, researchers can use these threshold values to determine whether children are meeting recommended physical activity guidelines (Pulsford et al., 2011). They have been widely used in both national and international studies and are an accurate measurement of physical activity in children (de Vries, Bakker, Hopman-Rock, Hirasing, & van Mechelen, 2006; Riddoch et al., 2007; Rothney, Schaefer, Neumann, Choi, & Chen, 2008). Accelerometers can accurately measure ($r = 0.89$, $p < 0.001$) average physical activity counts, total activity, and energy expenditure (Heil & Klippel, 2003; Mattocks et al., 2008). Their technological evolution increased battery life, and falling costs have enhanced the practicality of using accelerometers as a preferred method of objective physical activity measurement (Pulsford et al., 2011).

One popular accelerometer in population-based research is the Actical accelerometer, a small, waterproof, omnidirectional accelerometer that is a valid and reliable form of objective measurement of children's physical activity. Using the Actical is an ideal form of objective measurement because of its small size, waterproof casing, and practicality for both indoor and outdoor use. Researchers can appreciate the convenience of placing it on the participant without the hassle of removal during the study intervention because of its durable, waterproof nature (Cliff, Reilly, & Okely, 2009; Dale, Corbin, & Dale 2000; Evenson, Catellier, Gill, Ondrak, & McMurray, 2008). It has a tamper-resistant casing that makes it attractive for use with curious children. The

accelerometer can be worn on a belt on the hip over the iliac crest, the wrist, or the ankle to best simulate free-living activity (Pfeiffer, Mciver, Dowda, Almeida, & Pate, 2006).

There are other ways of objectively measure physical activity in children besides the accelerometer used in this study. Pedometers have become an accepted form of physical activity in children. The advantages of using pedometers to measure physical activity levels over traditional self-report methods includes the avoidance of recall bias and a more accurate estimate of the total daily volume of physical activity (Craig, Tudor-Locke, Cragg, & Cameron, 2010; Schneider, Crouter, & Bassett, 2004). Tracking raw step counts, the pedometer is easy to understand, cost effective, and requires no additional software (Colley, Janssen, & Tremblay, 2011). Drawbacks of the pedometer include risk for child tampering because it clips onto clothing, not being waterproof, and fails to capture intensity, duration, and frequency movement which would not incorporate the efforts of stair walking, swimming, or weight lifting (Duncan, Schofield, & Duncan, 2006).

Other forms of objective measurement of physical activity include direct observation, indirect calorimetry, doubly-labeled water, and heart rate monitors. Direct observation consists of a trained observer coding type, intensity, and duration of physical activity. It allows for multiple direct observations of physical activity but is limited to the number of participants, time being observed, and the location the physical activity occurred (Reilly et al., 2003; Robertson et al., 2006; Trost, Sirard, Dowda,Pfeiffer, &Pate, 2003). Indirect calorimetry measures physical activity through monitoring oxygen consumption and carbon dioxide production with energy expenditure. This is an expensive, cumbersome tool to wear and is not favorable to measure energy expenditure

of bouts of physical activity (Levine, 2005). Doubly labeled water is reported to be the best strategy in determining energy expenditure during physical activity. Isotopes of water are orally administered and carbon dioxide production is estimated by analyzing left over isotopes detected in the urine. Downfall of this method includes the cost as well as the inability to describe type, intensity, and duration of physical activity (Schoeller et al., 1986). Hear rate monitoring is a common method of measurement for physical activity by classifying the intensity and duration of physical activity. These monitors define the relationship between oxygen uptake and heart rate across a range of moderate to vigorous physical activities. The weak relationship between heart rate and oxygen consumption is a limitation for distinguishing physical activity levels (Lof, Hannestad, & Forsum, 2003).

What is Physical Activity

Physical activity is body movement produced through skeletal muscle use that results in energy expenditure. It can be leisure, occupational, intermittent, continuous, and weight bearing (Allender, Cowburn, & Foster, 2006; Seabra, Mendonca, Thomis, Malina, & Maia, 2011). Physical activity is a known determinant in the prevention of obesity and obesity health consequences and results in various positive health outcomes, including increased resting metabolic rate and muscle hypertrophy and decreased body fat (McWhorter, Wallmann, & Alpert, 2003).

The CDC categorizes physical activity recommendations into moderate and vigorous physical activity (CDC, Physical Activity, 2011). Physical activity is expressed in terms of metabolic equivalents (METS). Metabolic equivalents are the ratio of working metabolic rate and resting metabolic rate. Moderate physical activity is

approximately 3 to 6 metabolic equivalents which requires a moderate amount of effort and accelerates the heart rate with movement including brisk walking and dancing. Vigorous physical activity is approximately greater than 6 metabolic equivalents, which requires a large amount of effort and rapidly increases heart rate and causes substantial heavy breathing including running and aerobics (WHO, 2013)

Current recommendations from the CDC and several other authoritative public health organizations including the World Health Organization (WHO), and the US Department of Health and Human Services recommend are that both normal-weight and overweight children should participate in at least 60 minutes of moderate to vigorous physical activity (MVPA) on most days of the week (CDC, Childhood Obesity, 2010). One study reported that MVPA was inversely related to body fat percentage (Chaput et al., 2012). This finding is consistent with another study that identified weight status, socioeconomic status, and children in ethnic minority populations as being much less active than children of higher socioeconomic, lower weight, and/or nonminority status (Delva, Johnston, & O'Malley, 2007; Janssen et al., 2005).

The American College of Sports Medicine and the American Academy of Pediatrics both state the importance of regular physical activity in childhood and of maintaining physical activity levels in adulthood (McWhorter, Wallmann, & Alpert, 2003). Even so, only 36% of US children met the Healthy People 2000 goal of vigorous activity and less than 3% of children are meeting the Healthy People 2010 goal for vigorous activity (Davison, Cutting, & Birch, 2003). Children who participate in physical activity do so in various contexts. Structured forms include physical education

classes and organized sports while less structured forms include walking and active play during free time.

Regular physical activity participation in childhood is important in creating lifelong habitual health-promoting behaviors. Physical activity participation during childhood predicts physical activity levels and cardiovascular health in adulthood (Jolliffe & Janssen, 2006; Telama et al., 2005; Twisk, Kemper, & van Mechelan, 2002). At least 40 minutes of daily physical activity has been positively associated with lower body fat (Ruiz et al., 2006). Regular physical activity improves cognition and blood pressure, increases bone density, regulates blood glucose levels, reduces whole body adiposity, and decreases time spent in sedentary activities (Brockman, Jago, & Fox, 2011; McMurray et al., 2002). Diminished increases in BMI over time have been linked to increased levels of physical activity (Ara, Moreno, Leiva, Gutin, & Casajus, 2007; Donnelly et al., 2009). Active living, including walking with friends, dancing, bicycling, jumping rope, and skateboarding, enhances child development through creativity, conflict resolution, and social engagement (Dollman, Norton, & Norton, 2005). Also, children who are physically fit show greater focus in school, have better test scores, and display fewer behavioral problems (Racette, Cade, & Beckmann, 2010). Furthermore, engagement in a healthy lifestyle in childhood with regular physical activity has positively predicted regular physical activity practices in adulthood (Lau, Engelen, & Bundy, 2013).

Activities need to be enjoyable and complement the child's lifestyle to increase adherence (Daniels et al., 2005). Instead of targeting fitness and sports performance, physical activities should be geared toward fun and improving fundamental skills such as running, jumping, kicking, and balancing in noncompetitive environments (McWhorter,

Wallmann, & Alpert, 2003). An observation of children during active play revealed that children are active in short bursts over several seconds followed by decreased levels of activity or rest comparable to interval training (Barkley, Epstein, & Roemmich, 2009).

Physical activity levels depend on various environmental, social, and psychological components. Multiple studies focusing on motivational factors for increasing physical activity levels have taken place in school-based settings and relied mostly on self-reporting (Bean, Miller, Mazzeo, & Fries, 2012; Gao, 2010; Welk, Wood, & Morss, 2003). However, children are not meeting CDC-recommended physical activity targets during the school day, making afterschool environments a prime opportunity to increase physical activity levels (Lytle et al., 2009; Mota et al., 2005; Nilsson et al., 2009; Ridgers, Stratton, & Fairclough, 2005). Research has shown that boys are generally more active than girls, and children with a high socioeconomic status have been reported as more physically active during school and after hours (Seabra, Mendonca, Thomis, Malina, & Maia, 2011).

Making physical activity a priority and encouraging habitual patterns of physical activity in childhood is important for developing skills, improving flexibility, and creating lasting behaviors for physical activity participation. To sustain physical activity levels, the emphasis should be on active living rather than on strenuous physical activity (Jolliffe & Janssen, 2006). Enrolling children in organized physical activities in school and the community has the potential to increase their levels by introducing them to other peers who participate in physical activity and who potentially will promote related behaviors through support, encouragement, and networking (Davison & Jago, 2009).

Despite the many beneficial effects that physical activity has on the body including increased metabolism, maintenance of a healthy weight, and the prevention of cardiovascular and metabolic disorders, as noted, children do not meet the CDC daily recommendations. According to Davison and Jago (2009), objectively measured physical activity has been steadily declining. The percentage of children meeting the CDC-recommended 60 minutes of moderate to vigorous daily physical activity has declined from 42% at 6 to 11 years to 8% at 12 to 15 years (Davison & Jago, 2009). The assumption that children are naturally active and ready participants in physical activity actually is a deterrent to promoting physical activity in children. Children who are hyperactive or spend hours a day away from their parent are inadequately assessed for determined physical activity measurement and parents cannot only rely on assumption or weight status. Even though a child may appear to be of normal weight in their parents view, the child may still be leading asedentary lifestyles (McWhorter, Wallmann, & Alpert, 2003).

Socio-cultural Factors Influencing Physical Activity Levels

The cultural norm has now shifted to a more sedentary lifestyle, and the progressive nature of sedentary activity in the daily lifestyle is a major determinant for development of chronic disease and premature death (Craig, Tudor-Locke, Cragg, & Cameron, 2010; Edwards, 2005; Hills, King, & Armstrong, 2007; Power, Bindler, Goetz, & Daratha, 2010). The knowledge of the value of physical activity may have been compromised, and barriers for physical activity have prevented children from pursuing an active lifestyle. Safety concerns, physical environment, time constraints, and home distraction have been noted as barriers to physical activity. Parents may size up their

children relative to other family members or other comparators to look for validation of a child's weight status and an excuse for sedentary activity (Bentley et al., 2012).

Overweight children, girls, and children with low perceived sports competence are determined to be more physically inactive (Haverly & Davison, 2005; Lytle et al., 2009). Boys and Caucasians have been noted to be consistently more physically active than girls and African Americans (Zhao, Gao, & Settles, 2013). Boys not only are documented to be more physically active but also are reported to participate in more vigorous activity than girls (Hinkley, Crawford, Salmon, Okely, & Hesketh, 2008; Pate et al., 2006). In addition, a higher education level of the parents has been positively correlated with physical activity levels in their children (Bastos, Araujo, & Hallal, 2008).

Children are increasingly spending less time outdoors and choosing more sedentary activities such as television and computer gaming (Brockman, Jago, & Fox, 2011). Active transport such as bike riding, participation in organized sports, and time spent in physical education classes are declining (Dollman, Norton, & Norton, 2005). Once children approach puberty, their levels of physical activity dramatically decline, more so for girls compared to boys (Riddoch et al., 2007; Sallis, Prochaska, & Taylor, 2000). Low confidence and ability are cited as barriers to physical activity. Performance-based physical activities that rely on competition negatively affect physical activity participation in children (Belanger et al., 2011), but parental encouragement through love, trust, empathy, and support are positively associated with higher levels of physical activity (Biddle & Goudas, 1996; Dowda, Dishman, Pfeiffer, & Pate, 2007; Martin & McCaughtry, 2008; Springer, Kelder, & Hoelscher, 2006). Lack of parental support or an unwillingness to facilitate transportation to physical activity opportunities has proven to

discourage children from being to be physically active. Additionally, a lack of time and cost of participation can inhibit physical activity involvement (Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006).

Jackson, Crawford, Campbell, and Salmon (2008) explored parental concerns about children's physical activity levels and whether parental support increases in relation to their concern. The authors found that children of concerned parents were actually less active than children whose parents were not concerned about their physical activity levels. Yet, fewer supportive measures were implemented from more concerned parents, suggesting that concerns need to be transformed into action.

Another issue with obesity and lack of physical activity in children is the environment in which children live. For example, children are challenged by many limitations presented in a rural community. The lack of opportunity for physical activity may be because of transportation barriers and inaccessibility to sports because of physical distance living when living in a rural community. Suggestions for overcoming these barriers include incorporating physical activity practices into family gatherings, providing physical activity equipment in the home, and finding outdoor activities conducive for all weather conditions (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2010; Moore et al., 2010).

The literature has presented both objective and subjective methods of measuring physical activity levels of children. Most methods have relied on self-reports which can be problematic because of recall and desirability bias. Bender, Brownson, Elliot, and Haire-Joshu (2005) reported the challenges faced with parental measures of physical activity levels of children. Parents lead busy lives, and filling out survey reports could

possibly be done in haste; furthermore, being away from the child during the school day would lead to guesswork about activity levels. Purslow, van Jaarsveld, Semmler, and Wardle (2009) found that maternal measures of children's physical activity levels were stable over time and associated with objectively measured methods of physical activity; therefore, they can represent an acceptable account. Although they come with limitations, self-reports are valuable in behavioral research for identifying and understanding contexts and patterns.

Motivation to Promote Physical Activity in Children

The motivation to be active is an important concept to characterize because it often precedes regular patterns of physical activity that develop (Haverly & Davison, 2005). Motivation drives the intention to go forth with an action with conscious effort and is conceptualized as a linear process of attitudes, norms, and self-efficacy (Araujo-Soares, McIntyre, & Sniehotta, 2009). Motivation for physical activity has been linked to numerous influences including interpersonal, social, and environmental factors (Stanley, Boshoff, & Dollman, 2011). Research has identified a variety of motivational factors for physical activity through child questionnaires and focus groups, which include spending time with friends, social and environmental support, desires to feel healthy, and boredom prevention. Knowing what drives children to participate in physical activity is a key component in intervention design. Researchers need to determine children's motivations to engage in physical activity and supporting factors for participation. Increasing available options and self-choice can leave children more motivated to be physically active (Brockman, Jago, & Fox, 2011). Although access to physical activity options influences behavior, Barkley, Epstein, and Roemmich (2009) determined that

reinforcement as a motivational factor can better increase the chances of engaging in regular physical activity. The home environment has also been reported as more of a facilitator for physical activity in children compared to the neighborhood environment (Crawford et al., 2010).

The literature is mixed as to how weight status affects motivation in children. Some studies have found that weight status played no role in the effects of parental support on children's motivation to be physically active (Trost, Kerr, Ward, & Pate, 2001; Ward et al., 2006). However, other studies reported positive associations with parental support and children's motivation to be physically active in lower weight status, but not for overweight or obese children (De Bourdeaudhuij et al., 2005; Kitzman-Ulrich, Wilson, Van Horn, & Lawman, 2010). There is a need to establish what motivates children to engage in physical activity that will lead to sustained behavior of physical activity pursuits and lifelong health-fitness behaviors.

Extrinsic Motivation

Children can be motivated to act by both extrinsic and intrinsic factors. Extrinsic motivation drives children to act through some separate consequence. Rewards, threats, and tangible payments drive extrinsic motivation, leaving individuals to perform physical activity for the simple fact of these external pressures. Feeling that one must participate or feeling riddled by guilt, anxiety, or rules represents the non-autonomous nature of extrinsic action (Standage, Duda, & Ntoumanis, 2003). External rewards, which prompt children to be physically active, derive from aims to meet separate outcomes from the activity itself. This is a more controlling aspect of the behavioral changing process that includes the desires to be thin and feminine, which are linked to motivation for physical

activity in girls rather than the mere pleasure of wanting to be active (Allender, Cowburn, & Fosters, 2006). Examples of children being physically active for the purposes of losing weight or improving appearance are key determinants of extrinsic goals. Being driven to be physically active by the feelings that one should participate have been related to psychological stressors including body dissatisfaction and dysfunctional behavioral patterns (Gillison, Standage, & Skevington, 2006). Studies on the effectiveness of external rewarding to increase physical activity levels in children have not shown success in sustaining these levels for long-term habits (Hardman, Horne, & Fergus-Lowe, 2011).

Intrinsic Motivation

Another determining concept of physical activity participation is intrinsic motivation. This type of motivation represents a more autonomous behavior to enact feelings of having fun, pleasure, and satisfaction that are directly related to the participation in that activity (Standage, Duda, & Ntoumanis, 2003). Children driven to physical activity for the sole purpose of performing a behavior because of aesthetic enjoyment reflects the meaning of intrinsic motivation (Wang, Chatzisarantis, Spray, & Biddle, 2002). Intrinsic factors such as autonomy, belongingness, and competence sustain behavior more so than extrinsic factors (Lawman, Wilson, Van Horn, Resnicow, & Kitzman-Ulrich, 2011; Verloigne et al., 2011). Autonomy-supporting behaviors such as parental support and encouragement for physical activity promotion are linked with intrinsic regulation of behaviors (Ginsburg & Bronstein, 1993). Research shows that children with high intrinsic motivation think more positively towards physical activity, have greater perceived competencies, and join more school sport programs (Haverly & Davison, 2005). When children are driven by intrinsic motivation, their self-

determination and core values to be physically active have been associated with greater effort, performance, and persistence in physical activity behavior (Gillison, Standage, & Skevington, 2006). Intrinsic motivation in children develops when they feel competent and in control of their own accomplishments. Parents can facilitate feelings of competence through support and encouragement (Bentley et al., 2012; Biddle & Armstrong, 1992; Bois, Sarrazin, Brustad, Trouilloud, & Cury, 2005). Research has also shown that intrinsic motivation has generated more positive outcomes, lower attrition rates, and better effort in the physical activity in which children participate (Ferrer-Caja & Weiss, 2000). Therefore, this study focused on intrinsic motivation because it has consistently been associated with more sustainable physical activity levels in children overtime compared to extrinsic motivation regulation.

Perceived Parental Support and Physical Activity Levels in Children

For children to obtain health benefits from physical activity, they should aim to reach for a goal of 60 minutes of MVPA on most days of the week. To achieve this behavioral change, the physical and social environments need to facilitate healthy lifestyle changes. The effects of motivational factors on increasing physical activity levels in children have been a point of interest in research but have not been widely assessed. Several forms of motivation have been identified in the literature. Four types most prominently defined are personal fulfillment (enjoyment), weight-based (desire to be fit), parental, and peer influence (Allender, Cowburn, & Foster, 2006; Haverly & Davison, 2005). Parental support can also be categorized as a tangible or intangible concept. Examples of tangible support include providing physical activity equipment, paying sports fees, transportation, and observation of or participation with the child in

physical activities. Intangible methods of support include motivation, encouragement, and praise for children to participate in physical activities (Beets, Cardinal, & Alderman, 2010).

Parental support has been identified as a motivational factor that can influence children and their decision to participate in physical activity behaviors (Anderssen & Wold, 1992; Edwardson, Gorely, Pearson, & Atkin, 2012). Both parent and peer support for physical activity has been examined. Parental support has been reported to be more influential with children under the age of 12 years (Bently et al., 2012; de la Haye, de Heer, Wilkinson, & Koehly, 2013). Davison and Jago (2009) reported that findings from a study in 9 to 15 year old children, that parental support decreased overtime and peer support increased across the lifespan. This finding suggests that parents are a good early support network for early patterns of physical activity, while peers facilitate physical activity behaviors in later adolescents (Davison & Jago, 2009). Peer support has been reported to more of a significant factor in determining physical activity levels in children ages 11 years and older (Beets, Pitetti, & Forlaw, 2007; Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006; Hoelscher, 2006; Keresztez, Piko, Pluhar, & Page, 2008). As children age, peer support has shown to be just as important as parental support for influencing physical activity levels in adolescents age 13 years and older (Anderssen & Wold, 1992). This current study population focused on children ages 8 to 12 years; therefore, parental support was targeted for the intervention procedure. Parental support may be instrumental in the form of transportation or equipment provided for physical activity participation, or be emotional and motivational through encouragement and praise (Prochaska, Rodgers, & Sallis, 2002; Tudor-Locke, 2002). Parents are significant role

models in habit-forming behaviors, including physical activity, and play a central role in funding and organizing activities for children (Davison, Cutting, & Birch, 2003; Lau, Engelen, & Bundy, 2013). Jago et al. (2012) also found that parental support from enrolling children in activities and transporting them to physical activity events was associated with increased participation in physical activities among both boys and girls. Interestingly, the authors additionally reported that children felt more supported to be physically active with permissive parents versus authoritative parents (Jago et al., 2012).

Studies of the effects of parent perceived physical activity and parental support on children's physical activity levels found that parents often overestimated their children's levels. In addition, if they perceived children to be already participating in significant amounts of physical activity, they were less inclined to promote additional activity (Bender, Brownson, Elliot, & Haire-Joshu, 2005; Lau, Engelen, & Bundy, 2013). Even when parents acknowledge that their child has an excess fat accumulation, their focus is on the management of other acute concerns effecting health and behavior rather than on looking to health promotion and disease prevention related to obesity (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000; Carnell, Edwards, Croker, Boniface, & Wardle, 2005; Eckstein et al., 2006; Huang, Ball, & Franks, 2007, Ward et al., 2011).

In another study by Bentley et al. (2012), many parents perceived their children to be physically active enough to meet CDC guidelines and indicated no need to further encourage physical activity behaviors. Parents used visual cues to help make this determination, such as perceiving their child as being at a healthy weight or feeling that their child was full of energy. Inaccurate perceptions of physical activity are determined

as a barrier for implementation of parental support measures. Also, Corder et al. (2010) identified that overestimation of children's physical activity could be caused by numerous factors. Social desirability bias, unawareness of a child's actual physical activity routine, and lower fat mass index were all associated with lower parent-perceived support. One suggested theory is that parents of children with lower fat mass might assume their child is sufficiently active and does not need further support (Corder et al., 2010). Sithole and Veugelers (2008) reported that children who perceived to be more physically active than their parents perceived them to be tended to be more overweight or obese compared to children who agreed with their parents about their activity level.

Parental Support as a Motivator for Physical Activity

Rutten, Boen, and Seghers (2013) explored the role of motivation and the effects on physical activity levels in children. Children completed a self-report measure including motivation to be physically active and perceived support for physical activity from parents. Parents filled out a self-report questionnaire on their perception of current parenting practices and home environments that were supportive with physical activity opportunities. Results confirmed that motivation linked the relationship between parental support and physical activity levels in children. Motivation was also a mediator in the relationship between parental perceived support and physical activity levels in children. No differences were found between boys and girls in perceived motivation for physical activity. Interestingly, the lower levels identified in girls conflicts with other research showing that motivation positively predicts children's physical activity levels. A limitation of this study is that it was based solely on self-reports and that no objective measurement was used to validate the findings.

In contrast, Davison, Cutting, and Birch (2003) found a difference in parental support for physical activity between boys and girls. They identified that parental encouragement and participation as a means of parental support affected physical activity levels more for girls than boys. Others reached the same conclusions in previous studies determining gender differences with parental support (Fogelholm, Nuutinen, Pasanen, Myohanen, & Saatela, 1999; Myers, Strikmiller, Webber, & Berenson, 1996; Trost et al., 1997).

In one study, Act by Choice, parental support was assessed using the Support for Exercise Scale, which has internal consistency (alpha = .84) and construct validity. There was a significant relationship in child reports on increased physical activity with children who reported higher levels of perceived parental support ($p<0.05$). The results were consistent with prior research identifying parental support as an important component in increasing physical activity levels in children (Sallis, Prochaska, Taylor, Hill, & Geraci, 1999; Wilson, Lawman, Segal, & Chappell, 2011).

Other studies have also concluded that parental support encourages child motivation for increasing physical activity (Adkins, Sherwood, Story, & Davis, 2004; Biddle & Goudas, 1996; Ornelas, Perreira, & Ayala, 2007; Prochaska, Rodgers, & Sallis, 2002; Sallis, Prochaska, & Taylor, 2000). Support for physical activity from parents motivates children to become more active and increases child self-efficacy (Trost et al., 2003).

Parental Strategies to Motivate Children

Rutten, Boen, and Seghers (2013) have reported that parents can support increases in physical activity levels by motivating children through positive feedback, offering

choices, and participating in physical activity with them. The direct relationship between modeling and physical activity in children indicated that intentional promotion of physical activity from parents can improve physical activity levels in children. Nolan, Cottrell, and Dino (2013) conducted a study on determinants for physical activity participation in children and also found that parents are positive predictors when they participated in physical activity with their children. Similarly, other research showed that parental support improves motivation in children to be physically active, which can be achieved through offering different types of physical activities, identifying various strengths to boost self-efficacy, and directing children toward their talents (Nolan, Cottrell, & Dino, 2013). Words of encouragement, comfort, and permission to participate in physical activities were indicated as positive predictors for increasing children's physical activity levels. Material forms of support were also indentified as positive indicators for increasing children's physical activity levels, including paying registration sports fees, transporting to physical activity opportunities, and buying sports equipment (Hosseini, Abbaszadeh, & Ehsani, 2013).

Studies investigating parental perceptions of support have found that parents felt that ways of encouraging children to be physically active included having children go outside to play, transporting children to activities, modeling physical activity behavior, being enthusiastic about their child's involvement with physical activity, and showing their own enjoyment of physical activity (Veitch, Hume, Salmon, Crawford, & Ball, 2013).

Social Factors Related to Physical Activity Levels

In rural communities, where physical activity is even more challenged because of limited resources, lack of transportation and fewer opportunities for organized physical activity events, parental support is even more imperative. Permissive parenting by limiting time demands of children and avoiding plaguing physical activity as a chore for a methods of weight loss will encourage fun, healthy, sustainable physical activity behaviors (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2010).

Parental support behaviors for physical activity happen most when close relationships exist between the parent and child. In one study, parents reported that they were more intended to encourage physical activity as well as participate in physical activities with their children if there were strong family connections. Interestingly, the same study also found that parents who were overweight were less prone to encourage physical activity behaviors in children but were the most promising to participate in physical activities with their children (de la Haye, de Heer, Wilkinson, & Koehly, 2013). This same conclusion was reached in a study that found that parents of overweight children who perceived their children to be overweight were less in favor to encourage physical activity behaviors than parents of children who did not feel their children were overweight (Zhao, Gao, & Settles, 2013).

Edwardson and Gorely (2010) also reported that parental support promoted physical activity in children, but which support measures were most effective differed between mothers and fathers in supporting physical activity practices. For boys, paternal modeling of physical activity behaviors was significantly associated with physical activity levels. Directly limiting sedentary activities and providing logistic support

including transportation and physical activity equipment were favored support practices of mothers. Similar findings were identified by Davison, Cutting, and Birch (2003), who reported father's modeling physical activity behavior and mother's logistic support through observation and enrolling children in sports. Although each used different methods of support, all were associated with increased physical activity levels in children.

Another study investing children's physical activity levels and parental support revealed, however, that the activity level of the mother or sibling was a positive predictor for physical activity but that father's activity level had no association (Seabra, Mendonca, Thomis, Malina, & Maia, 2011). The results of this study complement findings from previous research conducted by Sallis, Patterson, Buono, Atkins, and Nadar (1988) that reported stronger correlations with mother's and children's physical activity compared to a father's and children's physical activity. In contrast, Bastos, Araujo, and Hallal (2008) identified that father's physical activity habits were directly related to physical activity behaviors in girls. Research has also shown that children were more conceivable to be physically active if at least one of their parents was supportive. In families where one parent gave support, there was no difference in physical activity levels determined by whether the mother or father provided the support (Davison, Cutting, & Birch, 2003). Mixed results in the literature indicate that further exploration is needed of the differences in maternal and paternal methods of support for physical activity in children.

Dempsey, Kimiecik, and Horn (1993) investigated parental influence on children's physical activity levels through questionnaire via an expectancy-value model. Correlation analysis revealed that parent perceptions and expectations of their children's

activity levels were directly related to the child's physical activity participation. In contrast to other research studies done on parental modeling, there was no evidence of a significant correlation between parent and child physical activity levels.

Inconsistent Findings of Parental Support on Children's Physical Activity

Associations between social support and children's physical activity levels in the literature have been inconsistent, possibly in part because of different assessment methods of physical activity and different modes of social support. A study by Prochaska, Rodgers, and Sallis (2002) assessed physical activity levels in children and social support, separating parental and peer support. Measured by both accelerometer and self-report, there was a significant correlation ($r = 0.61$, $p < 0.001$) with parental support, encouragement, praise, and viewing child's participation in physical activities or sports. The association no longer existed when analyzing only the objective accelerometer measurement, raising concern that activity levels are not related to social support.

Jago, Fox, Page, Brockman, and Thompson (2010) also investigated the associations between parent support and children's physical activity levels. They found no association between the amount of intensity, time, or duration engaged in physical activity for either boys or girls.

Other studies have failed to identify parental support as a significant indicator for increasing physical activity. A study by Bradley et al. (2011) found that parental support strategies including parent participation and encouragement did not slow the rate of decline of physical activity in girls. These supportive strategies did seem to affect boys, but their rate of decline as they aged was steeper, so there was less difference by late

adolescence. Providing transportation to physical activities was a significant predictor for physical activity in children and girls from high-income families, but the association no longer existed for girls as they grew older (Bradley et al., 2011).

In another study by Adkins, Sherwood, Story, and Davis (2004), there was no significant association ($r = 0.26$, $p < 0.06$) between parent perceived support for physical activity and children's physical activity levels. Further, there was no correlation among children's perception of parental support, home environment, and children's physical activity levels. These results are similar to findings from a study conducted by Beets, Pitetti, and Forlaw (2007) that showed that peer support for physical activity was a mediator for increased physical activity, but that parental support had no effectiveness for improving physical activity levels of children. They differ, however, from a study conducted by Adkins, Sherwood, Story, and Davis (2004) that identified parent's perceived support as a positive mediator for physical activity, but that found children's perceptions of parental support to have no association with their physical activity levels.

In addition, even though parental support has been indicated as a positive behavior in health promotion for children, methods of support have shown inconsistency in results. Rutten, Boen, and Seghers (2013) found that modeling and encouragement of physical activity proved effective in boosting children's levels, but providing physical activity equipment in the home had no direct association. The literature is mixed on the differences in parent-perceived support and children's perceived parental support. Barr-Anderson, Robinson-O'Brien, Haines, Hannan, and Neumark-Sztainer (2010) conducted a study that concluded that children's perceived parental support was significantly correlated with increased physical activity levels compared to parent-reported perceived

support for physical activity. One factor that may have contributed to this finding is that parents might have considered their supporting behaviors as more of a parental duty, while children directly saw words of encouragement and transportation to physical activities as supportive behaviors.

De la Haye, de Heer, Wilkinson, and Koehly (2013) completed a study to determine relationships between mutual support and physical activity levels in children and parents. They found that parental support that included promotion of self-efficacy, role-modeling behaviors, and positive attitudes appeared to have positive influences on physical activity levels. Even so, mutual encouragement was predicted to be a strong indicator of physical activity in children, but unilateral support from only parent to child was not.

In a study done by Fisher et al. (2011), parental support was significantly associated with increased physical activity levels in children; however, when child psychosocial variables were analyzed parental support was no longer an indicator for this increase. Also, parental support and none of the psychosocial variables were significantly associated with the objective measurement of physical activity in the children. This study suggests that psychological correlates of children mediate how parental support can affect their motivation for physical activity and further research is warranted.

The effects of parental support on physical activity levels of children had shown some positive association at the time of the study, but Deforche, De Bourdeaudhuij, Tanghe, Hills, and De Bode (2004) found that even if they are successful during the intervention, the effects of parental support strategies on children's levels of activity tend

to wane. Six months after a parental support intervention in their study, parental support and physical activity levels of children decreased following treatment. That study identified that parental support interventions can be successful, but that there are challenges in the maintenance of these supportive and physical activity behaviors.

Parental support has not been fully examined; therefore, findings cannot be conclusive. Concrete data are lacking about the effectiveness of parental support intervention programs on physical activity levels in children (Nyberg, Sundblom, Norman, & Elinder, 2011). The current study will contribute to the body of knowledge in testing the effectiveness of parental support as a motivational factor for increasing physical activity levels in children by adding both an objective form of evaluation with accelerometer measurement and determining parent-perceived support before and after a parental support intervention.

Significant Gaps in Knowledge

With the increased prevalence of childhood obesity and the steady decline of physical activity in children, there is an increased need to understand what factors can increase physical activity levels. Few studies were identified that addressed parents' perceptions of support provided to children to promote increased physical activity. There is also limited knowledge on the types of supportive mechanisms parents can enact that best motivate children to be more physically active.

Most studies conducted are confined to self-report only, which limits the valid and accurate assessment that objective feedback can offer. More studies are needed using objective measurement tools to evaluate physical activity levels in children to collect physical activity data in the home, school, and community settings (Lytle et al., 2009).

Although research has identified accelerometers as a valid tool to measure physical activity levels in children, the option of which epoch time interval to use during data collection may pose challenges to comparing these levels of children and more research is needed (Pfeiffer, Mciver, Dowda, Almeida, & Pate, 2006).

In addition, numerous studies are descriptive and lack experimental designs that use intervention-based strategies of parental support to improve physical activity levels in children. Research is currently very limited on parental support interventions to increase children's physical activity levels in the community (Bentley et al., 2012).

Rutten, Boen, and Seghers (2013) found that parental support was limited because of physical activities often occurring outside the home environment such as at school and in after school sports programs. Also, they found no difference between boys and girls in motivation to be physically active, yet research has shown that girls are less active compared to boys and motivation has been suggested as a direct predictor of physical activity levels. Although these findings suggest limitations in parental support in the home, other studies have mentioned that the home environment is the most influential place to facilitate healthy behaviors in children (Cong, Feng, Liu, & Esperat, 2012).

More research is needed on parental perception and the effects of children's physical activity levels. Burdette, Whitaker, and Daniels (2004) proposed that parent perception is an important factor in the amount of physical activity children participate in. Lau, Engelen, and Bundy (2013) point out, however, that the accuracy of these self-reports needs to be further evaluated. Although researchers have concluded that parental reports of perceived support and physical activity are useful, other researchers have suggested that parents are limited in their ability to correctly assess physical activity

levels in children and conflicting evidence about the reliability raises a challenge (Bailey, Pepper, Porszasz, Barstow, & Copper, 1995; Baquet, Stratton, Van Praagh, & Berthoin, 2007). Burdette, Whitaker, and Daniels (2004) and Taylor et al. (2009) concluded that parents are reliable reporters of physical activity in children while other researchers have found that parents tend to over-report these behaviors (Bender, Brownson, Elliot, & Haire-Joshu, 2005; Krishnaveni et al., 2009). The literature shows inconsistencies in how much parents feel their children are being physically active, which indicates the difficulties presented with recall, subjectivity, and the tedious completion of written self-reporting.

Environmental Factors

Furthermore, little research has been done in regards to parental perceptions of physical activity of children during after school hours (Bender, Brownson, Elliot, & Haire-Joshu, 2005; Ekelund, et al., 2004; Prochaska, Sallis, Griffith, & Douglas, 2002). Currently, interventions have shown mixed results, and the effectiveness of parental support in promoting physical activity levels in children remains unclear. How parental support interventions affect boys and girls differently is uncertain (Cong, Feng, Liu, & Esperat, 2012). Very few rural-based studies on parental support and physical activity levels in children are available; therefore, this area of study requires more attention (Moore et al., 2010). Even though parental support has been indicated as a positive facilitator for increasing physical activity levels in children, many studies are short in duration and the long-term outcomes and sustainability of physical activity behaviors and parental support are unknown (Cong, Feng, Liu, & Esperat, 2012).

Numerous studies have found that parental support can have a positive influence on physical activity levels of children, but many combine different methods of social support, making it challenging to decipher which parental support measure is most effective in increasing children's physical activity (Beets, Cardinal, & Alderman, 2010).

Practice Issues

Nurses can become actively involved in promoting research and evaluation of current parental support measures on physical activity levels in children. As emphasized, the CDC recommends that children participate in at least 60 minutes of moderate to vigorous physical activity on most days of the week, and this criterion could be used to evaluate the success of new parental support programs. Criteria for future practice implementation are that: (a) parental support measures must lead to an improvement in the end result, which includes increased physical activity and maintenance of healthy weight trends; (b) the effectiveness of parental support strategies must be determined through clinical trials before addition to physical activity programs; (c) health services must be available to children because of the nature of MVPA to maintain cardio-metabolic health, as should supporting strategies for physical activity including potential physical injury and emotional distress; (d) the cost-benefit and cost effectiveness of clinical trials, educational programs, and objective measuring tools must be identified for the development of the necessary therapeutic and prevention services; (e) the incidence, distribution, severity, and alternate approaches for detection and prevention of low physical activity levels must be known; (f) the cost, sensitivity, specificity, and acceptability of the parental support measures must be known, as should strategies that promote extrinsic and intrinsic motivation in children to be physically active; and (g) the

end beneficial result for both parent and child must be greater than any risk factors for participating in regular physical activity. An additional focus of area for evaluating a parental support program is the effectiveness of parental education related to perceived parental support and actual physical activity levels and the inclusion of child-perceived parental support associated with increased motivation to be physically active. This researcher agrees with Bentley et al. (2012) that an effective education program can help inform parents of current CDC-recommended physical activity guidelines and how children can meet these goals with parental support. This aim can partly be achieved by educating parents on ways to teach their children basic, age-appropriate physical activity skills.

Nursing researchers need to evaluate the current status of parent perception of the education they receive regarding parental support for facilitating motivation, competence, and enjoyment in children to increase physical activity levels. Nursing, in the educative-supportive role, is in a position to work with parents to provide the necessary education to prepare them for possible support to identify physical activity barriers and to help minimize the effects of these barriers. Therefore, it is also critical to evaluate children's perceived parental support and perceived motivation to be physically active and to validate these findings with an objective form of measurement so that nurses can respond to them and meet the educational needs of parents.

Summary

Parental support strategies to increase physical activity levels in children have advanced significantly over the past decade. Despite growing efforts to improve physical activity of children, obesity rates continue to rise and physical activity levels continue to

decline. Parents need to be educated and assisted with supportive strategies to increase their awareness of support and role modeling for children, facilitating positive parenting practices regarding health promotion and building healthier home environments and community activity participation.

Several gaps in understanding exist regarding the effects of parental support on physical activity levels in children that need additional research. These gaps are in understanding children's perceptions of what methods are best to increase motivation for physical activity; qualitative studies that explore the extent to which parents perceive their support for children to increase physical activities; experimental studies on parental support interventions; and evaluation of various parental support mechanisms. Several issues with parental support program implementation remain unclear. Parental support studies have mixed outcomes and there are no concrete answers. Despite evaluating perceived barriers to physical activity of children in previous descriptive studies, intervention-based studies are still lacking that explore particular methods of parental support.

CHAPTER III

METHODOLOGY

This chapter describes the methods and procedures for this study and provides a description of the subjects, instruments, method of data collection, and the statistical procedures used to analyze the data. The purpose of this study, as presented in the previous chapter, was to determine the effects of parental support on physical activity levels in children. The specific aims addressed in this study were as follows:

1. Analyze for differences in accelerometer counts before and after children received parental support to encourage physical activity.
2. Analyze for differences in children's motivation scores before and after they received parental support to encourage physical activity
3. Analyze for differences in parents' perceived support scores before and after their child received a parental support session to encourage physical activity.

Research Design

This clinical study used a pre-test/post-test design before and after a parental support intervention to determine children's physical activity levels. Children's and parents' perceived support and motivation scores were analyzed as well as the relationships among perceived parental support, perceived motivation, accelerometer counts, demographics, and anthropometrics. Each participant served as his or her own

baseline to help reduce errors, such as fundamental differences, that occur in between-subjects design.

The effectiveness of the personal influences on health-promoting behaviors such as parental support on physical activity levels in children as identified by Pender were explored through the results of this study. This work examined the differences in perceived parental support from both parents and children before and after a parental support intervention. Information collected through parent- and child-completed surveys was used to achieve the above research aims.

The influence of Pender's HPM personal factors as well as information related to parent's perceived supportive behaviors for increasing children's physical activity levels were assessed through completion of the Amherst Health and Activity Adult Survey (see Appendix D). In addition, the effect of parental support on children's perceived levels of parental support was compared before and after the intervention by completion of the Social Support and Exercise Survey. The relationship among the variables related to perceived parental support, perceived motivation, and accelerometer measures was statistically analyzed to identify any significance related to the information reported by parents and children on the surveys and accelerometer measures of physical activity.

Study Population and Sample

Sample Description

The sample population consisted of children in a rural community from a Midwestern afterschool program. After school programs are an important community setting where children have the opportunity to perform a great amount of their total daily recommended levels of moderate to vigorous physical activity (Beets, Beighle, Bottai,

Rooney, & Tilley, 2012). Recruitment of subjects took place at a Boys and Girls Club, which is an afterschool program that provides a safe environment for fun and life-enhancing programs. Approximately 550 to 650 children ages 6 to 18 attend the afterschool program each year, with approximately 100 children between the ages of 8 and 12 years attending each day. According to the National Center for Education Statistics (2000), 79% or 6645 of the children in the community were Caucasian and 15% or 1270 Native American.

Physical activities were unique and individualized for each participant because they had the autonomy to choose which physical activities interested them while wearing the accelerometer and getting parental support to make active choices and motivating them to increase their physical activity levels from baseline measurements.

Inclusion criteria included a) being a girl or boy ages 8 to 12 years; b) having no physical or cognitive limitations that would prevent participation in physical activity; c) being part of any racial or ethnic group; d) having the ability to speak, read, and understand English; e) having consent from parent or guardian to participate in the study; and f) having assent from child to participate in the study. Exclusion criteria included a) children without parental informed consent, b) children not assenting to participate in the study, c) children with physical disabilities or any known health condition that could affect normal physical activity or development, and d) children not present on the day of baseline assessment. Every child from the afterschool program was offered participation, but only children who gave assent, had parental consent, and met inclusion criteria took part in the study. These inclusion criteria yielded a broad representative sample of boys and girls representing both overweight and normal-weight status and racial/ethnic origin.

Sample Selection

The power calculation for this study indicated that 30 children needed to be recruited and studied to provide at least 80% power, an estimated Cohen's medium effect (0.3), with an alpha set at 0.05, and a retention rate of 80% for both pre and post-intervention assessment (Polit, 1996).

The research study had 100% retention rate of parent-child participants during the study. There was no attrition in this study sample. All children recruited for the study completed both baseline and intervention phases with no drop-outs or incomplete data. An attrition rate of 10% or less has been reported as being successfully used in other physical activity studies with children (Kriemler et al., 2010).

Human Subjects Protection

Institutional review board approval was sought following approval of the dissertation proposal by the dissertation committee members. Prior to the start of this project, the Boys and Girls Club, parents, and children were provided with information about the study. A letter of approval was received from the Boys and Girls Club executive director agreeing to partner with the researcher and allowed for subject recruitment and data collection on site. Consent was obtained from the parents and assent from children before the start of the study. This study does not affect academic curriculum at school, home commitments, or any program in progress at the Boys and Girls Club. Although no adverse events were expected, there was a risk of psychological distress for children during the onset of physical activity interventions and during data collection. Children were encouraged to talk with the counselor at the Boys and Girls Club about any concerns that arose during the study. Physiological risks are present

when participating in any type of activity regimen, which was fully documented in the consent form. No invasive procedures were planned in this study. All recordings were stored in a locked cabinet in a locked office in the researcher's home. Participant names were not included in any recordings, and they were assigned a number for identification purposes. Paper evaluation tools were kept in a locked cabinet until the completion of the study and will remain stored for a minimum of 5 years before being destroyed. The computerized database used for data coding and analyses was maintained on a secured server with firewall protection, accessible only by password. Human subjects approval from the University of North Dakota was sought for this study prior to the start of the recruitment phase of the study.

Informed Subjects

At the initiation of the intervention phase, parents were given a flyer on the benefits of physical activity, the significance of family support, and how encouraging children to be physically active will motivate them to participate in a more active lifestyle, with examples given of parental support including encouragement, praise, transportation, observation, and participation. A 15-minute informal meeting with parents at the Boys and Girls Club consisted of discussing the importance of parental support, its effects on physical activity behaviors in children, and ways to support their children and was held prior to the intervention phase of the study. During the meeting, parents were also informed of the device purpose and usage of the accelerometer. The Boys and Girls Club had bikes, scooters, sports activities, and equipment on offer that parents were allowed to use as a means to encourage physical activity. The parents were also given a magnetic recipe card to place on their fridge as a reminder to provide extra

support for physical activity with examples of support measures including encouragement, praise, observation, participation, and transportation along with a jump rope to give to their child as a means of supporting physical activity with equipment. During the parental support intervention, the children wore the accelerometer for one consecutive 4-day period (Tuesday through Friday). Actions parents were expected to undertake during the intervention included providing supportive measures such as encouraging their children to play sports, participating in physical activities with their child, providing transportation to physical activities, being a spectator when their child participated in physical activity, providing physical activity or sports equipment, and/or positively reinforcing participation when children performed physical activities. Children needed to have at least 3 days of accelerometer data and completed surveys in both baseline and intervention phases to be included in the analysis. Incentives to participate in the study included 10 dollars per child and parent at the completion of the study. Parents were notified of the incentive, but children were not aware until the end of the study to avoid external motivation as a means for increasing physical activity levels.

Procedures

For randomization, the names of all 42 children with parental consent and who gave assent were written down individually on pieces of paper, which were folded and placed into a box and then selected by someone uninvolved in the research study. Thirty randomly drawn participants were assigned to participate in the study. Children wore accelerometers to establish baseline physical activity in activity counts for a 4-day (Tuesday through Friday) period, followed by a 2-week washout phase prior to intervention to avoid any possible reactivity effects from accelerometer wear. The

intervention phase also spanned 4 days (Tuesday through Friday). Studies have shown that 3 days of accelerometer measurement are sufficient to obtain a reliable estimate of children's routine physical activity levels (Duncan, Schofield, & Duncan, 2006; Eather, Morgan, & Lubans, 2011). Only weekday measurements were taken because of documented findings showing differences in physical activity levels and motivational influence on weekdays compared to weekends (Duncan, Duncan, & Schofield, 2008; Jacobi et al., 2011). Prior to the baseline period of the study, accelerometers were calibrated and verified for accuracy with Philips Respironics before accelerometers were shipped to researcher. At the conclusion of each test, the Actical data were downloaded to a laptop computer for subsequent analysis. Ten Actical accelerometers were used during the study, and the device used was chosen at random for each participant. Ten participants were monitored at a time, staggering the baseline assessments, washout periods, and interventions assessments over a 6-week period for accelerometer and survey data collection.

The accelerometers were placed on each child by the researcher on the first day of baseline with a snap lock bracelet on the wrist to avoid tampering and removal. The sampling interval (epoch) was set at 30 seconds for both baseline and intervention data collection to capture children's short energy bursts of activity. Participant dyads engaged in two rounds of data collection separated by a 2-week washout period. In both rounds, each child wore an accelerometer for 4 consecutive weekdays. Children's adherence to wearing the accelerometers was also high, again due to the high levels of researcher involvement in placing the devices. Children wore the accelerometers at all times, even when sleeping, bathing, and swimming. During the 4-day baseline, the children

participated in their normal habitual, freestyle physical activity routines without parents providing any extra means of support. Neither parent nor child were informed that the accelerometers measured physical activity, but were told that it was a way for the researcher to identify who the participants were going to be for the study. See Appendix K for study timeline.

In this clinical study children ages 8 to 12 years and their parents completed surveys on their perception of parental support and children's perceived motivation for physical activity, and physical activity in terms of energy expenditure was objectively measured using the accelerometer. Surveys were completed in a private room at the Boys & Girls Club at baseline and following the parental support intervention as well as height and weight assessments. The information was gathered through participants' completion of the Physical Activity Questionnaire-Child (PAQ-C) (see Appendix A) which gathered information on children's perceived physical activities and levels in the past 7 days. The second survey completed by the children, the Physical Activity Motivation Scale, measured how motivated children are to partake in physical activities. The information resulting from children's completion of this scale was used to examine the effects of parental support on children's motivation to be physically active (see Appendix C). The third survey, the Social Support and Exercise Scale, was completed by children to determine their perceived level of parental support for physical activities before and after a parental support intervention (Appendix B). Parents identified their perceived parental support in the Amherst Health and Activity Adult Survey (Appendix D), which measured parent-perceived support for encouraging physical activity in children. The purpose of the accelerometer was to compare valid and reliable objective

measurements of children's physical activity before and after a parental support intervention. The resulting data were examined for correlations and significance that emerged with survey scores and Pender's HPM personal factors: age, race, gender, and BMI.

Instrumentation

Measurements for this study were accomplished through accelerometers and questionnaires. Descriptive statistics for age, height, weight, BMI, gender, and race were collected on the Tuesday during the baseline week prior to accelerometer placement. On the first day of baseline, height was measured using a portable height scale to the nearest millimeter (Mentone-Educational Center, www.mentone educational.com.au). Weight was measured to the nearest 0.1 kg using a digital scale (A&D Weighing, www.andweighing.com.au). Both height and weight were measured twice for each participant and an average taken to ensure accuracy. BMI percentiles were then determined using the CDC growth chart (CDC, BMI-for-Age Growth Chart, 2011; CDC, BMI Percentile Calculator for Child and Teen, 2013). The data obtained from the surveys were compiled and configured into an Excel table by this researcher. This researcher and the statistician worked together on input of the survey mean differences at baseline and intervention to ensure reliability of the process.

Parental Support Intervention

For this study, support measures to encourage physical activity participation were given to the children in the form of encouragement and praise, transportation, observation, and/or participation with child by the parents. Intervention instruction for the parents was held in a private room at the Boys and Girls Club which included

guidance to encourage and praise their child's physical activity efforts, observe their children engaging in physical activity, participate along with the child in physical activity, and provide transportation to environments conducive for physical activity including parks, sports, and ball fields. The parental support intervention was informed by with the Social Support and Exercise Survey. This survey assesses childrens' perceptions of five parental support measures including encouragement, praise, observation, transportation, and participation. With a test-retest ICC = 0.88 in determining effects of parental support, the survey was used as an assessment tool to guide the parental support intervention and to also analyze the effects of perceived parental support of children's physical activity levels (Prochaska, Rodgers, & Sallis, 2002). Construct validity of the Social Support Survey is supported by correlations of social support with physical activity, in the hypothesized direction (J. Sallis, personal communication, August 2, 2013). A study by Sallis, Grossman, Pinkski, Patterson, and Nader (1987) confirmed construct validity by testing the Social Support Scale against interpersonal related behaviors to physical activity habits. Validity construct of the Social Support and Exercise Scale has been demonstrated when the scale was tested on 348 participants to determine potential differences between the English and Persian versions of the scale (Noroozi, Ghofranipour, Heydarnia, Nabipour, & Shokravi, 2011).

During the baseline period all children wore accelerometers while parents were instructed to not provide any means of supportive behaviors for physical activities beyond their normal routine. Parents were instructed to allow their children to practice normal physical activity behaviors whether they were usually active or relatively sedentary. During the intervention period, parents were instructed to provide ongoing

support to their children to partake in physical activities. The support measures were praise, encouragement, observation, transportation, and participation with child in physical activity. The intervention aimed to promote the development and maintenance of increased physical activity and motivating for physical activity in children by targeting parental support as a mediator for behavior change. The parental support intervention was ground in Nola Pender's Health Promotion Model and aimed to provide parents with the necessary knowledge for physical activity behavioral change in children. A full description of the intervention components, the benefits of physical activity, and how parental support might motivate increases in physical activity was provided to the parents prior to the intervention. See appendix (J) for the narrative of instruction and teaching to parents.

Intervention Fidelity

Researchers need to ensure that study interventions are carried out in the way they are intended. Infidelity in research design risks the possibility of non-significant study findings that are not caused by the study design but instead by factors that affect the intervention delivery (Morgan et al., 2011). With intervention fidelity, research studies are conducted as planned. Fidelity supports the specific aims and the associations between the intervention and the study outcomes (Horner, Rew, & Torres, 2006). Researchers thus should focus on intervention fidelity to ensure that internal validity is maintained and external validity is enhanced. To maintain intervention fidelity, this researcher implemented all study procedures independently from recruitment to data collection and monitoring to analysis (Breitenstein, Gross, Garvey, Hill, Fogg, & Resnick, 2010). A study proposal was also developed that spelled out study goals,

objectives and behaviors to be modeled by the parents, and strategies used to check participants' understanding throughout the study. In addition, the researcher conducted weekly phone calls on Thursday mornings to monitor parental involvement and address questions or concerns. Other strategies the researcher used to maintain intervention fidelity were to ensure the same treatment within conditions by standardizing the study methods for each child-parent dyad and equivalence across conditions, and to ensure participant comprehension and ability to perform behavioral outcomes before and during study implementation.

Mechanics of the Accelerometer

This study thus used the Actical accelerometer as a valid measurement tool to accurately and objectively measure the level of physical activity performed by children as well as for evaluating parental support intervention effectiveness.

The Actical measures physical activity in one plane sensing movements using cantilevered rectangular piezoelectric bimorph plate in the 0.5 to 3 Hz range (Dinesh & Freedson, 2012). Accelerations in movement are picked up through the vibrations of movement and then the volted energy is amplified and filtered by an analog circuit (Dinesh & Freedson, 2012). The filtered voltage is run through a digital converter and processed into time intervals or epoch seconds. Various studies have used different epoch lengths to measure physical activity levels. Children move most often in short, sporadic bursts; therefore, smaller time intervals are more useful in monitoring their physical activity levels (Pfeiffer, Mciver, Dowda, Almeida, & Pate, 2006). The Actical monitor has 256kb memory storage, and activity can be recorded as frequently as

1-second epoch lengths if needed to capture the spontaneous, free-living nature of children's physical activity (Dinesh & Freedson, 2012).

Accelerometers have proven to be a valid measurement tool for assessing changes in physical activity levels of free-living activity in children, but some research has noted their unreliability in capturing physical activities with upper limb movements, biking, swimming and uphill movements (Pfeiffer, Mciver, Dowda, Almeida, & Pate, 2006). However, there is published research on the reliability of the instrument to accurately measure movement with a reliability coefficient of r = 0.92 (Davison, Jurkowski, Kranz, & Lawson, 2013; Pate, Almeida, McIver, Pfeiffer, & Dowda, 2006; Pfeiffer, Mciver, Dowda, Almeida, & Pate, 2006; Pulsford et al., 2011; Welk, Corbin, & Dale, 2000).

Another issue brought up in the literature concerning accelerometers is the concept of reactivity, which is a change in behavior arising from the awareness of being monitored. Most literature does not support reactivity as a threat to validity, and it has not been proven to affect the results of accelerometer data in children whether sealed or unsealed (Craig, Tudor-Locke, Cragg, & Cameron, 2010; Tudor-Locke, 2002). If reactivity were a factor, physical activity would be overestimated initially, but would then steadily decline after the first day of wear to true baseline. Also, reactivity effects would be similar in both baseline and intervention assessments; therefore, they should not significantly impact results (Tudor-Locke, McClain, Abraham, Sisson, & Washington, 2009). Reactivity with parents was avoided by not letting parents know the accelerometers watches measured physical activity levels in children at baseline, but rather a method to keep track of what children were in the study.

Physical Activity Questionnaire-Child

Collection of information for the study included child completion of the PAQ-C which has been shown to be a reliable and valid tool to assess physical activity behavior in children. It is designed for children ages 8 to 14 years and includes nine questions structured to identify moderate to physical activity levels in the last 7 days. This tool worked well because the recruitment age for this study sample was 8 to 12 years. In the PAQ-C, each participant recorded the amount of physical activity performed during the previous week by using a 5-point Likert scale response; whereby (high activity = 5; moderately high activity = 4; moderate activity = 3; low activity = 2; no activity = 1) (Knox**,** Baker, Davies, Faulkner, Rance, Rees, et al., 2009). The composite scores for the nine questions in the survey were added and then divided by 9 according to scoring directions to obtain the mean, which resulted in the final PAQ-C activity summary score. A score of 1 indicated low physical activity whereas a score of 5 indicated high physical activity (Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997). Item and scale properties, test-retest reliability, internal consistency, sensitivity to gender- and age differences, convergent validity, and construct validity have been examined and reported as acceptable to good. Test retest reliability ranges from (r = 0.75 to 0.82) and internal consistency reliability ranges from 0.81 to 0.86, and has moderately high validity (0.57 to 0.63) (Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997; Kowlaski, Crocker &, Kowalski, 1997; and Kowlaski, Crocker, & Faulkner, 2007). This questionnaire was administered at baseline and after the parental support intervention phase. The time commitment for completing the PAQ-C was approximately 10 minutes. It was this

researcher's intent to maintain a high level of reliability in the test administration and scoring process.

Social Support for Exercise Scale

Social support for physical activity was measured using the Social Support and Exercise Scale at baseline and in the post-intervention phase. This 5-item parental support scale assessed children's perceived parental (a) encouragement, (b) praise, (c) transportation to physical activity environments, (d) physical activity participation with the child, and (e) observation of children's participation in physical activity. The frequencies of perceived parental support behaviors were scored on a 5-point Likert scale ranging from (never = 0; once = 1; sometimes = 2; Almost every day = 3; and everyday = 4). Total scores ranged from 0 to 20. Scores for the five areas were analyzed both separately and together as a mean composite score to calculate perceived parental support before and after a parental support intervention. With published test-retest reliability data (ICC = 0.88), it accurately represented the parental support as perceived by children in promoting participation in physical activity (Prochaska, Rodgers, & Sallis, 2002). The time completion for this survey was approximately 5 minutes.

Physical Activity Motivation Scale

The Physical Activity Motivation Scale was used to assess children's motivation for physical activity at baseline and in the post-intervention phase. This 10-item questionnaire has shown adequate reliability and validity (reliability coefficient 0.9) (Wilson et al., 2002; Wilson et al., 2005). The instrument evaluates regulatory motives related to physical activity in a 3-point Likert scale (not like me = 0; a little like me = 1; a lot like me = 2). The researcher standardized and averaged the items after reverse coding

the relevant items in order to determine the significance of means before and after the parental support intervention.

Amherst Health and Activity Study: Adult Survey

Findings from this survey helped identify parental perceptions of children's physical activity habits as well as household influences that supported behaviors to increase physical activity. Survey questions were set up in a Likert scale asking parents to identify how often they had encouraged physical activity, were physically active with the child, provided transportation to a setting where the child could be physically active, observed the child in physical activities, and/or told the child that physical activity was good for their health (none =0; once = 1; sometimes = 2; almost daily = 3; daily = 4). The scores were tallied, and the researcher computed the mean to compare parent-perceived support before and after the parental support intervention. Intraclass correlations (ICC) of 0.70 to 1.00 were calculated using a one-way ANOVA to determine the reliability of this survey (Sallis, Taylor, Dowda, Freedson, & Pate, 2002).

Data Collection Procedures

Data collected during the study included measurements of parental support through objective accelerometer measurements, demographics, anthropometrics, perceived parental support and motivation for physical activity. All data were quantified for analysis. Measurements for this study were accomplished through accelerometers and questionnaires. Descriptive statistics for age, height, weight, BMI, gender, and race were collected on Tuesday, the first day of the baseline week, followed by accelerometer placement by this researcher.

Children between the ages of 8 and 12 years were considered eligible for participation in this study according to the sample selection criteria. They were invited to participate by the researcher during an initial Boys and Girls Club afterschool program meeting at the end of August before the 2012-2013 school year. The purpose of the project and details of the study were explained to the children and their parents in terms of measuring physical activity in children, but with care not to divulge the parental support strategies for increasing physical activity prior to intervention week. Study inquiries were answered by the researcher. Consent and assent forms were completed upon agreement to participate in the study. Children were instructed that they would wear the accelerometer from the moment the researcher attached it to their wrist on that Tuesday until the end of the week on Friday when the researcher would remove the accelerometer at the Boys and Girls Club. They were reassured that the accelerometer could be worn in the water and was not to be taken off. The investigator checked in by phone with parents on Thursday, the night before the end of the intervention week, to remind them of removal of the accelerometer and completion of study surveys at the Boys and Girls Club the next day.

Baseline data collection took place on the first day of the study at the Boys and Girls Club by the researcher and included demographics and anthropometric measurements. The children also completed three questionnaires on the first day of baseline: the PAQ-C, Social Support for Physical Activity Scale, and Motivation for Physical Activity Scale. Their parents completed the Amherst Health and Activity Adult survey to assess their current perceived parental support before implementing a parental support intervention. On the last day of the intervention week (Friday), children

completed the three questionnaires again to determine perceived effects of the parental support intervention on children's physical activity levels. Data recorded by the primary investigator were kept confidential in a locked file cabinet. All names were removed from the sample, and data were coded with numbers for each participant.

All parents and children from the Boys and Girls Club were invited to participate in the study via flyer and a15-minute presentation, but only those who met inclusion criteria were eligible to participate. The participants were assured that individually identifiable information would not be included in any reports generated from this study but that results would be presented as grouped data. They were also informed by the researcher and in the consent and assent forms that their consent to participate in the study was strictly voluntary, that they could drop out without consequence at any time, and about the importance of their participation to the outcome of the study. The parents were offered a copy of the results of the study if they desired to have one.

Data Analysis

Once the survey and accelerometer data were collected from the participants, their responses were entered by this researcher into an Excel file. Prior to Excel entry, the accelerometer data were downloaded from the watch by the frequency monitor into computer software following each week of wear for each participant in the baseline and intervention weeks. The data were examined by both this researcher and the statistician to ensure that they were correctly entered and that consideration was given to any missing responses. The Excel files were copied into Statistical Package for Social Sciences (SPSS) for analysis. An alpha level of 0.05 was the criterion for significance. Data analysis included descriptive statistics, Pearson correlations, and paired t-test analysis.

ANOVA was used to detect significance between BMI and race, BMI and gender, surveys and race, and watch data and race. ANOVA was used only in an exploratory sense because the sample sizes involved for the ANOVAs were quite small having been broken down into classes or groups with some very small numbers. Because the overall sample size was 30, properties of the central limit theorem satisfy t-test assumptions of normality for all hypothesis tests conducted using the t distribution.

Descriptive Data

Analysis of the demographic and anthropometric data was completed using SPSS. The descriptive analysis included review of the frequency and percentages for the participant responses related to their gender, age, race, and body mass index. ANOVA was used to determine any relationships between physical activity and race. Examination of the specific aims was achieved as follows:

Specific Aim 1

Analyze for differences in accelerometer counts before and after children received parental support to encourage physical activity.

The survey data collected to respond to Specific Aim 1 included accelerometer counts for one consecutive 4-day period during a baseline week and then again for a 1 four-day week during a parental support intervention to determine differences in physical activity levels for each child. Total activity step counts were the measurement of physical activity for analyzing differences in physical activity levels in this study. The responses were analyzed to identify the means and standard deviations. Paired t-tests were used to statistically analyze the difference ($p < 0.05$) in mean between accelerometer measures before and after a parental support intervention.

Specific Aim 2

Analyze for differences in children's motivation scores before and after they received parental support to encourage physical activity.

Survey data were collected from the children to obtain raw scores of perceived level of parental support and motivation to be physically active during baseline and again during the parental support intervention. Participants were asked to rate their perceived support, motivation, and physical activity using Likert scales to determine the frequencies and the mean of participant responses. The baseline and intervention values were determined and imported into an Excel file in preparation for data analysis. The quantitative data analysis plan was to use the paired t-test to compare for significant differences ($p< 0.05$) between the means of child's perceived parental support, motivation, and physical activity levels assessed before and after the parental support intervention.

Specific Aim 3

Analyze for differences in parents' perceived support scores before and after their child received a parental support session to encourage physical activity.

The quantitative data analysis plan for specific aim 3 was to use the paired t-test to compare for significant differences ($p< 0.05$) between the means of parent- perceived parental support assessed before and after a parental support intervention. The responses were analyzed to identify differences in the means and standard deviations of effects of parent-perceived support before and after the parental support intervention. This analysis included the examination of parental perception of support for physical activity in

children, which was assessed using the household influences section of the Amherst Health and Activity Adult survey.

Summary

This chapter reviewed the research design, population and sample, instrumentation, data collection procedures, and data analyses that were used to address the specific aims set forth to organize the study methodology. A pre-test/post-test was used as the method of inquiry for this study to accomplish the purpose. This quantitative approach allowed the researcher to determine the effectiveness of a parental support intervention on physical activity levels in children by limiting the chance of error associated with individual differences. The individuals were exposed to the same intervention conditions, so that the results would not be distorted by individual differences between the baseline and intervention assessments. The findings from this study were planned to expand the body of knowledge regarding the effects of a parental support intervention on parent-and child-perceived support, the responses in children's motivation to be physically active, and children's measured physical activity levels via objective assessment. The next chapter focuses on the results of the analyses of data obtained from this study.

CHAPTER IV

RESULTS

Introduction

The purpose of this study was to determine the effectiveness of a parental support intervention on physical activity levels in children. Accelerometers were used to determine the effects of parental support on physical activity levels in children. Parents' perceived support for children's physical activity was also explored for mean differences before and after a parental support intervention. Pender's Health Promotion Model guided this study because it explores the factors contributing to health-promoting behavior. The model integrates nursing and social sciences with factors including support and motivation that influence people's ability to change health behaviors.

Results

Chapter IV begins with a description of the population sample (N=30) followed by the results of testing the specific aims. It concludes with a summary of results, including a description of overall statistically significant effects of parental support on perceived support and motivation and physical activity levels in children. Correlation studies were conducted to determine any relationships between perceived parental support, perceived motivation, accelerometer counts, and age, gender, body mass index, and race. No significant results were found among relationships; therefore, results were not included in this dissertation. Power analysis was not figured for correlation analyses,

so this is not a surprising outcome. The specific aims addressed in this study were as follows:

1. Analyze for differences in accelerometer counts before and after children received parental support to encourage physical activity.

2. Analyze for differences in children's motivation scores before and after they received parental support to encourage physical activity.

3. Analyze for differences in parents' perceived support scores before and after their child received a parental support session to encourage physical activity.

Descriptive Data

Ages of the child participants in this study ranged from 8 to 12 years with a mean of 9.67 (SD=1.18). Two-thirds of the children were boys (66.70%, *n*=20) compared to girls (33.30%, *n*=10). Approximately 67% (*n*=20) self-identified as Caucasians, 23% (*n*=7) as Native American, and 10% (*n*=3) as African American. BMI was calculated for each participant using the CDC's BMI calculator for children (CDC, BMI for Child and Teen, 2011). The participants' mean BMI was 20.14 (range 14.28 to 27.53; SD= 4.10). The descriptive characteristics of the study sample (*N*=30) are presented in Table 1.

The CDC provides recommended BMI levels specific to children's age and gender. Children are considered underweight below the 5th percentile, of healthy weight between the 5th and 85th percentile, overweight above the 85th percentile, and obese at or above the 95th percentile (CDC, Overweight & Obesity, 2012). For 8 year old girls, the 5th to 85th percentiles of normal BMI ranges from 13.53 to 18.26. For 8 year old boys, the 5th to 85th percentile of normal BMI ranges from 13.79 to 17.96. For 9 year old girls, the 5th to 85th percentile of normal BMI ranges from 13.72 to 19.05. For boys 9 years of

age, the 5th to 85th percentile of normal BMI ranges from 13.94 to 18.57. For 10 year old girls, the 5th to 85th percentile of normal BMI ranges from 14.001 to 19.91. The range of 5th to 85th percentile of normal BMI ranges for boys age 10 are from 14.19 to 19.33. In this current study, 66.7% of the participants were in the healthy BMI category, 13.3% were in the overweight BMI category, and 20.0% were in the Obese BMI category.

Table 1. Children's Demographics (Gender, Age, and Race).

Variable	Frequency	%
Participants by Gender		
Boys	20	66.70
Girls	10	33.30
Participants by Age		
8 years	6	20.00
9 years	7	23.30
10 years	10	33.30
11 years	5	16.70
12 years	2	6.70
Participants by Race		
African American	3	10.00
Caucasian	20	66.70
Native American	7	23.30

N = 30

Normal BMI ranges from 5th to 85th percentile for 11 year old girls ranges from 14.37 to 20.80 and for boys 14.53 to 20.13. For 12 year old children, normal range BMI for child in the 5th to 85th percentiles range from 14.80 to 21.67 for girls and 14.94 to 20.96 for boys (CDC, Data table of BMI-for-age Chart, 2001). Baseline heights and weights were recorded for the participants on the first day of the baseline assessment and then converted into BMI using the CDC BMI calculator, before running descriptive statistics in SPSS.

Specific Aim 1: Analyze for Differences in Accelerometer Counts Before and After Children Received Parental Support to Encourage Physical Activity

This specific aim examined whether accelerometer counts significantly improved following the parental support intervention. Accelerometers were placed on the children's wrists, they were instructed to continue their usual activities of daily living and parents were told to not provide any means of support that were more than their ordinary behavior to collect baseline physical activity levels. Child participants wore accelerometer devices to capture activity counts to represent physical activity levels for 4 days during a consecutive 4-day baseline period in one week and then again for 4 days during a parental support intervention. The mean value of energy expenditure for the participants at baseline was 2440 (SD=1325) with a range of 961 to 8891. Compared to baseline physical activity, children significantly increased their accelerometer activity counts during a parental support intervention with a mean value of 3604 (SD=2860) and a range of 1329 to 1100. After a 2-week washout, children wore accelerometers again while parents implemented parental support measures to encourage an increase in physical activity levels. Results showed a significant difference (*paired t*=2.60, p= 0.01)

when analyzing pre-test post-test accelerometer activity counts of children when receiving parental support in comparison to their baseline accelerometer measures. Table 2 presents the differences in means of accelerometer counts of physical activity of children before and after the parental support intervention.

Table 2. Significant Differences in Accelerometer Counts Following a Parental Support Intervention.

Variable	Mean	SD	Range	*t*	*p*
No Parental Support (control)	2440.00	1325.00	961-8891	2.62	0.010*
Following Parental Support	3604.00	2860.00	1329-11000		

$N = 30$ $*p < 0.05$

ANOVA analyses showed significance for race with accelerometer measures at baseline (df= 2, *F*= 6.73, p= 0.00) and post-parental support intervention (df= 2, *F*= 3.85, p= 0.03). After a significant ANOVA F test results was identified at baseline, a multiple comparisons test, the Tukey Honestly Significant Test (HST) was conducted and revealed that African-American children were significantly more active than Native Americans and Caucasians at baseline. The Tukey HST showed no significant differences between Native-American and Caucasian children at baseline. Similarly, a significant ANOVA F test result was found with race and accelerometer measures following the intervention (df= 2, *F*= 3.85, p= 0.03). The Tukey HST revealed that African-American children were more active than Caucasian children; however, there was no significant difference in

accelerometer-measured activity levels between Native-American and Caucasian children.

Specific Aim 2: Analyze for Differences in Children's Motivation Scores Before and After They Received Parental Support to Encourage Physical Activity

Children completed three surveys to determine perceived parental support, motivation for physical activity, and perceived physical activity. On the PAQ-C, participants were asked to rate their perceived level of physical activity during the past week, giving the extent to which they agreed with each statement using a 5-point Likert scale. The options for rating the statements were as follows: 1 = No Activity; 2 = Low Activity; 3 = Moderate Activity; 4 = Moderately High Activity; and 5 = High Activity.

The first question asked the children to state whether they had done any of the following activities listed and to rate how many times that past week. If there was an activity that was not listed, a blank line was provided for children to write in their own activity and determine how many times that week they had performed it. Other questions asked children to determine their level of physical activity during gym class, recess, lunch, after school, and in the evening. They were also asked a question about how physically active they felt they had been over the past week: none of the time, sometimes (1 -2 times), often (3-4 times), quite often (5-6 times), and or very often (7 or more times). The last question provided information about how often children felt they were active, broken down into each week day. The composite scores for the nine questions in the survey were added together and divided by 9 per scoring directions to obtain the mean, which resulted in the final PAQ-C activity summary score. The mean score for the baseline survey was 2.93(SD=0.63) compared to the post-parental support intervention

survey mean of 3.41(SD=0.56). There was a significant difference in children's perceived levels of physical activity from baseline (*paired t*= 5.87, p= 0.001) compared to after the parental support intervention. Table 3 refers to the frequency data related to perceived levels of physical activity in children.

Table 3. Significant Differences in Children's Perceived Physical Activity Scores following a Parental Support Intervention.

Variable	Mean	SD	*t*	*p*
No Parental Support (control)	2.93	0.63	5.87	0.001*
Following Parental Support	3.41	0.56		

$N = 30$ $*p < 0.05$

The second survey the children were asked to complete was the Social Support and Exercise Scale at baseline and following the parental support intervention. This 5-item parental support scale assessed children's perceived (a) encouragement, (b) praise, (c) transportation to physical activity environments, (d) physical activity participation with the child, and (e) observation of children's participation in physical activity. The frequencies of perceived parental support behaviors were scored on a 5-point Likert scale ranging from: Never = 0; Once = 1; Sometimes = 2; Almost Every day = 3; and Everyday = 4.

Total scores ranged from 0 to 20. Scores for the five areas were analyzed both separately and together as a mean composite score to calculate perceived parental support before and after a parental support intervention. Results for the total score mean for

perceived parental support are presented first. The total mean score for perceived parental support at baseline was 10.8 (SD=4.37) compared to the post-intervention mean of 14.57 (SD=3.83). Parental support measures were then analyzed separately. Parental encouragement at baseline had a mean of 2.27 (SD=1.26) compared to the post-intervention mean of 3.17 (SD=0.87). The parental participation in physical activity mean at baseline was 1.50 (SD=1.11) compared to a post-intervention mean of 2.23 (SD=1.19). For providing transportation to physical activities, the baseline mean was 2.23 (SD=1.10) compared to a post-intervention mean of 3.37 (SD=0.77). For parental observation of physical activity, the baseline mean was 2.27 (SD=1.14) compared to the intervention mean 2.63 (SD=1.16). Praise was the other parental support measure assessed in the survey. The baseline mean for praising children in physical activities was 2.53 (SD=1.31) compared to a post-intervention mean of 3.17 (SD=1.21).

Pre-test post-test differences in the mean of the total scores from baseline to post-intervention of the Social Support and Exercise Survey were significant (*paired t*=7.43, p= 0.001) when comparing children's perceived parental support before and after the parental support intervention. To further determine whether certain parental support strategies were more significant than others, individual analyses were conducted on each of the strategies. Perceived parental encouragement significantly increased (*paired t*=4.27, p=0.001) when comparing before and after a parental support intervention. Parental participation with children in physical activity showed significant differences in the mean (*paired t*=3.72, p=0.001) before and after the intervention. Similarly, significant differences were found (*paired t*= 4.96, p=0.001) in providing transportation to physical activities when children received parental support compared to no parental

support. Furthermore, significant differences were found in parental observation of children's physical activity (*paired t*=2.01, p=0.03) when comparing perceived support before and after a parental support intervention. Within-subject differences were also significant (*paired t*= 2.52, p=0.01) for parents giving praise to children for participating in physical activity. Tables 4 and 5 refer to the frequency data related to perceived levels of parental support of children.

Table 4. Significant Differences in Children's Perceived Parental Support Following a Parental Support Intervention. Total Score Survey.

Variable	Mean	SD	*t*	*p*
Before Parental Support (control)	10.80	4.37	7.43	0 .001*
Following Parental Support	14.57	3.83		

$N = 30$ $*p < 0.05$

The third survey children completed was the Physical Activity Motivation Scale used to assess children's motivation for physical activity at baseline and following a parental support intervention. The instruments evaluated regulatory motives related to physical activity in a 3-degree Likert scale and were tallied as follows: Not like me = 0; A little like me = 1; and A lot like me = 2. The participants were asked to determine the answer that best described them regarding their drive for physical activity. Ten questions assessed how excited and interested children were about physical activity, how important they rated it, whether they plan physical activity behaviors, and care about being active.

Table 5. Significant Differences in Children's Perceived Parental Support Following a Parental Support Intervention: Individual Parental Support Measures.

Variable		Mean	SD	*t*	*p*
Parental Encouragement	No Parental Support (control)	2.28	1.26	4.27	0.001*
	Following Parental Support	3.17	0.87		
Parental Participation	No Parental Support (control)	1.50	1.11	3.72	0.001*
	Following Parental Support	2.23	1.19		
Providing Transportation	No Parental Support (control)	2.23	1.10	4.96	0.001*
	Following Parental Support	3.37	.77		
Parental Observation	No Parental Support (control)	2.27	1.14	2.01	0.027*
	Following Parental Support	2.63	1.16		
Parental Praise	No Parental Support (control)	2.53	1.31	9.65	0.010*
	Following Parental Support	3.17	1.21		

$N = 30$ $*p < 0.05$

The mean baseline value was 11.53 (SD=2.86) compared to the post-parental support intervention mean of 13.60 (SD=2.50). When analyzing motivation scores before and after the parental support intervention, the researcher found significant differences (*paired t*= 9.65, p=0.001) in children's perceived motivation to be physically active. Table 6 presents the differences in mean of children's perceived motivation for physical activity before and after the parental support intervention.

Table 6. Significant Differences in Children's Perceived Motivation for Physical Activity Following a Parental Support Intervention.

Variable	Mean	SD	*t*	*p*
No Parental Support (control)	11.53	2.86	9.65	0.001*
Following Parental Support	13.60	2.50		

N= 30 *$p < 0.05$

Specific Aim 3: Analyze for Differences in Parents' Perceived Support Scores Before and After Their Child Received a Parental Support Session to Encourage Physical Activity

This specific aim explored the extent to which parents perceived that they supported their children's physical activity levels. To determine parent-perceived support scores, parents filled out one survey on perceived levels of their own support for children's physical activity using the Amherst Health and Activity Adult Survey. Findings from this survey helped identify whether parental support for physical activity was perceived as given. Survey questions were set up in a Likert scale asking parents to identify how often they had encouraged physical activity, done a physical activity with

the child, provided transportation to a setting where the child could be physically active, observed the child in physical activities, and told the child that physical activity was good for their health with responses were tallied as follows: None =0; Once = 1; Sometimes = 2; Almost daily = 3; and Daily = 4.

The mean response at baseline for parent-perceived support was 12.37 (SD=3.54) compared to the post-parental support mean 13.87 (SD=3.18). Scores from the Amherst Activity and Health Adult Survey were analyzed before and after a parental support intervention. Parent-perceived support was significantly higher (*paired t*=3.04, p= 0.001) after the parental support intervention compared to baseline. Table 7 presents the differences in means of parent-perceived support of physical activity of children before and after a parental support intervention.

In light of the fact that Pender's HPM personal factors can influence motivation, support, and physical activity levels in children, the researcher recomputed the above survey analyses using BMI, gender, age, and race as covariates. When analyzing

Table 7. Significant Differences in Parent Perceived Support for Children's Physical Activity Following a Parental Support Intervention.

Variable	Mean	SD	*t*	*p*
No Parental Support (control)	12.37	3.54	3.04	0.001*
After Parental Support (intervention)	13.87	3.18		

$N = 30$ $*p < 0.05$

parental-perceived support using the Amherst Health and Activity Adult Survey and gender using a two-sample t-test, no statistical difference was found at baseline (*paired t*=-0.07, p= 0.94) or intervention (paired t= -0.51, p= 0.62) between parents of boys or girls.

Children's perceived level of physical activity (PAQ-C) was next explored further by testing for statistical differences with the covariates of gender, BMI, age, and race. Broken down by gender, no statistical difference was noted between girls and boys and perceived levels of physical activity before (*paired t* = -0.16, p= 0.88) or after the parental support intervention (*paired t* = 0.95, p= 0.35).

Children's motivation to be physically active was measured using the Motivation for Physical Activity Scale. The researcher recomputed the analysis for significance after the parental support intervention by examining gender, BMI, age, and race as covariates that could potentially influence motivation for physical activity. A paired t-test was conducted to determine significance between perceived motivation and gender. There was no statistical difference between boys and girls and motivation to be physically active either before (*paired t* = -0.20, p= 0.85) or after (*paired t* = 0.32, p= 0.75) the parental support intervention. ANOVA analyses also showed no significant associations among children's perceived motivation and race before (df =2, *F*= 0.98, p= 0.39) or after (df = 2, *F*= 0.66, p= 0.53) the intervention.

Summary

The effects of perceived parental support of 30 children ages 8 to 12 years were examined using various statistical analytic tools. The quantitative analysis conducted within this chapter involved using five valid measures to collect primary data: the PAQ-

C, Social Support and Exercise Survey, Children's Physical Activity Motivation Scale, Amherst Health and Activity Adult Survey, and accelerometers. Physical activity was measured by accelerometer counts. The results indicated children's perceptions of their level of physical activity, parental support, motivation, and actual physical activity measures significantly increased after a parental support intervention. Parent-perceived support also significantly increased post-parental support intervention. Although survey scores showed significant increases in perception of support and motivation, there was no relationship with actual physical activity measures.

The results of this study present data that could provide a base for future research studies designed to further explore the effects of parental support on physical activity levels in children and their motivation to be physically active. The following chapter presents a discussion and conclusions on the effects of parental support on perceived-parental support and motivation and physical activity levels. Also, implications for nursing education, practices, policy, and further research on parental support strategies to increase children's physical activity levels are provided.

CHAPTER V

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The purpose of this study, as presented in the previous chapters, was to determine the effects of parental support on physical activity levels in children. The specific aims addressed in this study were as follows:

1. Analyze for differences in accelerometer counts before and after children received parental support to encourage physical activity.

2. Analyze for differences in children's motivation scores before and after they received parental support to encourage physical activity

3. Analyze for differences in parents' perceived support scores before and after their child received a parental support session to encourage physical activity.

Detailed results from the statistical analyses were presented in Chapter IV. This discussion section focuses on how the independent variable, parental support, predicted perceived and actual physical activity levels in children, and this presents the discussion of the results within the perspective of previous research literature and Pender's HPM as the guiding framework. Further, the influence of Pender's HPM personal factors (age, gender, race, BMI, motivation) on perceived parental support and subsequent levels of physical activity in children are explored.

The results of the study are addressed in the order of its specific aims. Each specific aim is restated, followed by a brief discussion of the main findings related to the aim. The results are addressed in terms of the aims related to the children's perceived parental support and motivation, accelerometer measures, parent-perceived support, and correlations with Pender's HPM personal factors. It is important to note that the findings are generalizable only to the study population. A larger, randomized controlled trial would need to be conducted to generalize findings to other populations. The chapter concludes with recommendations for nursing practice, future research, and policy.

Consequences With Decline of Physical Activity

Increased physical activity can reduce obesity and is associated with positive cardio-metabolic health; however, less than 40% of US children meet the CDC daily recommended 60 minutes of moderate to vigorous physical activity most days of the week. The rise in obesity prevalence in children is largely attributed to their lack of daily physical activity. (Colley, Janssen, & Tremblay, 2012). Although increased physical activity can reduce obesity and its consequences, the prevalence of childhood obesity for children ages 6 to 11 years has tripled in the last 30 years from 6.5% in 1980 to 19.6% in 2008 (CDC, Childhood Obesity, 2010). The prevalence of childhood obesity in this current study was 20%, which is quite similar to 19.6% national average. If the present obesity trend continues, this generation of children may be the first to have a shorter life expectancy than their parents (Brownson, Chriqui, Burgeson, Fisher, & Ness, 2010).

Gaps in Research on Effects of Parental Support on Physical Activity in Children

Parental support has been frequently cited as key in promoting physical activity in children, but evidence has been inconclusive. Many studies pose limitations including cross-sectional designs and restrictive samples, and many depend on self-report measures only (Bauer, Nelson, Boutelle, & Neumark-Sztainer, 2008; Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006; Kleges, Malott, Boschee, & Weber, 1986; Trost et al., 2003). A review of the literature addressing whether parental supportive measures influence children's physical activity levels identified mixed outcomes. Several studies evaluating the effect of supportive measures on children's physical activity levels have been inconclusive, posed weak correlations between parental support and children's physical activity levels, and had limited generalizability (Gustafson & Rhodes, 2006; Rutten, Boen, & Seghers, 2013; Van der Horst et. al, 2007). In addition, minimal information is available related to parents' perception of how much they feel they provide support behaviors to their child to promote physical activity participation. With the increasing prevalence of childhood obesity and the steady decline in physical activity levels in children, the need increases to understand the impact of perceived parental support on physical activity levels of children. Few studies were identified that addressed parents' perceptions of support that they provided to their children for promoting increases in these levels. Knowledge is also limited on the types of supportive mechanisms parents can enact that best motivate children to be more physically active.

Current Research on Physical Activity Studies in Children

Most studies have been limited by self-report methods that constrain the valid and accurate assessment that objective feedback can offer. More studies are needed using

objective measurement tools to evaluate physical activity levels in children with physical activity data at home, in school, and the community setting (Lytle et al., 2009). Increasing parents' awareness of how supportive they are towards physical activity in children may increase supportive behaviors that will result in improving physical activity levels. In addition, numerous studies in the literature are descriptive and lack a design that uses intervention-based strategies of parental support to improve physical activity levels in children. Studies that do implement interventions are primarily in school-based settings. Research is quite limited on actual parental support interventions to increase children's physical activity in rural community settings (Bentley et al., 2012). Consequently, more research is needed because of the lack of concrete evidence that parental support can improve children's physical activity levels.

The literature also is mixed regarding the behavioral methods that effectively motivate children to meet CDC physical activity guidelines. Research has not fully examined how parental influence can affect children's behavior; therefore, the purpose of this study was to determine whether parental support can motivate children to increase their activity levels. In addition, minimal information is available related to parents' perception of the support they give to children to increase physical activity; thus, this study also explored this question.

Method of Study

A pre-test post-test was used to determine the effects of parental support on children's physical activity levels. Parental support strategies included encouragement, praise, transportation, observation, and participation in physical activity with children. Child and parent survey scores, accelerometer measurements, demographics, and

anthropometric measures were analyzed using paired t-tests and Pearson correlations at baseline and following a parental support intervention.

Specific Aim 1: Analyze for Differences in Accelerometer Counts Before and After Children Received Parental Support to Encourage Physical Activity

Accelerometers were placed on the children's wrists, who were instructed to continue their usual activities of daily living, and parents were told to not provide any means of support that were more than their ordinary behavior to collect baseline physical activity levels. After a 2-week washout, children wore accelerometers again while parents implemented parental support measures to encourage an increase in physical activity levels. Child participants wore accelerometer devices to capture activity counts, which represented physical activity levels for 4 days during a baseline week and then again for 4 days during a parental support intervention. The mean value of energy expenditure for the participants at baseline was 2440 (SD=1325) with a range of 961 to 8891. Compared to baseline physical activity, children significantly increased their energy expenditure during a parental support intervention with a mean value of 3604 (SD=2860) and a range of 1329 to 1100. Results showed that there was a significant difference (*paired t*=2.62, p=0.01) in accelerometer counts when analyzing physical activity of children after the parental support intervention. McMinn, Griffin, Jones, and van Sluijs (2013) reported similar findings that afterschool physical activity was positively associated with parental support when objectively measured by accelerometers.

Accelerometer Measurements

This finding is somewhat consistent with the documented literature on objectively measured data and children's physical activity level results obtained from previous

studies. Research has shown through objective measurement that accelerometers can be an effective tool in assessment of children's physical activity levels (Lawman, Wilson, Van Horn, & Zarrett, 2012; Schuna, Lauersdorf, Behrens, Liguori, & Liebert, 2013; Trost, Rosenkrantz, & Dzewaltowski, 2008). Although the research has identified accelerometers as a valid tool to measure these levels in children, the option of what epoch time interval to use during data collection may pose challenges in comparing children's levels, and more research is needed (Pfeiffer, Mciver, Dowda, Almeida, & Pate, 2006). There is also a large discrepancy in physical activity outcomes because of the various cut-off points for MVPA among children, failing to provide a concrete definition of a clear goal toward promoting increases in their physical activity levels. A standardization of methods of inquiry is urgently needed for sufficient comparison (Cain, Sallis, Conway, Van Dyck, & Calhoon, 2012; Guinhouya, Samouda, & de Beaufort, 2013; Routen, Upton, Edwards, & Peters, 2012). In addition, both hip and wrist placements of accelerometers have been used in physical activity research with children; however, data comparisons between the two monitor placements are inappropriate because of the different cut-off points researchers have used to obtain data.

Variations in Measurements

In the study by Routen, Upton, Edwards, and Peters (2012), hip counts revealed lower activity levels than wrist counts and sedentary, light, moderate, and vigorous activity varied depending on the cut-points used for analysis. Wrist placement was suggested in the literature to be as accurate and more comfortable, promoting adherence among child participants (Ekblom, Nyberg, Bak, Ekelund, & Marcus, 2012; Routen, Upton, Edwards, & Peters, 2012). In the present study, the researcher used wrist

placement for the accelerometer for both baseline and intervention assessments to obtain comparable results for activity energy expenditure. In contrast, Rosenberger, Haskell, Albinali, Mota, Nawyn, and Intille (2013) have suggested that a hip-worn accelerometer is a more valid approach becuase watch-worn accelerometers have been quite variable with calibration protocols. Regarding the relationship between accelerometer measurements and actual physical movement, hip-worn placement (r^2 =0 .52) was greater than wrist-worn placement (r^2 = 0.13). This gap in provision of accelerometer measurements supports the need for further testing of wrist-worn accelerometers with comparable cut-points.

Specific Aim 2: Analyze for Differences in Children's Motivation Scores Before and After They Received Parental Support to Encourage Physical Activity

Children completed three surveys to determine perceived parental support, motivation for physical activity, and perceived physical activity.

Child's Perceived Physical Activity Levels Related to Current Research

The mean score for the baseline survey was 2.93 (SD=0.63) compared to the post-parental support intervention survey mean of 3.41 (SD=0.56). There was a significant difference in children's perceived levels of physical activity from baseline (t-value= 5.87, p= 0.00) compared to post- parental support intervention. These results support the researcher's hypothesis that children will perceive themselves as more active following a parental support strategy. This result gives parents the knowledge needed to provide parental support strategies to promote physical activity in children. Although no data are available on the direct relation of a parental support intervention to children's perceived levels of physical activity, findings from Janz, Lutuchy, Wenthe, and Levy (2008),

Treuth, Hou, Young, and Maynard (2005), and Voss, Ogunleye, and Sandercock (2013) provide a useful discussion context for the study results. Voss, Ogunleye, and Sandercock (2013) used a representative sample of participants (n=7226, 53% boys, 10-15years) and measured perceived general estimates of physical activity levels. Peak oxygen uptake was predicted and categorized into at-risk and no-risk for metabolic syndrome. The normative criterion-referenced values of 2.90 or greater for boys and 2.70 or greater for girls were identified as the standard cut-off points for being at risk for metabolic syndrome when categorizing youth in population-based research. The present study's participants' summary PAQ-C scores at baseline were 2.93, and post-intervention PAQ-C summary scores increased to 3.41, indicating that children are at a less risk for metabolic syndrome participating in physical activities following a parental support intervention.

Reliability With Self-Report Physical Activity Measures

Janz, Lutuchy, Wenthe, and Levy (2008) noted that the PAQ-C questionnaire shows good internal consistency when measuring perceived levels of physical activity in children. Self-report measures have often been criticized for being unreliable and problematic because of the difficulty children have in recalling events. Self-report questionnaires are low cost, easy to administer, and an efficient way to retrieve information in population-based studies. The questionnaire was tested for scale reliability and stability on 210 11-year-old children. The Pearson correlation for reliability (r=0.30) showed that PAQ-C was moderately stable over a 2- year period. The present study was a within-subjects design using a 2-week washout period between PAQ-C questionnaire administration, which is anticipated to be a stable time period to compare

before and after PAQ-C summary scores of perceived levels of physical activity (Janz, Lutuchy, Wenthe, & Levy, 2008).

Student responses were studied for reliability using the PAQ-C on 70 elementary children in rural Maryland. The children wore accelerometers and took the PAQ-C questionnaire on two separate occasions to determine reliability and compared with accelerometer data to determine validity. The PAQ-C showed moderate reliability (r= 0.48) and a correlation coefficient determining validity between the questionnaire and the accelerometer measures (r=0.34, p=0.001). The results from this study showed that this questionnaire is an acceptable tool for measuring perceived levels of physical activity in elementary-aged school children. This outcome supports the reliability of the PAQ-C results that were compared at baseline and after a parental support intervention (Treuth, Hou, Young, & Maynard, 2005).

Perceived Parental Support Findings Related to Current Research

To further determine whether certain parental support strategies were more significant than others, individual analyses were conducted on each strategy. Lack of evidence warranted further exploration of the effects of perceived parental support on children's physical activity levels. Therefore, information was gathered to respond to this specific aim through participants' responses to a series of questions regarding perceived parental support. The data obtained from the participants' responses to the statements revealed that overall, children perceived themselves to be more supported by their parents after the parental support intervention compared to before it (*paired t*= 7.43, p= 0.001).

Children's overall perception that the parental support they received improved after the parental support intervention suggests the need for further studies of the effects

of such interventions on children's perceived level of parental support and their level of physical activity in responding to the perceived level of parental support. Parental support measures were then analyzed separately.

Parental encouragement. Parental encouragement for baseline had a mean of 2.27 (SD=1.26) compared to the intervention mean of 3.17 (SD=0.87). When looking at specific parental support measures, children perceived being more supported with parental encouragement after the parental support intervention (*paired t*=4.27, p= 0.001) than before. This finding of parental encouragement as a support mechanism to increase children's physical activity levels is congruent with previous studies. Results from the current study are supported by Hosseini, Abbaszadeh, and Ehsani (2013), who reported that words of encouragement, comfort, and permission facilitate physical activity behaviors in children. Parental encouragement through love, trust, and empathy have been well documented as successful support measures for increasing levels of physical activity in children (Biddle & Goudas, 1996; Dowda, Dishman, Pfeiffer, & Pate, 2007; Martin & McCaughtry, 2008; Springer, Kelder, & Hoelscher, 2006).

Parental participation. The parental participation in physical activity mean at baseline was 1.50 (SD=1.11) compared to the intervention mean of 2.23 (SD=1.19). Children's perception of parental participation with them in physical activities was significantly greater (*paired t*=3.72, p=0.001) after the parental support intervention compared to before it. Nolan, Cottrell, and Dino (2013) determined that parental participation was a positive predictor for increased physical activity in children.

However, Cong, Feng, Liu, and Esperat (2012) have indicated that parental participation increased time children spent being physically active but that parental

encouragement did not have the same impact. These mixed results warrant further exploration of parental encouragement on increasing physical activity levels in children.

Transportation. Providing transportation to physical activities baseline mean was 2.23 (SD=1.10) compared to the intervention mean of 3.37 (SD=0.77). Similarly, children felt that parents provided more transportation to physical activities after the intervention (*paired t*= 4.96, p=0.001) than it.

Observation. For parental observation of physical activity, the baseline mean was 2.27 (SD=1.14) compared to the intervention mean of 2.63 (SD=1.16). Furthermore, children perceived that their parents observed them significantly more often following the intervention (*paired t*=2.01, p=0.03) compared to prior to it.

Praise. Praise was the other parental support measure assessed in the survey. The baseline mean for praising children in physical activities was 2.53 (SD=1.31) compared to the intervention mean of 3.17 (SD=1.21). Children's overall perception of parental praise was also significantly greater following the parental support intervention (*paired t*= 2.52, p=0.01), suggesting that parents need to support children in physical activity behaviors through praise and positive feedback.

Peer support versus parental support. In 2002, Prochaska, Rodgers, and Sallis (2002) assessed physical activity levels in children and social support, separating parental and peer support. Measured by both accelerometer and self-report, there was a significant correlation ($r = 0.61$, $p < 0.00$) with parental support, encouragement, praise, and viewing child's participation in physical activities. However, the association no longer existed when analyzing only the objective accelerometer measurement. This outcome raised concern that activity levels are not directly related to parental support.

Other studies have failed to identify parental support as a significant indicator for increasing physical activity. Parental support has not been fully examined; however, findings are not conclusive. The lack of concrete data on the effectiveness of parental support intervention programs on physical activity levels in children suggests the need for further exploration (Nyberg, Sundblom, Norman, & Elinder, 2011). This study agrees with the findings from other studies on parental support strategies, which indicate that parental support can be a positive predictor of children's perceived levels of support and actual physical activity levels.

Conflicting findings of parental support. Wilson, Lawman, Segal, and Chappell (2011) and Sallis, Prochaska, Taylor, Hill, and Geraci (1999) highlight parental support as an important component for increasing physical activity levels of children after studying perceived parental support in the Act by Choice study ($p < 0.05$). This finding is consistent with results from other studies. De la Haye, de Heer, Wilkinson, and Koehly (2013) found that children are more conceivable to participate in physical activities if they are supported to do so by their parents. Similarly, Sallis et al. (1992) reported that parents have an important role in creating a desirable environment that promotes physical activity behaviors. Although research has supported the results of the current study, other research has shown conflicting outcomes. Ferreira et al. (2007) found a significant association between parental support and adolescents but not with younger children. Similar findings were found by Sallis, Prochaska, and Taylor (2000) who reported no determinate cause-and-effect relationship of parental influence on physical activity levels in children.

Numerous studies have reported that parental support can have a positive influence on physical activity levels of children, but many combine different methods of social support, making it challenging to decipher which parental support measure is most effective in children (Beets, Cardinal, & Alderman, 2010). Material forms of support were also cited as positive indicators for increasing children's physical activity levels, including paying registration sports fees, providing transportation to physical activity opportunities, and buying sports equipment (Hosseini, Abbaszadeh, & Ehsani, 2013). Lack of parental support and willingness to facilitate transportation to physical activity opportunities have proven to discourage children from being physically active (Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006).

This study analyzed specific methods of perceived parental support including encouragement, praise, observation, transportation, and participation to determine significant effects on physical activity levels in children and found that each method significantly improved the perception of parental support, although determining which methods were most significant was beyond the scope of this study. This area needs more focus in nursing research to more clearly define which methods of parental support are most conducive for increasing perceived support that will improve physical activity levels in children.

Perceived Motivation for Physical Activity Related to Current Research

Physical activity motivation scores were used to measure children's desire and drive to participate in physical activity. The mean baseline value was 11.53 (SD=2.86) compared to post-parental support intervention mean 13.60 (SD=2.50). When analyzing

motivation scores before and after a parental support intervention, the researcher found significant differences (*paired t*= 9.65, p=0.001) in children's perceived motivation to be physically active. This result supports this researcher's hypothesis that parental support will increase children's motivation for participating in physical activities. These findings are congruent with those of Haverly and Davison (2005), who indicated that motivation is an important consideration with any physical activity intervention because it most often precedes regular patterns of physical activity that will develop. Interpersonal factors such as parental support have been linked to types of factors that motivate children to participate in physical activities. Motivation is reported to be a linear concept that drives intention to go forth with action from attitudes, norms, and self-efficacy (Haverly & Davison, 2005). This provision of intrinsic motivation could be related to the desire children feel to be physically active after receiving ongoing supportive measures from their parents (Stanley, Boshoff, & Dollman, 2011). Barkley, Epstein, and Roemmich (2009) determined that reinforcement as a motivational factor can better increase the chances of engaging in regular physical activity.

The built environment. Weather conditions did not interfere with this study because children had access to indoor activities, gymnasiums, and physical activity equipment as well as outside green space at school, home, and the Boys and Girls Club. Parents had freedom to support physical activity in all environmental settings.

The home environment has also been reported as a bigger facilitator for physical activity in children compared to the neighborhood environment (Crawford et al., 2010). Congruent with this study's findings, the convenient access to parental support in the home environment may encourage children to be physically active and support Pender's

HPM on the effects of physical activity behaviors. Ginsburg and Bronstein (1993) have suggested similar findings that parental support behaviors such as encouragement for physical activity promotion are linked with intrinsic motivation and increased desire for initiating physical activity behaviors.

Linking perceived support with motivation for physical activity. Motivation to be physically active in this study significantly increased following the parental support intervention. Trost et al. (2003) have found that motivation for support of physical activity from parents motivates children to become more active and increases child self-efficacy. Others have provided insight into what motivates children to be physically active and studies have specifically linked parental support in the form of transportation, equipment, encouragement, and praise with children's physical activity behaviors (Anderssen & Wold, 1992; Edwardson, Gorely, Pearson, & Atkin, 2012; Prochaska, Rodgers, & Sallis, 2002; Tudor-Locke, 2002). Instilling intrinsic motivation in children to be physically active is an area where nursing education is needed to empower parents to serve as facilitators in health promotion of physical activity behaviors in children. The current state of knowledge about what motivates children to sustain physical activity behaviors is still under scrutiny despite reports that identify motivation as a factor in increasing physical activity levels.

Specific Aim 3: Analyze for Differences in Parents' Perceived Support Scores Before and After Their Child Received a Parental Support Session to Encourage Physical Activity

Information was gathered to respond to this specific aim through parents' responses to a series of statements regarding their perceptions of the extent to which they believe they support their children in participating in physical activities. Scores from the

Amherst Activity and Health Adult Survey were analyzed before and after a parental support intervention. Findings from this survey helped to identify to what extent household influences support physical activity behaviors in children. The mean response at baseline for parent-perceived support was 12.37 (SD=3.54) compared to the post intervention mean of 13.87 (SD=3.18). Parents perceived that they were more supportive following the parental-support intervention (*paired t*=3.04, p=0.001). Significant findings indicate that parents concluded that they provided more support for physical activity to their children while implementing the parental support intervention compared to normal daily interactions with their children. This result suggests that making parents aware of how much they support children's physical activity behaviors may increase the amount of support they provide in an attempt to raise children's physical activity levels.

Awareness of Parental Support

Parents' overall perception was that the support they provided to their children was greater following the parental support intervention. This suggests that if parents are more cognizant of their supportive behaviors in promoting physical activities, they will more prone to perform these supportive measures to encourage physical activity behaviors in their children. Veitch, Hume, Salmon, Crawford, and Ball (2013) also found ways parents are thought to be supportive in promoting physical activity in children, including having children go outside to play, transporting children to activities, modeling physical activity behavior, being enthusiastic about their child's involvement with physical activity, and showing their own enjoyment of physical activity were known supporters for increasing children's physical activity levels. The failure of healthcare providers to provide parents with this critical education information has implications for

positively affecting the quality and characteristics of parental support measures that parents can practice with their children.

Perceived Parental Support and Health Promotion Model Personal Factors

Based on the statistical analysis conducted in this study to explore the association between BMI and gender, there were no differences between boys and girls (*paired t* = 2.11, p= 0.06). In this area, previous studies present mixed findings. Nolan, Cottrell, and Dino (2013) reported that higher levels of parental support are associated with higher BMI in girls. However, Corder et al. (2010) concluded that parents with children of a healthy BMI tended to be more supportive of physical activities, even though the parents overestimated the level of physical activity their children participated in. This result is consistent with Zhao, Gao, and Settles (2013), who found that parents of overweight children were less presumable to promote physical activity behaviors in children compared to parents who perceived their children as a healthy weight. BMI was not correlated with perceived social support and gender of the child in this current study. Although findings from previous studies conclude that gender and BMI differences affect perceived social support in children, the failure to identify significant correlations in this study highlights the need for further exploration to determine if gender and BMI can be associated with one another as strong predictors of perceived parental support.

In a study done by Fisher et al. (2011), parental support was significantly associated with increased physical activity levels in children; however, when child psychosocial variables were analyzed, parental support was no longer an indicator for increasing children's physical activity levels. Also, parental support and none of the

psychosocial variables were significantly associated with the objective measurement of physical activity in the children. Fisher et al.'s (2011) study suggests that psychological correlates in children mediate how parental support can affect their motivation for physical activity and further research is warranted.

Jackson, Crawford, Campbell, and Salmon (2008) explored parental concern for children's physical activity levels and whether parental support increased in relation to their concern. Interestingly, the authors found that children of concerned parents were actually less active than children whose parents were not concerned about their physical activity levels. Consequently, less supportive measures were implemented from more concerned parents suggesting that concerns need to be transformed into action.

Health Promotion Model Personal Factors and Accelerometer Counts

Physical activity and gender. Children's actual physical activity measurements were further analyzed to determine any significance or correlation with gender, BMI, age, or race. A paired t-test showed no significance between boys and girls and accelerometer measures at baseline (*paired t* = 1.25, p= 0.24) and after the parental support intervention (*paired t* = -0.71, p= 0.49). Gender was not a predictor of actual physical activity levels in this study, suggesting that neither boys nor girls are more affected by parental support for increasing their physical activity levels. These findings are not comparable to previous literature reports that showed varied responses to parental support dependent on gender. Boys have been reported to participate in more physical activity compared to girls when feeling supported by their parents (Fisher et al., 2011; Lau, Engelen, & Bundy, 2013; Zhao, Gao, & Settles, 2013). In addition, boys not only are documented to be more

physically active, but also are reported to participate in more vigorous activity than girls (Hinkley et al., 2008; Pate, Pfeiffer, Trost, Ziegler, & Dowda, 2004).

Similarly, girls were noted to have a steadier decline in physical activity once approaching puberty when compared to boys, despite receiving social support (Bastos, Araujo, & Hallal, 2008; McWhorter, Wallmann, & Alpert, 2003; Zhao, Gao, & Settles, 2013). Boys are generally more active than girls, and children with a high socioeconomic status have been reported as more physically active during school and after hours (Seabra, Mendonca, Thomis, Malina, & Maia, 2011). Even though parental support is a more significant factor in the physical activity of boys compared to girls, Bradley et al. (2011) noted that the rate of decline of physical activity was greater in boys, so there was less difference in physical activity levels by late adolescence. On the other hand, Adkins, Sherwood, Story, and Davis (2004), found that parent-reported support for physical activity was associated with girls' physical activity levels. Similarly, several other studies have shown that parental support influences the activity levels of girls significantly more than boys (Davison, Cutting, & Birch, 2003; Fogelholm, Nuutinen, Pasanen, Myohanen, & Saatela, 1999; Myers, Strikmiller, Weber, & Berenson, 1996; Trost et al., 1997). Findings from this present study agreed with Edwardson and Gorely (2010) that no gender differences exist between girls and boys in mean levels of physical activity after receiving parental support.

Physical activity and race. ANOVA showed significance in race with accelerometer measures at baseline ($F= 6.73$, $p= 0.00$) and post-parental support intervention ($F= 3.85$, $p= 0.03$). After a significant ANOVA F test result at baseline, a multiple comparisons test, the Tukey HST revealed that African-American children were

significantly more active than Native Americans and Caucasians at baseline. The Tukey HST identified no significant differences between Native-American and Caucasian children at baseline. Similarly, a significant ANOVA F test result was found with race and accelerometer measures following the intervention (F= 3.85, p= 0.03). The Tukey HST revealed that African-American children were more active than Caucasian children; however, there was no significance in accelerometer-measured activity levels between African-American children and Native-American children or between Native-American and Caucasian children. Caucasians have been noted to be consistently more physically active than African Americans (Zhao, Gao, & Settles, 2013). An ANOVA was conducted to explore the covariate of race with parent-perceived support. There were no differences in racial origin and perceived parental support at before (df = 2, F= 0.05, p= 0.95) or following the parental support intervention (df = 2, F= 0.64, p= 0.54).

Perceived parental support and gender. Children's perceived parental support measured by the Social Support and Exercise Survey and Pender's chosen personal factors as covariates were also further explored. A two-sample t-test was conducted to explore the differences in perceived parental support between boys and girls before and after the intervention. No statistical significance between girls and boys was identified before (*paired t* = 0.00, p= 1.00) or after (*paired t* = -0.68, p= 0.51) the parent support intervention. Jago et al. (2011) also found that parental support by enrolling children in activities and transporting them to physical activity events was associated with increased participation in physical activities in both boys and girls. Providing transportation to physical activities was a significant predictor for physical activity in girls, but the association no longer existed for girls as they aged (Bradley et al., 2011).

In contrast, Davison, Cutting, and Birch (2003) reported that there is a difference in parental support for physical activity between boys and girls. They found that parental encouragement and participation as a means of parental support affected physical activity levels more for girls compared to boys. These same findings were also identified in previous studies examining gender differences with parental support (Fogelholm, Nuutinen, Pasanen, Myohanen, & Saatela, 1999; Myers, Strikmiller, Webber, & Berenson, 1996; Trost et al., 1997). Bradley et al. (2011) found that parental support strategies such as parent participation and encouragement did not slow the rate of decline of physical activity in girls. These supportive strategies did seem to affect boys, but their rate of decline as they aged was steeper, so there was less difference by late adolescence.

Perceived parental support and race. ANOVA revealed no significance between race and perceived level of parental support during baseline assessment ($df = 2$, $F= 0.31$, $p= 0.74$) or after the parental support intervention ($df = 2$, $F= 1.41$, $p= 0.26$). There is abundant research on physical activity level variations in different races among children, but after exhaustive search, no literature could be found specifically about perceived levels of parental support differences among children of different race (Kimm et al., 2001; Hsu et al., 2011; White & Jago, 2012; Willig et al, 2011). More research is needed to gear interventions toward culturally competent prevention strategies.

Perceived Physical Activity Levels and Health Promotion Model Personal Factors

Sithole and Veugelers (2008) reported that children who perceived themselves as being more physically active than their parents perceived them to be tended to be more overweight or obese compared to children who agreed with their parents about their level

of physical activity. Age differences were explored for significance for perceived levels of physical activity. There was no significance at baseline (r= -0.24, p= 0.20), but there was a significant relationship of age with perceived levels of physical activity following the parental support intervention (r= -0.38, p= 0.04). An ANOVA to test for significance between children's perceived physical activity levels and racial origin before and after a parental support intervention. Results showed no significant differences between race and perceived levels of physical activity before (F= 0.36, p= 0.69) or after (F= 0.93, p= 0.41) the parental support intervention.

Child's Motivation for Physical Activity and Health Promotion Model Personal Factors

Children's motivation to be physically active was measured using the Motivation for Physical Activity Scale. The researcher recomputed the analysis for significance after the parental support intervention by examining gender, BMI, age, and race as covariates that could potentially influence motivation for physical activity. A paired t-test was used to determine significance between perceived motivation and gender. There was no statistical difference between boys and girls and motivation to be physically active either before (*paired t* = -0.20, p= 0.85) or after (*paired t* = 0.32, p= 0.75) the parental support intervention. However, other studies reported positive associations with parental support and children's motivation to be physically active in lower-weight status but not overweight or obese children (De Bourdeaudhuij et al., 2005; Kitzman-Ulrich, Wilson, Van Horn, & Lawman, 2010).

Emotional Support as a Motivation Factor

An ANOVA showed no significant associations among children's perceived motivation and race before ($F= 0.98$, $p= 0.39$) or after ($F= 0.66$, $p= 0.53$) the parental support intervention. St. George, Wilson, Lawman, and Van Horn (2013) conducted a study on weight status as a moderator among motivation, emotional support, and physical activity levels in children. Emotional support was found to facilitate intrinsic motivation by instilling autonomy, competence, and belongingness in children to increase their physical activity behaviors. This outcome was shown in children of lower weight status but not those perceived as overweight. Children who were obese or who perceived themselves as obese had less motivation to engage in physical activity.

Rutten, Boen, and Seghers (2013) explored the role of motivation and the effects on physical activity levels in children. Children completed self-report measures including motivation to be physically active and perceived support for physical activity from parents. Parents filled out a self-report questionnaire on their perception of current parenting practices and home environments that were supportive with physical activity opportunities. Results confirmed that motivation linked the relationship between parental support and physical activity levels in children. Motivation was also a mediator in the relationship between parent-perceived support and physical activity levels in children.

Ways of Motivating Physical Activity Behaviors

Rutten, Boen, and Seghers (2013) also have found that parents can support increases in physical activity levels by motivating children through positive feedback, offering choices, and participating in physical activity with their children. No differences were found between boys and girls in perceived motivation for physical activity.

Interestingly, because of the lower physical activity levels found in girls, this result conflicts with other research showing that motivation positively predicts physical activity levels in children. A limitation of that study is that it was based solely on self-reports and that no objective measurement was used to validate the findings. The current study analyzed differences in motivation between boys and girls but added an objective measurement in an attempt to validate findings. There were also no significant differences in perceived motivation between boys and girls, and no correlation with perceived motivation and objective physical activity measures. This outcome suggests that other confounding factors could have affected physical activity levels despite children's increased motivation following the parental support intervention.

Summary

Currently, interventions have shown mixed results, and the effectiveness of parental support in promoting physical activity levels in children remains unclear. How parental support interventions affect boys and girls differently is also uncertain (Cong, Feng, Liu, & Esperat, 2012). In addition, very few studies on parental support and physical activity levels in children have focused on rural populations and that area of study requires more attention (Moore et al., 2010). The aim of the current study was to decrease the gap in the state of knowledge regarding the effects of parental support on physical activity levels in children. This research has achieved this aim by producing data that support current knowledge that perceived motivation, perceived support, and actual physical activity levels show promise of improving with parental support measures.

Conclusions

The HPM has been used here to predict the effects of parental support on physical activity levels in children. Major factors influencing health-related behavior derived from the HPM that were studied here were personal factors (biological, psychological, and socio-cultural), interpersonal influences (parental support), and health-promoting behavior (physical activity). Pender's HPM argues that the individual's ability to engage in health-promotion activity depends on those factors along with competing demands for each individual. Interpersonal influences described in the model were measured with perceived support and motivation for physical activity. The model states that these constructs ultimately lead to health-promoting behavior. The health-promoting behavior of interest in this study was physical activity represented by energy expenditure.

Descriptive statistics for each variable within the theoretical model were individually measured and analyzed. These variables included age, gender, race, and BMI. Furthermore, correlations among these variables were tested with Pearson's correlations and ANOVA. Perceived parental support, perceived motivation, and subjective and objective measures of physical activity were analyzed using paired t-tests.

The results of this study show that parental support could be an effective strategy for improving physical activity levels in children. Children perceived that they received more parental support, were more motivated to be physically active, and perceived themselves as more physically active following a parental support intervention ($p< 0.05$). Actual physical activity levels also significantly increased among children following a parental support intervention. In addition, parents reported that they perceived

themselves to be more supportive in promoting physical activity behaviors in children after the intervention.

In accordance with the proposed HPM model, various personal factors were significantly associated with physical activity levels of children. BMI predicted physical activity levels of the children with significant effects following the intervention ($p< 0.05$), which suggests that the weight status of children affects how much they participate in physical activity after receiving parental support. Possible reasons for BMI affecting physical activity behaviors following parental support should be considered and include that the extent of support a parent provided might depend on how fit or out of shape the parent perceives the child is, depending on the child's weight status. Also, children with higher BMI might have reacted more to the parental support intervention compared to average-weight children, who might already receive extensive parental support on a regular basis. Determining whether children with higher or lower BMI were more active was beyond the scope of this paper but is worth further exploration.

Racial origin also predicted associated physical activity levels of children as measured by accelerometer. In this study, African-American children were significantly more active than Caucasian and Native-American children both before and after the parental support intervention. There were no significant differences in the physical activity levels between Caucasians and Native Americans. This information is important because racial origin could influence the strategies used to provide education to parents to best support these children in physical activity opportunities. Another finding in this study was the significance of age for children's own perceived levels of physical activity. Age was a positive predictor of whether children perceived themselves as more or less

active following a parental support intervention. Parental support measures should be tailored to age-specific strategies to best meet the needs of the child for developing self-efficacy and sustaining behaviors of physical activity participation.

Another significant ($p < 0.05$) effect in this study regarded parent-perceived support and children's perceived level of physical activity. Before the parental support intervention, parent-perceived support and children's perceived physical activity levels correlated significantly, but this correlation no longer existed following the parental support intervention. Possible inferences to consider include that parents perceived themselves to be fairly supportive before the parental support intervention compared to the lower levels of perceived physical activity the children felt they engaged in. Also, once the parental support intervention was implemented, parents possibly felt that they were more supportive than the children perceived themselves as more active.

Recommendations

Based on the findings and conclusions resulting from this study, recommendations can be made for nursing education, practice, research, and policy development.

Nursing Education

The results of this study indicate that nursing has a major role in providing education to parents regarding support strategies for increasing physical activity levels in children. With the continued rise in obesity and obesity-related health disparities, it is important that nurses provide education to parents that relates to obesity and its health consequences, the benefits of physical activity, and support strategies to promote and motivate physical activity behaviors in children. In addition, nursing must focus on

understanding the importance of communicating to parents about the benefits of physical activity, methods of support, and the importance of identifying what motivates their child to initiate behavioral choices. Parental support strategies to increase physical activity levels in children have advanced significantly over the past decade. Despite the growing efforts to improve physical activity levels in children, however, obesity rates continue to rise, and physical activity levels continue to decline. Parents need to be educated and assisted with supportive strategies through obesity-prevention programs and physical activity interventions to increase their awareness of support and role modeling for children, facilitating positive parenting practices regarding health promotion, and building healthier home environments and community physical activity participation.

For nurses to have an active role advocating for parents through provision of parental education, nurses themselves require education in undergraduate programs continuing education and other educational opportunities when they are in practice as new information evolves. Nurses need to be knowledgeable regarding the changes in physical activity guidelines and the latest effective support strategies, as well as determine what methods are most successful according to the population. Education for parents should be child age and gender specific. In communicating with parents, nurses should stress that physical activity is important for preventing diabetes and improving cardiovascular health and mental well-being, and not only for weight management. Parents of children of healthy weight may not see the importance of physical activity promotion and assume that their children engage in enough physical activity based on weight status, thus failing to promote increases in physical activity.

Nursing Practice

Nursing is well informed about the prevalence of obesity and problems with cardiovascular and metabolic diseases in children as well as the steady decline of physical activity behaviors in children. These children are the future leaders in our own communities and professions. The failure of children to meet physical activity recommended guidelines is partly because of the lack of evidence on concrete methods that parents can use to support their children in physical activity behaviors. Interventions need to be tailored individually based on whether a rural or urban community is the focus, as well as being age and gender specific. The BMI of children should also be considered when developing support strategies because it affects how children physically react to their perceived support for activity.

Community settings. Nurses can work with families in community settings on educating about physical activity benefits and evidence-based support strategies to facilitate movement toward more active lifestyle choices. It is important to emphasize to parents the variety of ways that they can be supportive agents including encouragement, praise, observation, transportation, and participation. Children should be involved with physical activity opportunities supported by parents offering choices and noncompetitive activities. Parents should be supported by receiving valuable information on perceived barriers and motivators that hinder or encourage physical activity.

Physical activity influences. Exploring any phenomenon in isolation does not provide a comprehensive picture of a health-related problem. Children have multiple areas of influence including home, community, and school, in addition to several supportive agents including parents, peers, and teachers. Families, peers, and healthcare

providers are important sources of interpersonal influence that can increase or decrease a child's engagement in physical activity. Therefore, the focus of support strategies should be broad, community based and multifaceted to meet the children's needs in the home, school, and community settings.

This study explored the effect of parental support on physical activity levels in children in terms of perceived physical activity, parental support, and motivation as well as actual physical activity levels. The findings potentially provide an evidence background for promotion of further understanding of how parental support affects perceived support and motivation as well as physical activity levels of children. Therefore, this study adds to knowledge development for implementation of nursing interventions in practice.

Education. In addition, provision of parental support education can have a positive impact on parents' ability to communicate with their children and transform their environment with interactive patterns of physical activity encouragement that will influence behavior change. Nursing can take an active role in using the information from this study and previous research to evaluate future parental support intervention strategies.

This study highlighted the importance of perceived parental support not only from children, but also from parents. This strategy is important in understanding parental awareness of their extent of support given for physical activities. Before future interventions can be initiated, obtaining a knowledge and awareness assessment of how parents perceive their extent of support for physical activity, their understanding of the

benefits of physical activity, and consequences of sedentary behaviors despite weight status should be further explored.

Further development. Despite the lack of strong correlations between physical activity levels and perceived motivation and support, significant changes in perception of support, motivation, and physical activity levels were detected following the parental support intervention. This finding has the potential to promote the development of innovative strategies designed to facilitate parents in supporting physical activity behaviors and motivating children to participate in these health-promoting behaviors. Multidimensional approaches are needed when designing parental support strategies for physical activity to increase perceptions of health benefits and decrease barriers at home, school, and after school programs. An example of one such strategy is a wellness program directed by nursing that reaches out to children in community settings beyond the boundaries of school. These programs could be organized through interactive sessions that involve parents in community-based settings.

Holistic approach. BMI and race strongly predicted total physical activity following a parental support intervention, suggesting that the individualized needs of children should be considered. Each child should be supported and encouraged in the physical activities that suite their needs. A holistic approach to improving physical activity levels in children includes implementation of time management after school hours, parent role modeling, continuous feedback, and implementing strategies that instill intrinsic motivation for physical activity.

Advancing practice. Nurses in practice can become actively involved in promoting research and evaluation of current parental support measures on physical

activity levels in children. The CDC recommends that children participate in at least 60 minutes of MVPA on most days of the week (CDC, Physical Activity, 2011). This criterion remains valid today and could be used to evaluate the success of new parental support programs. Criteria for future practice implementation are that: (a) parental support measures must lead to an improvement in the end result, which includes increased physical activity from the child's baseline and maintenance of healthy weight trends; (b) the effectiveness of parental support strategies must be determined through clinical trials before addition to physical activity programs; (c) health services must be available to children because of the association of MVPA with maintaining cardio-metabolic health, and supporting strategies for physical activity including potential physical injury and emotional distress; (d) the cost benefit and cost effectiveness of clinical trials, educational programs, and objective measuring tools must be identified for the development of the necessary therapeutic and prevention services; (e) the incidence, distribution, severity, and alternate approaches to detection and prevention of low physical activity levels must be known; (f) the cost, sensitivity, specificity, and acceptability of the parental support measures must be known, and strategies that promote extrinsic and intrinsic motivation in children to be physically active should be known; and (g) the end result for both parent and child must be of greater benefit than any risk factors for participating in regular physical activity.

An additional focus area of a parental support program to be evaluated is the effectiveness of parental education related to perceived parental support and actual physical activity levels and the inclusion of child-perceived parental support, which is associated with increased motivation to be physically active. This researcher believes,

similarly to Bentley et al. (2012) that an effective education program can help inform parents of current CDC-recommended physical activity guidelines and how children can meet these goals with parental support. This aim can be achieved partly by educating parents about ways to teach their children basic, age-appropriate physical activity skills.

Evaluation of parent perceptions. Nursing also needs to evaluate the current status of parents' perception of the education they receive regarding parental support for facilitating motivation, competence, and enjoyment in children to increase physical activity levels. Nursing, in the educative-supportive role, is in a position to work with parents to provide the necessary education to prepare them for possible support and physical activity barriers and to help minimize the effect of these barriers. Therefore, it is critical to evaluate children's perceived parental support and perceived motivation to be physically active and to validate these findings with an objective form of measurement in future experimental studies so that nurses can respond to the findings and meet the educational needs of parents.

Nursing Research

There are several gaps in understanding of the effects of parental support on physical activity levels in children that need additional research. Gaps in understanding in this area of study include lack of qualitative research studies focused on parental perceptions of the support they provide and how the gaps relate to children's motivation for physical activity, parental support interventions, perceived barriers to support, and evaluation of various parental support mechanisms. Several issues with parental support program implementation remain unclear. Validating findings with objective feedback may have a significant effect on education and community organization policies as well

as on pedagogical and parenting practices by raising awareness in parents, educators, and community leaders of the importance of parental involvement in implementing physical activity programs. Limitations that affect generalizability of the findings suggest the need for further studies that objectively delineate these findings. This study could be replicated in larger populations and urban communities, with children of different age, race, or weight status, to address parental support and their perceived support and motivation for exercise over a longer period of time. A similar approach can be used to study only boys or girls, associating effects specifically with variable BMI categories, or to evaluate specific strategies of parental support to determine which are most effective. Evaluating the effects of socioeconomic status on parental support and physical activity in children is beyond the scope of this paper, but previous research has identified its effects on physical activity levels in children, and further exploration is recommended.

Some other areas for nursing research regarding effects of parental support on physical activity levels in children include analyzing differences in fathers' and mothers' perceptions of supportive behaviors and implementing intervention-based studies to determine which social support measures are most promising for each parent. Knowing the history of how parents were supported as children might bring to light how they currently support their children in physical activities. An effective education program can help parents be prepared to provide various supportive methods at home and in the community. Interventions may also be designed to determine the relationship between parental support and physical activity levels of children over a longer time period, with follow-up assessments to determine the sustainability of support behaviors and physical

activity levels, or during different seasons to study how weather might possibly affect support efforts, motivation, and objectively measured physical activity.

Intervention studies are lacking concerning parent support of children's physical activity. Most are descriptive, correlation studies with no objective form of measurement otherwise most intervention-based research has focused on school-based settings. To minimize the effects of self-report measures only, more research should continue to use both subjective and objective measures of physical activity in intervention-based studies. Research into parental support effects on physical activity levels of children should progress to experimental designs in which interventional programs can be implemented to improve children's health-promoting behaviors. In addition, a key area for further research is distinguishing which among the methods of support motivate children most to participate in physical activity.

Policy Development

Population focused. Because many children in the United States fail to meet CDC-recommended physical activity guidelines, inactivity needs to be considered as a critical public health problem. Next to balanced nutrition, physical activity is essential to preventing obesity and obesity-related diseases in children. Parental support interventions should be conceptualized on a population basis because focusing on individuals or small groups is less inclined to bring about population-wide change. Institutions that promote health have long endorsed the value of policy intervention. For example, the American Academy of Pediatrics reported that physical activity must be a lifelong conscious decision, and that healthcare professionals can assist in this commitment by educating families about why physical activity is important for overall

health as well as providing them information on community physical activity resources (American Academy of Pediatrics, 2006). The Centers for Disease Control and Prevention and the President's Council on physical activity have recognized the importance of physical activity as an essential component of everyday lifestyle. Children should aim for 60 minutes of moderate to vigorous physical activity on most days of the week to prevent obesity and chronic health disease as well as to improve sleep quality and mental wellbeing (CDC, Physical Activity, 2011; President's Council on Fitness, Sports, and Nutrition, 2013).

Physical activity initiatives. Healthy People 2020 stated that physical activity is a leading health indicator and set new goals regarding children, including policies targeting young children through physical activity in childcare settings, limiting television and computer usage, and promoting recess and physical education in public and private elementary schools (Healthy People 2020, 2013). Healthy People 2020's objectives should be incorporated into policy development for improving community settings. They report that for children ages 4 to 12, the most positive indicators for physical activity participation include parental support (Healthy People 2020, 2013).

Environmental changes. Also, environmental influences that are positively associated with physical activity in children include sidewalks, availability of public transportation, and access to neighborhood recreational equipment. Policy development should include the partnership of parents, healthcare providers, and policy-makers to develop settings that promote physical activity. Transportation and access to parks, green space, and school playgrounds and sidewalks on traffic-dense roads will enhance physical activity opportunities (Healthy People 2020, 2013).

Despite published knowledge about the benefits of physical activity, children are still not meeting the recommended guidelines, and obesity prevalence is rising; therefore, policy development is critical for creating supportive environments, strengthening community action, developing parental support skills, and reorienting healthcare practitioners to the need to promote physical activity, educate parents, and work with policy-makers for developing settings conducive to promoting better physical health.

Physical activity planning. The World Health Organization (WHO) (2013) defines physical activity for children as including free play, games, sports, chores, physical education, and planned exercise in varied environmental settings: home, school, and community. The Surgeon General's call to action (2013) suggests planning family activities around physical activity and providing a safe environment for children to run, swim, bike, and play ball sports to enhance physical activity opportunities (U.S. Department of Health and Human Services, Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity, 2013).

Future policy goals. The focus of policy development should be on providing safe environments for children and families to be active, and to assess availability of local transportation, sidewalk development, and access to built behavioral settings such as sports fields, gymnasiums, health clubs, and bike trails. The public must support policy interventions to be successful; therefore, healthcare providers should encourage parents to become involved in change through surveys to gauge the public's opinion on policy changes regarding physical activity opportunities in local communities. Incentive programs for physical activity should be advertised through a variety of media, targeting incentive programs for families to use vehicles less and person-powered transportation

more, and supporting physical activity environments by funding more walking and bike trails, parks, and recreational organizations that target physical activity promotion.

Conclusion

The support that parents provide their children in promoting physical activity can have a significant and positive effect on the lives of many children and families. The goal of physical activity participation is to maximize children's self-efficacy, which can be enhanced through parental support to help children meet CDC-recommended physical activity guidelines. It is critical that nursing take a more active role in ensuring that this vulnerable population of children is given every opportunity to be successful in engaging in health-promoting behaviors. Parents need education regarding the benefits of physical activity, the consequences of inactivity, how best to motivate children for physical activity, and ways to provide support that will help improve physical activity levels. Nurses should inform parents that physical activity should be fun, offer a variety of choices, make it noncompetitive, and encourage behavior with positive feedback.

Nursing can provide parents with the education they need to become more effective as support agents for physical activity for their children. The knowledge resulting from this study provides nursing with insight into how the profession can be more effective in meeting the educational needs of parents related to support, motivation, and physical activity for children and yields recommendations for nursing education, practice, research, and policy development in this research area.

APPENDICES

Appendix A
PAQ-C Questionnaire

Physical Activity Questionnaire (Elementary School)

Name:_____ Age:_____

Sex: M_____ F_____ Grade:_____

Teacher:_____

We are trying to find out about your level of physical activity from *the last 7 days* (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

Remember:
1. There are no right and wrong answers — this is not a test.
2. Please answer all the questions as honestly and accurately as you can — this is very important.

---

1. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? (Mark only one circle per row.)

	No	1-2	3-4	5-6	7 times or more
Skipping	○	○	○	○	○
Rowing/canoeing	○	○	○	○	○
In-line skating	○	○	○	○	○
Tag	○	○	○	○	○
Walking for exercise	○	○	○	○	○
Bicycling	○	○	○	○	○
Jogging or running	○	○	○	○	○
Aerobics	○	○	○	○	○
Swimming	○	○	○	○	○
Baseball, softball	○	○	○	○	○
Dance	○	○	○	○	○
Football	○	○	○	○	○
Badminton	○	○	○	○	○
Skateboarding	○	○	○	○	○
Soccer	○	○	○	○	○
Street hockey	○	○	○	○	○
Volleyball	○	○	○	○	○
Floor hockey	○	○	○	○	○
Basketball	○	○	○	○	○
Ice skating	○	○	○	○	○
Cross-country skiing	○	○	○	○	○
Ice hockey/ringette	○	○	○	○	○
Other:					
_____	○	○	○	○	○
_____	○	○	○	○	○

2. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only.)

- I don't do PE ○
- Hardly ever ○
- Sometimes ○
- Quite often ○
- Always ○

3. In the last 7 days, what did you do most of the time *at recess*? (Check one only.)

- Sat down (talking, reading, doing schoolwork) ○
- Stood around or walked around ○
- Ran or played a little bit ○
- Ran around and played quite a bit ○
- Ran and played hard most of the time ○

4. In the last 7 days, what did you normally do *at lunch* (besides eating lunch)? (Check one only.)

- Sat down (talking, reading, doing schoolwork) ○
- Stood around or walked around ○
- Ran or played a little bit ○
- Ran around and played quite a bit ○
- Ran and played hard most of the time ○

5. In the last 7 days, on how many days *right after school*, did you do sports, dance, or play games in which you were very active? (Check one only.)

- None ○
- 1 time last week ○
- 2 or 3 times last week ○
- 4 times last week ○
- 5 times last week ○

6. In the last 7 days, on how many *evenings* did you do sports, dance, or play games in which you were very active? (Check one only.)

- None ○
- 1 time last week ○
- 2 or 3 times last week ○
- 4 or 5 last week ○
- 6 or 7 times last week ○

7. *On the last weekend*, how many times did you do sports, dance, or play games in which you were very active? (Check one only.)

None ..... O
1 time ..... O
2 — 3 times ..... O
4 — 5 times ..... O
6 or more times ..... O

8. Which *one* of the following describes you best for the last 7 days? Read *all five* statements before deciding on the *one* answer that describes you.

A. All or most of my free time was spent doing things that involve little physical effort ..... O

B. I sometimes (1 — 2 times last week) did physical things in my free time (e.g. played sports, went running, swimming, bike riding, did aerobics) ..... O

C. I often (3 — 4 times last week) did physical things in my free time ..... O

D. I quite often (5 — 6 times last week) did physical things in my free time ..... O

E. I very often (7 or more times last week) did physical things in my free time ..... O

9. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

	None	Little bit	Medium	Often	Very often
Monday	O	O	O	O	O
Tuesday	O	O	O	O	O
Wednesday	O	O	O	O	O
Thursday	O	O	O	O	O
Friday	O	O	O	O	O
Saturday	O	O	O	O	O
Sunday	O	O	O	O	O

10. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

Yes ..... O
No ..... O

If Yes, what prevented you? _____

Reference:

The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A)

Kowalski, K., Crocker, P., & Donen, R. The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) Manual. College of Kinesiology, University of Saskatchewan.

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Appendix B
Social Support for Exercise Survey

P7. **DURING A TYPICAL WEEK, how often has a member of your household:**
(For example, your father, mother, brother, sister, grandparent, or other relative)

		None	Once	Sometimes	Almost every day	Every day
A.	**Encouraged you** to do physical activities or play sports?	0○	1○	2○	3○	4○
B.	Done a physical activity or played sports **with you**?	0○	1○	2○	3○	4○
C.	**Provided transportation** to a place where you can do physical activities or play sports?	0○	1○	2○	3○	4○
D.	**Watched you** participate in physical activities or sports?	0○	1○	2○	3○	4○
E.	**Told you** that you are doing well in physical activities or sports?	0○	1○	2○	3○	4○

Appendix C
Physical Activity Motivation Scale

Directions:

Read each sentence. Fill in the circle of the answer that describes YOU. Being active means that you play active games or sports, exercise, run or walk fast so that you breathe faster.

1) RM01- I am excited about being active on most days

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

2) RM02- It is important to be active every day

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

3) RM03- I get into being active on most days

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

4) RM04- I make sure I get plenty of activity each day

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

5) RM05- I do not care about being active on most days (reverse scored)

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

6) RM06- I plan how I can be active every day

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

7) RM07- Being active is important to me

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

8) RM08- I get excited about being active everyday

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

9) RM09- I am not interested in being active (reverse scored)

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

10) RM10- I get into it when I am active every day

NOT LIKE ME A LITTLE LIKE ME A LOT LIKE ME

(Wilson et al., 2002; Wilson et al., 2005)

Appendix D
Amherst Health and Activity Adult Survey

HOUSEHOLD INFLUENCES

During a typical week, how often has a member of your household:
(CIRCLE ONE NUMBER FOR EACH TYPE OF PERSON)

	None	Once	Sometimes	Almost daily	Daily	Don't know	Not applicable
Q27. Encouraged this child to do physical activities or play sports?							
A. Male adult(s)	0	1	2	3	4	5	6
B. Female adult(s)	0	1	2	3	4	5	6
C. Other children	0		2	3	4	5	6
Q28. Done a physical activity or played sports with this child?							
A. Male adult(s)	0	1	2	3	4	5	6
B. Female adult(s)	0	1	2	3	4	5	6
C. Other children	0	1	2	3	4	5	6
Q29. Provided transportation so this child can go to a place where he or she can do physical activities or play sports?							
A. Male adult(s)	0	1	2	3	4	5	6
B. Female adult(s)	0	1	2	3	4	5	6
C. Other children	0	1	2	3	4	5	6
Q30. Watched this child participate in physical activities or sports?							
A. Male adult(s)	0		2	3	4	5	6
B. Female adult(s)	0	1	2	3	4	5	6
C. Other children	0	1	2	3	4	5	6
Q31. Told this child that physical activity is good for his or her health?							
A. Male adult(s)	0		2	3	4	5	6
B. Female adult(s)	0		2	3	4	5	6
C. Other children	0	1	2	3	4	5	6

Q32. How important is it to adults in your household that this child is good at sports and physical activities?
(CIRCLE ONE NUMBER FOR EACH TYPE OF PERSON)

	Very unimportant	Somewhat unimportant	Neutral	Somewhat important	Very important	Not Applicable
A. Male adult(s)	1	2	3	4	5	6
B. Female adult(s)	1	2	3	4	5	6

Q33. How much do the adults in your family enjoy physical activity or exercise?
(CIRCLE ONE NUMBER FOR EACH TYPE OF PERSON)

	Not enjoyable	A little enjoyable	Not sure	Somewhat enjoyable	Very enjoyable	Not Applicable
A. Male adult(s)		2	3	4	5	6
B. Female adult(s)		2	3	4	5	6

Appendix D

Amherst Health and Activity Adult Survey

General Information about this child:

Q1. What is this child's birthday?

Q2. What is this child's gender?

Q3. What is this child's height?

Q4. What is this child's weight?

Q5. Does this child have any physical limitations that limit his or her exercise?

Q6. How do you identify your child's racial or ethnic background

1. Asian/Pacific Islander
2. Black/African American
3. Native American Indian
4. Latino/Hispanic
5. White
6. Multi-racial/Multi-ethnic

Appendix E
Flyer for Recruitment

Fun on your Feet, Fitness for Life!

Join in the fun! Be a part of a study to get your moves on!!!

Kids we need you! Ages 8 to 12 to participate

*****Wear a cool watch that records all your moves!*****

***8 day study*-Two 4-day periods (Tuesday-Friday)**

Wear a watch and fill out a survey

FREE Jump Rope

FREE Snacks at sign up!

$10 for child & parent at completion

Appendix F
IRB Approval

UNIVERSITY OF UND NORTH DAKOTA

INSTITUTIONAL REVIEW BOARD
c/o RESEARCH DEVELOPMENT AND COMPLIANCE
DIVISION OF RESEARCH
TWAMLEY HALL ROOM 106
264 CENTENNIAL DRIVE STOP 7134
GRAND FORKS ND 58202-7134
(701) 777-4279
FAX (701) 777-6708

August 3, 2012

Julie Caspers
2709 Birchmont Drive NE
Bemidji, MN 56601

Dear Ms. Caspers:

We are pleased to inform you that your project titled, "Effects of Parental Support on Physical Activity Levels in Children" (IRB-201208-021) has been reviewed and approved by the University of North Dakota Institutional Review Board (IRB). The expiration date of this approval is August 8, 2013. Your project cannot continue beyond this date without an approved Research Project Review and Progress Report.

As principal investigator for a study involving human participants, you assume certain responsibilities to the University of North Dakota and the UND IRB. Specifically, an unanticipated problem or adverse event occurring in the course of the research project must be reported within 5 days to the IRB Chairperson or the IRB office by submitting an Unanticipated Problem/Adverse Event Form. Any changes to or departures from the Protocol or Consent Forms must receive IRB approval prior to being implemented (except where necessary to eliminate apparent immediate hazards to the subjects or others.)

All Full Board and Expedited proposals must be reviewed at least once a year. Approximately ten months from your initial review date, you will receive a letter stating that approval of your project is about to expire. If a complete Research Project Review and Progress Report is not received as scheduled, your project will be terminated, and you must stop all research procedures, recruitment, enrollment, interventions, data collection, and data analysis. The IRB will not accept future research projects from you until research is current. In order to avoid a discontinuation of IRB approval and possible suspension of your research, the Research Project Review and Progress Report must be returned to the IRB office at least six weeks before the expiration date listed above. If your research, including data analysis, is completed before the expiration date, you must submit a Research Project Termination form to the IRB office so your file can be closed. The required forms are available on the IRB website.

If you have any questions or concerns, please feel free to call me at (701) 777-4279 or e-mail michelle.bowles@research.und.edu.

Sincerely,

Michelle L. Bowles, M.P.A., CIP
IRB Coordinator

MLB/jle

Enclosures

REPORT OF ACTION: EXEMPT/EXPEDITED REVIEW

University of North Dakota Institutional Review Board

Date: 8/6/2012 **Project Number:** IRB-201208-021

Principal Investigator: Caspers, Julie

Department: Nursing

Project Title: Effects of Parental Support on Physical Activity Levels in Children

The above referenced project was reviewed by a designated member for the University's Institutional Review Board on August 9, 2012 and the following action was taken:

☑ Project approved. **Expedited Review** Category No. 4 or 5
Next scheduled review must be before: August 8, 2013
Copies of the attached consent form with the IRB approval stamp dated August 9, 2012 **must be used in obtaining consent for this study.**

☐ Project approved. **Exempt Review** Category No. _____
This approval is valid until _____ as long as approved procedures are followed. No periodic review scheduled unless so stated in the Remarks Section.

☐ **Copies of the attached consent form with the IRB approval stamp dated** _____ **must be used in obtaining consent for this study.**

☐ Minor modifications required. The required corrections/additions must be submitted to RDC for review and approval. **This study may NOT be started UNTIL final IRB approval has been received.**

☐ Project approval **deferred. This study may not be started until final IRB approval has been received.** (See Remarks Section for further information.)

☐ Disapproved claim of exemption. This project requires Expedited or Full Board review. The Human Subjects Review Form must be filled out and submitted to the IRB for review.

☐ Proposed project is not human subject research and does not require IRB review.
☐ Not Research ☐ Not Human Subject

PLEASE NOTE: Requested revisions for student proposals MUST include adviser's signature. All revisions MUST be highlighted.

☒ Education Requirements Completed. (Project cannot be started until IRB education requirements are met.)

1. Please notify IRB if there is a proposal change of funding is received
2. Review consent forms to see where you could adjust the reading level

cc: Lindseth, Glenda

Signature of Designated IRB Member — Date 8-9-12
UND's Institutional Review Board

If the proposed project (clinical medical) is to be part of a research activity funded by a Federal Agency, a special assurance statement or a completed 310 Form may be required. Contact RDC to obtain the required documents.

(Revised 10/2006)

COLLEGE OF NURSING
NURSING BUILDING
430 OXFORD STREET STOP 9025
GRAND FORKS ND 58202-9025
(701) 777-4174
FAX (701) 777-4096

Effects of Parental Support on Physical Activity Levels in Children

Dear Parent:

You and your child are invited to participate in a research study about physical activity levels in children which will be lead by Julie Caspers (College of Nursing). Your participation in this study is voluntary by choosing to do so because you want to. You should read the information below, and ask questions anytime about anything you do not understand, before deciding whether or not to participate.

STATEMENT OF RESEARCH

A person who is to participate in the research must give his or her informed consent to such participation. This means that he or she agrees to be involved in the activities the researcher wants to study. This consent must be based on an understanding of the nature and risks of the research. This document provides information that is important for this understanding. Research projects include only subjects who choose to take part. Please take your time in making your decision as to whether to participate. If you have questions at any time, please ask.

PURPOSE OF THE STUDY

This research study will test how well motivation can increase physical activity (exercise) levels in children. Currently, there is no straight answer in research articles on what is the best way to motivate children to want to exercise more. People who enter this study will be performing different physical activities including walking, biking, jumping rope, dancing, stair climbing, and lawn mowing. Children will be wearing exercise sensing watches one week before the study starts and during the study week to help measure their physical activity (exercise). These watches tell us when your child moves by walking, running, and biking, for example. We will have both parent and child complete questionnaires on how much they feel the child is being physically active and what encourages them to be physically active. This study will enroll 30 child participants from the Boys and Girls Club of Bemidji.

PROCEDURES

Your child is invited to be in a research study about testing what makes children want to be physically active (exercise) in a 4 week-long study. Up to thirty eligible children who agree to be in the study that have parental consent will then participate in the research study this September through October. The researcher will test 10 children at a time until all 30 children are tested. Each group of 10 children will be tested over a 4 week period. The first week, a watch will be put on the child to tell us how much the child spends walking, running, sitting, and moving

around each day while continuing physical activities (exercises) they normally want to do. The next two weeks the child will not wear the watch while still continuing their usual physical activities (exercises), and the last week the child will wear the watch again while receiving encouragement to walk, bike, jump rope, dance, climb steps, or mow lawn. If you and your child are allowed to participate, the researcher will meet with you at a convenient time within the next two weeks. This meeting should take about 60 minutes. At this meeting, the purpose of the project and details for the study will be explained. The nurse researcher will: hand out a questionnaire that will ask the parents to answer questions on whether they encouraged their child to walk or jump rope each day for the past week, for example, will weigh your child and measure his/her height, hand out and help your child complete a questionnaire on how much time they spent doing physical activities during the week including walking, biking, jumping rope, and answer questions on what makes them enjoy and do physical activities, as well as collect information on your child including age, gender, and race.

Your child's activity will be recorded by the exercise sensing watch during a pre study week (baseline) when they do what physical activities (exercises) they normally do and then recorded during the study week when they will do physical activities (exercises) given to him or her by you from the researcher along with encouragement. Results from the exercise sensing watches will then be studied for significant differences in physical activity (exercise) levels at baseline and after the study week is over. Your child will be filling out questionnaires on how much they walk, run, jump rope, or dance, for example as well as what makes them want to be physically active (exercise). The children's questionnaire takes about 10 minutes each to fill out. You will be filling out a parental questionnaire at baseline (pre-study) and after the study week is completed asking whether you encouraged the child to exercise by walking, biking, or jumping rope, for example. The parental questionnaire takes about 15 minutes to fill out. The results of these questionnaires will be compared to the results from the exercise sensing watches pre study (baseline) and after the study is completed.

Your child will be wearing an exercise sensing watch during both the baseline (pre-study) week (Tuesday through Friday) and study week (Tuesday through Friday). There will be a two week wash out period in between that your child will not wear the exercise sensing watch and will continue their usual physical activity (exercise) routines without the parent encouraging them to exercise. An exercise sensing watch (Actical) is a portable, electronic device worn on the wrist that tells us when your child moves by walking, running, and biking, for example, each day. During the baseline week of the study, children will be wearing the exercise sensing watches and carry on with their usual habits of physical activity (exercise). You will be asked to avoid encouraging or supporting any physical activity (exercise) behaviors. During the study week, the researcher will hand out a recipe card with a list of physical activities equal in level to each other to support your child to participate in including jumping rope 10 minutes, walking briskly 20 minutes, riding a bike 14 minutes, climbing stairs 13 minutes, dancing 20 minutes, and lawn mowing 30 minutes. You are to encourage your child to participate in one of these options daily through the study week (Tuesday – Friday). The exercise sensing watches will be placed on the

child by the researcher at the beginning of the baseline week (pre-study) and children will be told to not take off the watches until the researcher does so at the end of the week. The researcher will again place the exercise sensing watch on the child at the beginning of the study week and take them off the child at the end of the week. Your child will be told to not try to play with or damage the watch during the study.

POTENTIAL RISKS AND DISCOMFORTS

It is expected that there will be minimal to no risk for your child to participate in this study. Participating in any type of physical activity (exercise) could potentially result in injury including sprain, muscle strain, potential for falling and local bruising or abrasions due to falling, tripping, or misuse of physical activity equipment. Children will be repeatedly asked to report any discomfort, pain, or injury immediately to their parent and the researcher and will be asked to visit their doctor. They could possibly be dropped out from the study depending how bad an injury occurs. Access to study information will be limited to the researcher and people who oversee IRB procedures to prevent a possible break in confidentiality of medical/health related information. Break of confidentiality will also be minimized by labeling motion recording watches and questionnaires with a code number. The master list of subjects' names and numbers will be kept in a locked file in the researcher's home office. Only the nurse researcher (Julie Caspers) will have access to the master list that will have the coding numbers for the master list of subjects.

ANTICIPATED COMPENSATION TO SUBJECTS

For participation in this research study, you will receive a $5 gift card to Walmart for completion of the study. Your child will also receive a $5 gift card to Walmart for participating in the study. These gifts are payment for you and your child's participation time in the study, inconvenience, and as an expression of appreciation for contributing to science. Other than the payment specified and stated in this consent form, there is no other compensation for you or your child's participation in this research.

CONFIDENTIALITY

Your consent form and your child's assent form will be coded and held in a locked file in the researcher's home office for four years after the study is completed. After four years, the consent and assent forms and questionnaires will be shredded. This information will not become part of the Boys and Girls club records. Information cannot be shared with the employees or volunteers at the Boys and Girls club and will not affect their enrollment. With your consent, your child's age, race, gender, height, weight, and questionnaire results will be recorded for the study with total confidentiality. Your name would not be put on the questionnaire. Only the researcher and the University of North Dakota Human Subjects Review Board will have access to the study's identifying information. This information will not be shared individually, but only as grouped

data. Consent and assent forms will be separated from the questionnaires and locked in separate files from study information. All information obtained in the study is confidential.

PARTICIPATION AND WITHDRAWAL

If you and/or your child should decide to discontinue participation in this study, you are free to drop out at any point. Participation is voluntary. It is your choice on whether your child can be a part of this study. However, information we have collected as a result of your participation before you and your child leave this study may still be used. This information will only be reported as "grouped" results so that you or your child can not be identified as a single study participant.

WITHDRAWAL OF PARTICIPATION BY THE INVESTIGATOR

The investigator may withdraw your child from participating in this research if circumstances come about which make it necessary in doing so. If he/she becomes ill during the research, he/she may have to drop out, even if he/she would like to continue; or if it is determined that you are not giving your best effort in completing study tasks. The investigator will make the decision and let you know if it is not possible to continue. The decision may be made either to protect your child's health and safety, or because it is part of the research plan that people who develop certain conditions may not continue to participate.

NEW FINDINGS

During the course of the study, you will be informed of any significant new findings (either good or bad), such as changes in the risks or benefits resulting from your child's participation in the research or new ways of participation, that might cause you to change your mind about continuing in the study. If new information is provided to you, your consent and your child's assent to continue participating in this study will be re-obtained.

RIGHTS OF RESEARCH SUBJECTS/ IDENTIFICATION OF INVESTIGATORS

The researcher conducting this study is Julie Caspers. You may ask any questions you have now. If you later have questions, concerns, or complaints about the research please contact the researcher (Julie Caspers) at (218) 556-1336 during the day and after hours or the researcher's advisor Dr. Glenda Lindseth at (701) 777-4506.

If you have questions regarding your rights as a research subject, or if you have any concerns or complaints about the research, you may contact the University of North Dakota Institutional Review Board at (701) 777-4279. Please call this number if you cannot reach research staff, or you wish to talk with someone else.

IRB APPROVED

AUG 9 2012

SIGNATURE OF RESEARCH PARTICIPANT

I have read the information provided above. I have been given an opportunity to ask questions and all of my questions have been answered to my satisfaction. I have been given a copy of this form.

_____

Name of Subject's Parent/ Guardian (Please print)

_____

Signature of Subject's Parent/Guardian Date

_____

Permanent Address of Subject's Parent/Guardian

SIGNATURE OF WITNESS

My signature as witness certifies that the subject signed this consent form in my presence as his/her voluntary act and deed.

_____

Name of Witness

_____

Signature of Witness Date (same as subjects')

IRB APPROVED

AUG 9 2012

University of North Dakota
Research Development & Compliance

5

RESEARCH PROJECT TERMINATION FORM
University of North Dakota Institutional Review Board

This form is submitted for a **concluded or cancelled** research project that was previously approved by the University of North Dakota Institutional Review Board. This form should be completed after data analysis has concluded. The completed form should be returned to **IRB, Room 105 Twamley, 264 Centennial Drive Stop 7134, Grand Forks, ND 58202-7134.**

Date: _____ Project Number: _____

Principal Investigator(s) _____ Department/ College: _____

Current Address: _____

Project Title: _____

_____

Human subjects involved in the activity:

☐ Abortuses ☐ Adults (18 and over) ☐ Cognitively Impaired ☐ Prisoners

☐ Fetuses ☐ Children (age[s]_____) ☐ Mentally Ill ☐ Pregnant Women

This project was last reviewed and approved by UND's IRB on _____ (Date).

☐ **Project completed:** Summarize the results of the research or submit a reprint of research finding(s), if published, and indicate number of subjects below:

☐ **Project has not been/will not be completed:** No further work will proceed under this project number for the following reason(s):

☐ Research will continue under another project title(s)/number(s); reporting is no longer necessary for this project title(s)/number(s). Please list new project number(s): _____

☐ Project director has left the University of North Dakota. Any existing subject consent materials are filed at (location) _____

_____

☐ Project never funded. No subjects were recruited.

☐ Other (please list): _____

_____

The total number of subjects studied from _____ (Original Approval Date) **to** _____ (Termination Date) **was** _____.

_____ _____
Signature of Principal Investigator Date

IRB USE ONLY Approved _____ Not Approved _____
Comments:

Signature of Reviewer, IRB: _____ Date: _____

Appendix G
Boys and Girls Club Approval Letter

BOYS & GIRLS CLUB
OF THE BEMIDJI AREA
"The Positive Place for Kids"
www.bgcbemidji.com

July 20, 2012

Boys & Girls Club of the Bemidji Area
1600 Minnesota Ave NW - P.O. Box 91 - Bemidji, MN 56619-0191
218-444-4171 • Fax 218-444-0870

To whom it may concern;

It is with excitement that the Boys & Girls Club of the Bemidji Area (BGCBA) welcomes Ms. Julie Caspers, Sanford Health RN and UND student, to join our fall youth programming.

We understand Ms. Caspers will conduct her research program, "Effects of Parental Support on Physical Activity Levels in Children", over a six week period with willing Club parents/guardians and members.

Ms. Caspers has requested approval (which has been granted) to present her program during an August family-friendly event that includes both Club members and parents. She may ask for Club member and parent participation and then ask parents/guardians to complete a consent form for their child to participate in the study. For those interested, Ms. Caspers will gather baseline data (questionnaires, height/weight and pedometer/accelerometer counts.)

BGCBA agrees to:

- Collaborate and cooperate with Ms. Caspers project during the Fall of 2012
- Assist her in identifying the number and type of Club members/parents to participate, although we will not force any individuals to participate, therefore we hold no guarantee on the number/type participating.
- Allow her time during a family/friendly event to share information about her project
- Allow Ms. Caspers time during a 6-week window to gather information from participants and interact with their corresponding parents, using one week for baseline, two weeks for washout, then one week intervention for each of the three groups (with the goal of 10 participants in each group.)
- Assist Ms. Caspers in communicating with participants and parents
- Allow Ms. Caspers to provide program incentives to participants and parents.
- Allow Ms. Caspers, free of charge, to conduct her program.

We look forward to our partnership and the outcomes of Ms. Casper's program.

If you have any questions or comments, please feel free to contact me.

Respectfully,

Andrea Ohnstad

Andrea Ohnstad
Executive Director
Boys & Girls Club of the Bemidji Area
aohnstad@paulbunyan.net
218.444.4171 ext. 108

Appendix H
Parental Consent Form

UNIVERSITY OF UND NORTH DAKOTA

COLLEGE OF NURSING
NURSING/PHARMACY BUILDING
430 OXFORD STREET STOP 9025
GRAND FORKS ND 58202 9025
(701) 777 4174
FAX (701) 777-4008

INFORMED CONSENT

Effects of Parental Support on Physical Activity Levels in Children

Dear Parent:

You and your child are invited to participate in a research study about physical activity levels in children which will be lead by Julie Caspers (College of Nursing). Your participation in this study is voluntary by choosing to do so because you want to. You should read the information below, and ask questions about anything you do not understand, before deciding whether or not to participate.

STATEMENT OF RESEARCH

A person who is to participate in the research must give his or her informed consent to such participation. This means that he or she agrees to be involved in the activities the researcher wants to study. This consent must be based on an understanding of the nature and risks of the research. This document provides information that is important for this understanding. Research projects include only subjects who choose to take part. Please take your time in making your decisions as to whether to participate. If you have questions at any time, please ask.

PURPOSE OF THE STUDY

This research study will test how well motivation can increase physical activity (exercise) levels in children. Currently, there is no straight answer in research articles on what is the best way to motivate children to want to exercise more. People who enter this study will be performing different physical activities including walking, biking, jumping rope, dancing, stair climbing, and lawn mowing. Children will be wearing exercise sensing watches one week before the study starts and during the study week to help measure their physical activity (exercise). These watches tell us when your child moves by walking, running, and biking, for example. We will have both parent and child complete questionnaires on how much they feel the child is being physically active and what encourages them to be physically active. This study will enroll 30 child participants from the Boys and Girls Club of Bemidji.

PROCEDURES

Your child is invited to be in a research study about testing what makes children want to be physically active (exercise) in a 4 week-long study. Up to thirty eligible children who agree to be in the study that have parental consent will then participate in the research study this September through October. The researcher will test 10 children at a time until all 30 children are tested. Each group of 10 children will be tested over a 4 week period. The first week, a watch will be put on the child to tell us how much the child spends walking, running, sitting, and moving

around each day while continuing physical activities (exercise) they normally want to do. The next two weeks the child will not wear the watch while still continuing their usual physical activities (exercises), and the last week the child will wear the watch again while receiving encouragement to walk, bike, jump rope, dance, climb steps, or mow lawn. If you and your child are allowed to participate, the researcher will meet with you at a convenient time within the next two weeks. This meeting should take approximately 60 minutes. At this meeting, the purpose of the project and details for the study will be explained. The nurse researcher will: hand out a questionnaire that will ask the parents to answer questions on whether they encouraged their child to walk or jump rope each day for the past week, for example, will weigh your child and measure his/her height, hand out and help your child complete a questionnaire on how much time they spent doing physical activities during the week including walking, biking, jumping rope, and answer questions on what makes them enjoy and do physical activities, as well as collect information on your child including age, gender, and race.

Your child's activity will be recorded by the exercise sensing watch during a pre study week (baseline) when they do what physical activities (exercises) they normally do and then recorded during the study week when they will do physical activities (exercises) given to him or her by you from the researcher along with encouragement. Results from the exercise sensing watches will then be studied for significant differences in physical activity (exercise) levels at baseline and after the study week is over. Your child will be filling out questionnaires on how much they walk, run, jump rope, or dance, for example as well as what makes them want to be physically active (exercise). The children's questionnaire takes about 10 minutes each to fill out. You will be filling out a parental questionnaire at baseline (pre-study) and after the study week is completed asking whether you encouraged the child to exercise by walking, biking, or jumping rope, for example. The parental questionnaire takes about 15 minutes to fill out. The results of these questionnaires will be compared to the results from the exercise sensing watches pre study (baseline) and after the study is completed.

Your child will be wearing an exercise sensing watch during both the baseline (pre-study) week (Tuesday through Friday) and study week (Tuesday through Friday). There will be a two week wash out period in between that your child will not wear the exercise sensing watch and will continue their usual physical activity (exercise) routines without the parent encouraging them to exercise. An exercise sensing watch (Actical) is a portable, electronic devise worn on the wrist that tells us when your child moves by walking, running, and biking, for example, each day. During the baseline week of the study, children will be wearing the exercise sensing watch and carry on with their usual habits of physical activity (exercise). You will be asked to avoid encouraging or supporting any physical activity (exercise) behaviors. During the study week, the researcher will hand out a recipe card with a list of physical activities equal in level to each other to support your child to participate in including jumping rope 10 minutes, walking briskly 20 minutes, riding a bike 14 minutes, climbing stairs 13 minutes, dancing 20 minutes, and lawn mowing 30 minutes. You are to encourage your child to participate in one of these options daily through the study week (Tuesday – Friday). The exercise sensing watches will be placed on the

child by the researcher at the beginning of the baseline week (pre-study) and children will be told to not take off the watches until the researcher does so at the end of the week. The researcher will again place the exercise sensing watch on the child at the beginning of the study week and take them off the child at the end of the week. Your child will be told to not try to play with or damage the watch during the study.

POTENTIAL RISKS AND DISCOMFORTS

It is expected that there will be minimal to no risk for your child to participate in this study. Participating in any type of physical activity (exercise) could potentially result in injury including sprain, muscle strain, potential for falling and local bruising or abrasions due to falling, tripping, or misuse of physical activity equipment. Children will be repeatedly asked to report any discomfort, pain, or injury immediately to their parent and the researcher and will asked to visit their doctor. They could possibly be dropped out from the study depending how bad an injury occurs. Access to study information will be limited to the researcher and people who oversee IRB procedures to prevent a possible break in confidentiality of medical/health related information. Break of confidentiality will also be minimized by labeling motion recording watches and questionnaires with a code number. The master list of subjects' names and numbers will be kept in a locked file in the researcher's home office. Only the nurse researcher (Julie Caspers) will have access to the master list that will have the coding numbers for the master list of subjects.

ANTICIPATED COMPENSATION TO SUBJECTS

For participation in this research study, you will receive a $5 gift card to Walmart for completion of the study. Your child will also receive a $5 gift card to Walmart for participating in the study. These gifts are payment for you and your child's participation time in the study, inconvenience, and as an expression of appreciation for contributing to science. Other than the payment specified and stated in this consent form, there is no other compensation for you or your child's participation in this research.

CONFIDENTIALITY

Your consent form and your child's assent form will be coded and held in a locked file in the researcher's home office for four years after the study is completed. After four years, the consent and assent forms and questionnaires will be shredded. This information will not become part of the Boys and Girls club records. Information cannot be shared with the employees or volunteers at the Boys and Girls club and will not affect their enrollment. With your consent, your child's age, race, gender, height, weight, and questionnaire results will be recorded for the study with total confidentiality. Your name would not be put on the questionnaire. Only the researcher and the University of North Dakota Human Subjects Review Board will have access to the study's identifying information. This information will not be shared individually, but only as grouped

data. Consent and assent forms will be separated from the questionnaires and locked in separate files from study information. All information obtained in the study is confidential.

PARTICIPATION AND WITHDRAWAL

If you and/or your child should decide to discontinue participation in this study, you are free to drop out at any point. Participation is voluntary. It is your choice on whether your child can be a part of this study. However, information we have collected as a result of your participation before you and your child leave this study may still be used. This information will only be reported as "grouped" results so that you or your child can not be identified as a single study participant.

WITHDRAWAL OF PARTICIPATION BY THE INVESTIGATOR

The investigator may withdraw your child from participating in this research if circumstances come about which make it necessary in doing so. If he/she becomes ill during the research, he/she may have to drop out, even if he/she would like to continue; or if it is determined that you are not giving your best effort in completing study tasks. The investigator will make the decision and let you know if it is not possible to continue. The decision may be made either to protect your child's health and safety, or because it is part of the research plan that people who develop certain conditions may not continue to participate.

NEW FINDINGS

During the course of the study, you will be informed of any significant new findings (either good or bad), such as changes in the risks or benefits resulting from your child's participation in the research or new ways of participation, that might cause you to change your mind about continuing in the study. If new information is provided to you, your consent and your child's assent to continue participating in this study will be re-obtained.

RIGHTS OF RESEARCH SUBJECTS/ IDENTIFICATION OF INVESTIGATORS

The researcher conducting this study is Julie Caspers. You may ask any questions you have now. If you later have questions, concerns, or complaints about the research please contact the researcher (Julie Caspers) at (218) 556-1336 during the day and after hours or the researcher's advisor Glenda Lindseth at (701) 777-4506.

If you have questions regarding your rights as a research subject, or if you have any concerns or complaints about the research, you may contact the University of North Dakota Institutional Review Board at (701) 777-4279. Please call this number if you cannot reach research staff, or you wish to talk with someone else.

SIGNATURE OF RESEARCH PARTICIPANT

I have read the information provided above. I have been given an opportunity to ask questions and all of my questions have been answered to my satisfaction. I have been given a copy of this form.

_____

Name of Subject's Parent/ Guardian (Please print)

_____ _____

Signature of Subject's Parent/Guardian Date

Permanent Address of Subject's Parent/Guardian

SIGNATURE OF WITNESS

My signature as witness certifies that the subject signed this consent form in my presence as his/her voluntary act and deed.

_____

Name of Witness

_____ _____

Signature of Witness Date (same as subjects')

Appendix I
Child Assent Form

UNIVERSITY OF UND NORTH DAKOTA

COLLEGE OF NURSING
NURSING RESEARCH
430 OXFORD STREET STOP 9025
GRAND FORKS ND 58202 9025
(701) 777-4174
FAX (701) 777-4008

ASSENT FORM

Project Title: **Effects of Parental Support on Physical Activity Levels in Children**

Investigator: **Julie Caspers**

We are doing a research study about ways to exercise more. A research study is a way to find out about something and learn more about people. If you decide that you want to be part of this study, you will be asked to exercise while you wear a special machine called a pedometer that counts how many steps you take. We are trying to find out if you will exercise more if you feel encouraged by your parents. You will choose a daily exercise from a list given to you that will be 30 minutes or less while you wear your pedometer. You will also be asked to fill out questions that ask you to tell us how much you exercise and if you feel your parents want you to exercise.

Not everyone who takes part in this study will benefit. A benefit means that something good happens to you. We think these benefits might be sleep better, feel stronger, and feel better about yourself and your relationship with your parents.

When we are finished with this study we will write a report about what was learned. This report will not include your name or that you were in the study.

You do not have to be in this study if you do not want to be. If you decide to stop after we begin, that's okay too. Your parents know about the study too.

The questions we will ask are only about what you think. There are no right or wrong answers because this is not a test.

If you sign this paper, it means that you have read this and that you want to be in the study. If you don't want to be in the study, don't sign this paper. Being in the study is up to you, and no one will be upset if you don't sign this paper or if you change your mind later.

If you decide you want to be in this study, please sign your name.

I, _____, want to be in this research study.

_____ _____
(Sign your name here) (Date)

I certify that this study and the procedures involved have been explained in terms the child could understand and that he/she freely assented to participate in this study.

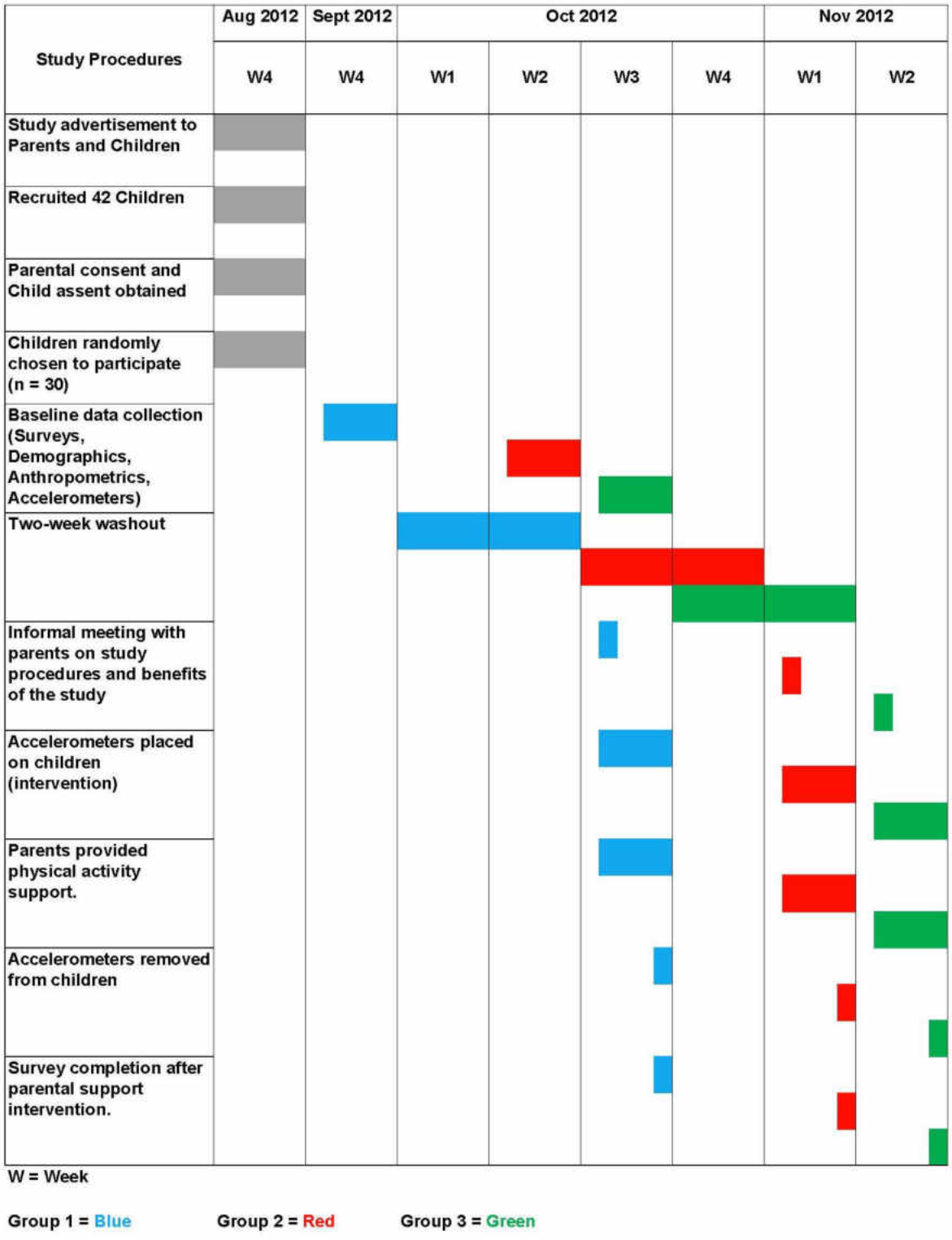
_____
Signature of Person Obtaining Assent Date

1

Appendix J
Narrative to Parents of Parental Support Intervention

Options for parental support include praising your child, encouraging your child, observing your child in physical activity, participating with your child in physical activity, and/or transporting your child to physical activity environments. You are urged to use one or all methods of support and allow children the freedom of choosing what physical activities they would enjoy doing. Research shows that children are more destined to practice physical activity behaviors if they have autonomy to choose a fun variety of activities. There is minimal to no risk in participating in this study other than the typical risks of injury due to the nature of participating in any type of physical activity such as tripping, falling, or straining a muscle, for example. I appreciate you allowing me the time to introduce my study and am excited to work with you on this project that will advance scientific knowledge and improve the health and wellbeing of children that can last through adulthood.

Appendix K
Project Timeline
(Human Subjects Approval through Data Collection)



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