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An Observational Study Of Parent Practices And Children's Physical Activity

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AN OBSERVATIONAL STUDY OF PARENT PRACTICES AND CHILDREN'S PHYSICAL ACTIVITY

by

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This thesis, submitted by Analee Eleanor Hokkala in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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Analee Eleanor Hokkala
4/8/2015

TABLE OF CONTENTS

LIST OF TABLES

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To my mom,
Words cannot describe how much you mean to me!

ABSTRACT

Background: Childhood obesity affects approximately 17% of U.S. children and teens. Children who are overweight or obese are at risk of developing psychosocial problems and cardiovascular risk factors. It is recommended that children engage in at least 60 minutes of physical activity at least 5 days per week, however, children are not meeting these recommendations.

Purpose: To our knowledge, there has not been an observed controlled study examining parent practices and children's physical activity. Thus, the primary purpose of this study was to observe parenting practices and to examine the relationship with children's physical activity. The secondary purpose of this study was to examine the relationship between parent weight status and physical activity with children's weight status and physical activity.

Method: Participants included parent and child dyads (n=40) with children ranging from 8-13 years old. Both parent and child's height and weight were measured and BMI was calculated using age, height, weight and gender (children) and height and weight (parents). Both parent and child participated in activities for 30 minutes in the same laboratory setting. Observations were made every 30 seconds; observing for 20 seconds and recording for 10 seconds using a modified SOFIT observation form. Observations assessed parent's communication to include encouragement and discouragement of physical activity and sedentary activity. Paired t-tests were used to analyze the data and SPSS 21 was used.

Results: Child participants had a mean age of 10.3 years (SD= 1.6), 23 were male (57.5%), 27 were white (67.5%), 17 were eligible for free or reduced lunch (42.5%) and 29 were normal weight (72.5%) Parent participants had a mean age of 37.3 years, 4 were male (10%), 21 reported college as the highest level of education completed (52.5%), and 8 were normal weight (20%). Overall, there was statistical difference with parent communication and the relationship with children's physical activity and weight status (normal weight/overweight or obese). Overweight children had parents discourage them more to not engage in sedentary activity compared to normal weight children ($p \leq 0.001$). Overweight children also had parents verbally discourage them from engaging in sedentary activity more compared to normal weight children ($p \leq 0.001$). Parent's BMI was found to not be significant with both children's physical activity and children's weight status ($p > 0.05$).

Conclusion: Our findings suggest that parent communication is related to children's physical activity and weight status (normal/overweight or obese). Promotion of parental encouragement and discouragement can lead to children engaging in more physical activities allowing them to meet the national physical activity recommendations and reduce obesity. Future studies should continue to examine parent practices and children's physical activity and look at specific parent gender interactions to see if there is a correlation with physical activity.

CHAPTER I

INTRODUCTION

Childhood obesity has become an increasingly popular research topic in today's society. The popularity of researching childhood obesity may be because it has become a serious public health concern for today's generation. Currently in the U.S., there are an estimated 73 million adults and 12 million children who are obese (Flegal, Carroll, Ogden, & Curtin, 2010; Ogden, Carroll, Curtin, Lamb & Flegal, 2010). For adults, overweight is defined as having a body mass index (BMI) between 25 and greater than or equal to 30 and obesity is defined as a BMI greater than or equal to 30 (Flegal et al., 2010). BMI is calculated by taking body weight in kilograms and dividing it by height in meters squared, (Lob-Corzilius, 2007). For children ages two to 19 years old, raw BMI scores are converted into percentiles according to CDC reference norms, (Kuczmarski et al., 2000). Child overweight is defined as a BMI greater than or equal to the 85^{th} to less than the 95^{th} percentile; and obesity is a BMI greater than or equal to the 95^{th} percentile (Barlow, 2007).

Childhood is a critical time to promote physical activity, (Licence, 2004; Philippas & Lo, 2005) as children and adolescents who participate in physical activity can benefit from many positive physical and psychological health outcomes, (Ribeiro et al., 2005), have better skeletal health, and lower adiposity rates (Boreham & Roddoch, 2011). However, adolescents are not meeting the daily recommendations for physical activity. According to the CDC (2011), 54 % of high school age boys and 73 % of high

school age girls did not meet the daily recommendations of engaging in 60 minutes of physical activity at least 5 or more days of the week. These activities should include aerobics, muscle strengthening and bone strengthening exercises. The national recommendations for adults are at least 150 minutes of moderately intense activities each week, (Physical Activity Guidelines for Americans, 2008).

Researchers have shown that, children who engage in regular physical activity benefit socially, psychologically and physiologically (Boyd & Hrycaiko, 1997; Kimiecik & Horn, 2011; Strauss, Rodzilsky, Burack, & Colin, 2011). However, children who are not engaging in regular physical activity are at risk for numerous health consequences, including social discrimination, low self-esteem, and delayed academic and social functioning (Schwartz & Puhl, 2002). In addition, obese youth are at greater risk for negative health outcomes, such as cardiovascular disease (CVD) (Matson & Fallon, 2012), asthma, sleep apnea, and type 2 diabetes (Gaziano, 2010; Matson & Fallon, 2012). Not surprisingly, children who are overweight or obese have an increased risk for adult obesity, cancer, coronary heart disease, stroke and many other chronic conditions (August et al., 2008; Gaziano, 2010).

Obesity not only has many physical and mental health consequences, but it can also have financial consequences as well. It has been estimated that the annual medical costs directly related to obesity in the United States, including diagnosis and treatments, to be $147 billion for adults and $14.3 billion for children (Hammond & Levine, 2010). Annual indirect costs related to obesity, such as lost productivity, have been reported to be around $66 billion (Hammond & Levine, 2010). From 2001 to 2005, child obesity

hospital costs increased from $125.3 million to $237.6 million (Trasande, Liu, Fryer, & Weitzman, 2009).

There are many factors that are associated with obesity such as: nutrition, lack of physical activity, sedentary activity, socioeconomic status and genetics. Researchers have shown that physical activity and nutrition are important influences on the increase in obesity and overweight individuals (Lob-Corzilius, 2007). With these two factors, family influence may play a large and important role in physical activity and nutritional influences in children. Families are important in a child's life especially when it comes to a child socializing because a major portion of a child's time is spent with their family during their developmental years (Edwardson & Gorely, 2010). Children's skills and beliefs are learned through their families which can lead to a child's outlook and behavior related to physical activity, (McEloy, 2002). Parents may also have a social impact with their child's physical activity involvement through reinforcement, their feelings of physical activity, being a role model, being involved and providing transportation and financial assistance (Edwardson &Gorely, 2010). However, parents who are from a lower socioeconomic status can be hesitant in encouraging physical activity that require financial assistance and transportation because they are not able to afford for their child to engage in that activity (Cox, Schofield, & Kolt, 2010). Although there are many factors associated with obesity that can be modified and influenced, genetic predispositions still play a major role in obesity contributing to about 50 percent of the variances in BMI in a given population, (Maffeis, 2000; Ravussin & Bogardus, 2000).

The prevalence of childhood obesity has rapidly increased throughout the past few decades, however within the past ten years, that rapid increase has slowed and may

have plateaued (Ogden, Carroll, Kit & Flegal, 2012). However, direct health concerns and long term consequences linked with obesity are still of concern, giving a need to continue researching areas associated with child and adolescent obesity.

Research has been conducted to examine the relationship between parent's influences of children's physical activity, however, according to our search, measurement of both physical activity and parental practices has not been conducted in a controlled laboratory setting to identify specific observed parent physical activity and parent practices associated with children's choice to engage in physical activity. In a review conducted by Gustafson and Rhodes (2006) found that 24 out of 34 studies reviewed examined the relationship between parent's physical activity level and children's physical activity level; measuring physical activity using accelerometers (six studies), questionnaires (six studies), or a combination of questionnaires and interviews (12 studies) and were not objectively measured. Within the same review, 19 studies examined the relationship between parental support and children's physical activity; using accelerometers (3 studies) and questionnaires, interviews or self-report log books (16 studies) to assess physical activity.

Edwardson and Gorely (2009) also conducted a review that examined parental influences on different intensities and types of physical activity of children and adolescents. When examining overall physical activity they found 15 studies that measured the relationship between parental influence and children's overall physical activity. Eight of the studies used self-report questionnaires, three studies used objective instruments, while two used a combination of methods and the other studies used an interview or parent proxy report of children's physical activity.

Pugliese and Tinsley (2007) also found in a meta-analysis, that the most commonly used methods for assessing physical activity with the 30 studies reported included self-reports and mechanical or electrical devices (70% vs 30%). Three of the studies used observation as a form of measuring children's physical activity, however, they were not conducted in a controlled lab setting and included mealtime influences (Klesges, Eck, Hanson, Haddock & Klesges, 1990; Klesges, Malott, Boschee, & Weber, 1986; McKenzie et al., 1991).

Purpose

After thoroughly reviewing parent physical activity there has not been to our knowledge an observed controlled study examining parent practices and children's physical activity. Thus, the primary purpose of this study is to observe parenting practices and to examine the relationship with children's physical activity. The secondary purpose of this study is to examine the relationship between parent weight status and physical activity with children's weight status and physical activity.

Testable Hypotheses

Hypothesis One

Parents who engage in greater amounts of physical activity, have higher scores for role modeling and encouragement will have children who engage in more physical activity.

Hypothesis Two

Parents who have a higher BMI score (overweight/obese) will have children who engage in less physical activity and will have a higher BMI score; and parents who

engage in more physical activities will have children who engage in more physical activity and have a lower BMI score.

CHAPTER II

LITERATURE REVIEW

This literature review examines child physical activity levels and the correlation to childhood obesity. It also looks at the relationship between parenting styles and parent encouragement on their child's physical activity levels. Childhood obesity and physical activity is an important topic because physical activity rates have declined over the years and obesity rates are continuing to increase (Matson & Fallon, 2012). One effective way to increase physical activity in children may be through parenting practices or the implementation of parental encouragement. Results from studies have suggested that a parent's beliefs about their own physical activity level are linked to their child's beliefs and their child's physical activity level (Bois et al., 2005; Kimiecik & Horn, 1998; Kimiecik et al., 1996). This chapter will review the literature related to the variables associated with child physical activity and settings for children to engage in physical activity. Table 1 shows the evidence reviewed and further discussed in this chapter that examines parenting behaviors associated with children's health behaviors (physical activity and healthy eating) and the results from those studies. Furthermore, this review will describe the impact of parents on child physical activity, and will provide direction of parental influences associated with children's participation in physical activity.

Table 1: Parental practices related to child health behaviors

Study	Authors	Sample Size n =	Methods	Results
Responsibility for children's physical activity: Parental, child, and teacher perspectives	Cox, Schofield & Kolt, 2009	32 children, 11-12 years 13 parents 15 teachers	Semi-structured focus groups 8 focus groups with 6-9 participants	Personal responsibility: major theme for children's responsibility was self directed behavior. Parental responsibility: Six themes emerged, including: Instrumental support, direction, nutrition, active transport and child prioritization. Third party responsibility: Four themes were identified, including: access, directions, instrumental support and backstop.
Family support for physical activity in girls from 8th to 12th grade in South Carolina	Dowda, Dishman, Pfeiffer & Pate, 2007	421 8th, 9th and 12th grade girls	Girls reported on physical activity and perceived family support in 8th, 9th and 12th grade time points using questionnaires asking about: family support for PA, perceived behavioral control, attitudes, PA self-efficacy and availability of equipment. Physical activity was measured using a 3 day PA recall	Self-efficacy, perceived behavioral control and family support were independently related to age related changes in physical activity.
Parental bonding may moderate the relationship between parent physical activity and youth physical activity after school	Dzewaltowski, Ryan & Rosenkranz, 2007	57 students-11 to 13 years 37 girls, 18 boys	Students completed a survey that assessed bonding with parents and parental physical activity Reported previous physical activity recall on 3 days	Interaction between parental physical activity and parental bonding significantly predicted youth physical activity.
Parenting styles, parenting practices, and physical activity in 10 to 11 year olds	Jago, Davison, Brockman, Page, Thompson & Fox, 2011	792 UK children-10 to 11 years	Cross sectional survey PA was assessed using an accelerometer Maternal parenting style and physical activity practices were self-reported	Permissive parenting was associated with girls having a higher mean MVPA Parental logistic support was associated with the mean MVPA with boys.
Family influences on children's physical activity and fruit and vegetable consumption	Pearson, Tempera, Salmon, Crawford & Biddle, 2009	775 children-10 to 12 years	PA was measured using accelerometers Self-report questionnaires assessed parent modeling and support	Parent modeling and support were associated differently with children's behaviors. Such as parents who modeled high PA had girls who consumed 5 or more portions of fruit and vegetables per day. Parents of boys who had high financial support for fast food/snacks had higher odds of boys having high PA with low fruit/vegetable intake
Parent and child reported parenting. Associations with child weight related outcomes	Taylor, Wilson, Slater & Mohr, 2011	175 children-7 to 11 years and their primary caregiver	Child self report on parenting styles, attitude toward fruit and vegetables and non core food and attraction to PA Parent self-report on parenting style and domain specific parenting and reported child dietary intake and PA and sedentary activity	Child reporting of parenting styles was associated with child food and activity attitudes. Parent reported parenting practices and child reported parenting styles were uniquely associated with child related outcomes.

Physical Activity and Obesity

Promoting high levels of physical activity early in a child's life can lead to positive choices when they mature into adolescents and adults, and may also have a positive effect on body fatness (Moore et al., 2003). Moore and colleagues (2003) examined whether early physical activity in children predicted their body fat change during childhood and adolescents. An eight year study assessed both diet and physical activity and measured height, weight and body fat. Results concluded that those who participated in the highest level of physical activity had significantly lower average BMI scores and lower average sum of skinfolds than those who were in lower levels of physical activity after the follow up. The authors concluded that, children who were more active had the smallest increase in BMI, and at age 6 more active children were at their lowest point within the BMI curve; where children who engaged in a lower amount of physical activity had a greater increase in their BMI and after age 5 had a continuous increase in BMI. Additionally, children who engaged in the most amount of physical activity had lower BMIs and less subcutaneous fat by the time they were 11; compared to the children who engaged in lesser amounts of physical activity. This study illustrates that by incorporating physical activity early in childhood can lead to children having positive body fat changes as they get older (Moore et al., 2003).

Physical Activity and Obesity in Schools

Several researchers have examined physical activity within schools, and provided insight on implementing programs into the academic curriculum to help student's achieve their recommended daily physical activity (Donnelly et al., 2009; Maddock, 2012). Incorporating physical activity plans into a child's academic career is favorable because

the number of children who are enrolled in school is about 98%, (U.S. Census Bureau, 2006). Schools are ideal for health promotion interventions (Goran, Reynolds & Lindroos, 1999; Kann, Brener & Allensworth, 2001), because children spend a minimum of 37 hours a week within a school setting; and schools have access to a large number of children to implement physical activity programs. In 2012, the Institute of Medicine (IOM) recommended goals that would aid in the movement of obesity prevention, one of the goals being to make the school a central area of health promotion (McGuire, 2012). Schools can be an essential source in promoting the prevention of obesity because most of a child's day is spent in school or school related programs (Maddock, 2012). Throughout the school day there are many areas where physical activity can be implemented; including the way children get to and from school, incorporating physical activity before and after school, promoting activity during physical education classes and during recess, and taking activity breaks throughout class time (Maddock, 2012). These changes can add up to an hour of physical activity per day, which meets the daily physical activity recommendations for children (Barr-Anderson, AuYoung, Whitt-Glover, Glenn, & Yancey, 2011). Researchers have also found that incorporating at least ten minutes of activity during classroom time can decrease a child's tiredness during class and instead allow them to be more focused (Maddock, 2012). The ten minute activity also allows children to meet a portion of their daily recommendations for physical activity (Barr-Anderson et al., 2011). The suggestions that Maddock (2012) recommends can be easy to implement into an academic program and of low financial cost; however, the implication of incorporating physical activity into academic curriculums is difficult because of the high standards for academics with the, "No Child

Left Behind Act," which focuses on "traditional academics" and takes time away from nontraditional academics including physical education classes (Maddock, 2012).

To further explore the implementation of incorporating physical activity into an academic program, Donnely and collegues (2009) conducted a study where they implemented physical activity into the curriculum known as PAAC (Physical Activity across the Curriculum). Within this program, teachers were encouraged to implement physical activity into academic lesson plans, which included 90 minutes per week of moderate and vigorous physical activity. At the end of the three year intervention, their results showed that there was not a significant difference with a change in BMI for the children in the PAAC intervention group compared to the children in the control group. However, they found that the children who took part in the PAAC for a longer period of time showed reduced growth in their BMI and positive shifts in their BMI percentile. Outside of the classroom (evenings and weekends), children who took part in PAAC engaged in more physically active activities than the children who did not take part in PAAC. Additionally, there was a positive connection between children's physical activity level and having a teacher model PAAC lessons. This last result suggests that positive role modeling has a greater influence on child's physical activity; and school intervention programs may not be the best solution when examining physical activity and a child's BMI, due to the insignificant findings of changes in a child's BMI over a three year intervention. Role modeling may also be more beneficial because schools are more focused on meeting academic standards, making it more difficult to meet and provide physical and health promotion and awareness (Storey et al., 2003).

Although there is research that supports implementing physical activity programs into an academic program, schools may not be the most ideal place to promote physical activity compared to the home environment and parent modeling. Parents are able to influence their children's behaviors and can help facilitate children's physical activity (Jago et al., 2011; Gustafson & Rhodes, 2006; Pugliese & Tinsley, 2007). In the end, schools face many barriers in promoting physical activity and allowing physical activity interventions to be incorporated into an academic lesson plan. Teachers and principals are faced with providing and meeting academic standards through the, "No Child Left Behind Act," and with this act, extracurricular activities such as physical education classes are pushed to the side for academics to come first (Maddock, 2012). Within a school setting academics are a top priority compared to physical activity, and the implementation of balanced program which includes both physical activity and academics could take years to approve and set up; while the implementation of physical activity within the home can take immediate effect (Donnelly et al., 2009).

Physical Activity and Academic Performance

The promotion of physical activity incorporated into an academic setting could also benefit academic performance. There have been many studies that provide a positive relationship between physical activity and academic performance, while only a few have shown no relationship or a negative relationship (Coe et al., 2006). Davis and colleagues (2007) conducted a study to examine the effects of aerobic exercise and cognitive functioning on overweight children. A total of 94 children were randomized into one of three groups including the low dose exercise group, the high dose exercise group or the control group. The low dose group consisted of children engaging in 20 minutes of

aerobic exercise and the high dose group consisted of children engaging in 40 minutes of aerobic exercise, and the control group was no exercise. Each group was equal in intensity and met 5 times per week for a total of 15 weeks. Each child's cognitive performance was also assessed prior to the intervention and also after the 15 weeks. Results of the study concluded that those who were in the control group had statistically significant lower posttest scores than those who were in the high dose exercise group ($p=0.015$). The results also showed that although there wasn't a statistical difference, the low dose exercise group had a lower posttest score than the high dose exercise group. Incorporation of physical activity not only allows children to benefit physically and meet the daily recommendations, but it also benefits them cognitively and can help them be successful academically as well.

Carlson and colleagues (2008) also conducted a longitudinal study examining the relationship between academic achievement and time spent in physical education from children in kindergarten through fifth grade. Data was analyzed at five points including fall of kindergarten, spring of kindergarten, spring of first grade, spring of third grade and also spring of fifth grade. Physical education groups were broken into groups including the low group of 0 to 35 minutes per week, the medium group of 36 to 69 minutes per week and the high group of 70 to 300 minutes per week. Academic achievement was measured by administrating mathematical and reading tests using the IRT scale scores. Results showed that girls who were in the lowest physical education group had the lowest IRT scale scores for both mathematics and reading. The results also showed that there was no association between physical education and academic achievement in boys. Although, results were not statistically significant with boys academic achievement and

physical achievement; physical activity wasn't found to negatively affect academic performance.

The CDC had a recent review of physical activity and academic achievement that reported that out of nine studies, eight of them had found a positive relationship between physical activity in the classroom and academic achievement, cognitive skills and attitudes and academic behavior and all nine studies didn't have a negative association (Kibbe et al., 2011). With these findings, incorporating physical activity into school lesson plans and promoting physical education classes will not only assist with academic achievement, but it can also help children meet their physical activity recommendations.

Responsibility for Children's Physical Activity

The responsibility for children's health and physical activity has been the role of parents due to children's limited development of cognitive and physical capabilities (Johnson et al., 2000; Penfold, 1985). Parents have shown their responsibility through modeling, by offering support, and offering opportunities for children to engage in physical activities (Sallis, Prochaska, & Taylor, 2000). Although parents have been shown to be responsible for their child's physical activity, Cox, Schofield, & Kolt (2010) wanted to determine whether parents, children or third parties were found to be more influential in the promotion of children's physical activity. Their results showed that all three groups were able to identify behaviors of their own personal responsibility towards a child's physical activity. When it came to a child's personal responsibility for their own physical activity, their results showed that children have a better understanding of what responsibility consists of than adults had perceived them to have. This suggests that children in that particular age group (11 -12 years) may have developed what behaviors

constitute being responsible. Parental responsibility included providing both logistical and instrumental support through positive reinforcement, encouraging physical activity, and financing activities. Responsibility also included providing direction by being a role model and educating children about the benefits of physical activity and providing nutritional information and also providing transportation and making the child a priority. Results showed that third party responsibility included providing active support, providing access and direction and acting as a backstop. Third party responsibility also included increasing children's participation in physical activity by providing access to facilities and equipment and by increasing opportunities for children to participate in a variety of activities by offering assistance financially. The responsibility over children's physical activity not only falls into the hands of the parent's but also other parental figures and the children themselves. Children are involved in extracurricular activities, spend many hours devoted to classroom learning, and look to others for support and encouragement to engage in physical activity.

Parental Influence and Family Support for Physical Activity

One important predictor when it comes to outcomes related to children's weight has been identified as parental influences (Birch & Davison, 2001; Procter, 2007). Parental influences connected with weight associated outcomes in children relate to parenting styles and practices (Taylor, Wilson, Slater, & Mohr, 2011). Parental styles are related to the communication between a parent and their child (as cited in Jago et al., 2011; Taylor et al., 2011), while parental practices are the specific behaviors and situations where a parent helps to provide physical activity or influence a child's behavior (Gustafson & Rhodes, 2006; Pugliese & Tinsley, 2007; Taylor et al., 2011). Parental

activity related practices include influencing activity, encouraging physical activity and modeling physical activity, (Edwardson & Gorely, 2010; Gustafson & Rhodes, 2006). Table 1 further summarizes studies that examined parental practices related to child health behaviors.

To further explore parent styles and practices, Taylor and colleagues (2011) studied the different associations of parental styles and parental practices with weight and weight related outcomes with children. They examined parental styles and practices as it relates to child BMI, physical activity, dietary intake and sedentary behaviors. Results showed that with BMI, general parenting styles were not associated with BMI, whereas parental practices of food restriction and pressure to eat showed associations with child BMI. Dietary outcomes including the consumption of fruit and vegetables were not significantly predicted by either parenting practices or parenting styles. With child physical activity, parenting practices such as parental encouragement was positively associated with physical activity and children who engaged in sedentary behavior was negatively associated with parental practices of modeling physical activity. Although parental practices were not associated with child weight they were however, associated with children's attitude towards healthy weight. The findings of this study show that both parental practices and styles are important associations with children and specific weight outcomes.

Several researchers have examined the influence of parents on their child's physical activity and nutritional choices. Dowda and colleagues (2006) looked at family support in 8th through 12th grade girls. They found that during the duration from 8th grade to 12th grade, girl's BMI had increased while their perception of family support had

decreased. The study also found that 8th grade girls who had higher perception of support from their families, greater perception of controlling their behavior, greater self-confidence and attitude and access to more equipment had greater overall physical activity involvement. The researchers concluded that the perception of having family support prior to 12th grade can be fundamental for girls to maintain and have an active life from early youth to maturity. This suggests that by promoting a child's participation in a variety of physical activities and also by providing parental encouragement it can lead to a greater amount of physical activity involvement throughout a child's lifespan and into adulthood and can help with decreasing a child's exposure to negative health consequences associated with obesity (Dowda et al., 2006).

Another avenue to explore when it comes to parental influences is parental bonding and the relationship with children's physical activity. Dzewaltowski and colleagues (2008) conducted a study to examine parental bonding with their child and their child's physical activity during an after school program. Their results concluded that there was a significant difference with vigorous physical activity between boys and girls, reporting that boys participated in more vigorous physical activity than girls' dd. When it came to parental bonding children who engaged in physical activity and bonded with their parents were found to be more likely to recognize physical activity opportunities and to participate in the physical activity and to find it satisfying. Their results also showed that the relationship between the perception of parents engaging in physical activity, and children participating in moderate to vigorous activity after school only increased with an increase in parental bonding. Parental bonding has showed to have a positive correlation with a child's physical activity participation; further reiterating the

importance of parental involvement and encouragement to help promote physical activity (Dzewaltowski et al., 2008).

Another aspect to look at is a parent's influence on a child's fruit and vegetable consumption along with their physical activity participation. Pearson and colleagues (2009) examined this relationship and found that for both boys and girls, there is a positive connection to health behaviors and parent modeling. Their results concluded that a higher number of boys were in the high physical activity and low fruit and vegetable group compared to girls; and a larger number of girls were in the low physical activity and high fruit and vegetable intake group along with being in the low physical activity and low fruit and vegetable intake group when compared to boys. Positive health behaviors are associated with parental modeling and parental influences and support. The results of Pearson and colleagues (2009) study showed that parents who participated with their children in healthy activities had children who also engaged in healthy habits; whether in the same area or not. Families are also an important agent in children's lives, because they teach them skills and beliefs about healthy behaviors related with physical activity and they provide parental encouragement with physical activity and are role models for children as well (McEloy, 2002).

Summary

This literature review examined childhood obesity and the relationships linked to obesity and physical activity participation amongst children. Important themes emerged throughout the literature review including; physical activity and obesity in schools, responsibility for children's physical activity, early physical activity throughout childhood and body fat change, and parental influence and family support for physical

activity. Although researchers have shown that parents play an important role in their child's physical and emotional well-being by modeling and providing support, more studies are needed to identify the relationship between parenting practices and child physical activity during active recreation opportunities. The purpose of the present study is to bridge the gap between literature related to parenting practices and the association of a child's choice to engage in physical activity. This study will also examine observed behavior of both the parent and child in a controlled laboratory setting.

CHAPTER III

METHOD

Participants & Design

A convenience sample of parent and child dyad volunteers (*n*=40 dyads), parents being the primary care giver and children ranging from 8-13 years old and free of physical and mental disabilities were recruited from the Grand Forks community. Similar studies examining parent practices associated with child behaviors have used participants ranging from 27 to 60 participants (Marvicsin & Danford, 2013; Cox et al., 2009). The recruitment procedure involved posting fliers with study information on bulletin boards in local community organizations including the YMCA and through fliers posted at local grocery stores, University of North Dakota facilities, and area shopping centers. Social media was also used to recruit volunteers via Facebook. The flier asked for child and guardian participants to take part in an observational study. Each flier had tabs that potential participants could take with a telephone number and e-mail address to contact a trained research assistant with further questions or to sign up to take part in the study. Each set of parent and child participants were compensated twenty dollars for their participation in the study.

The parent and child volunteers participated in a 30 minute observational study where parent and child physical activity and interaction was observed for 30 minutes. Both the parents and children were observed at the same time within the same location.

The study was IRB approved and took place in a small controlled laboratory at the Hyslop Sports Center located at the University of North Dakota.

Procedures

Upon arrival at the lab, a trained research assistant discussed the procedure and read the informed consent form to both the parent and child and answered any questions the participants had. After reading the informed consent form, the research assistant then asked parent to sign the informed consent form and complete a short parent survey which included parent and child demographics and two scales on parental practices from the Home Environment Survey (Gattshall et al., 2008). Parents and children had their height and weight measured two times using the CDC anthropometry procedure and a third measurement was taken if the height and weight differed by 0.5mm or 1kg respectfully. Height was measured using the CDC Results were recorded and both the parent and child had an armband to put on their non-dominant arm that collected physical activity data.

After all paperwork and measurements had been taken, the parent and child were instructed to go into a small lab (converted racquetball court) for a half an hour where they were able to choose any activities provided to partake in. Both physical activities and sedentary activities were provided for the parent and child to choose from. Parent active activities included: an elliptical, a stationary bike, yoga mat and video, step aerobics video and stepper and a jump rope. Parent sedentary activities included: a TV and TV sitcom, floor puzzles, brain puzzles (Sudoku, crosswords), magazines and Yatzee. Child active activities included: a soccer ball, cones and net, basketball and basketball hoop, floor hockey, jump rope, skip it, and hula hoop. Sedentary activities

included: TV and TV sitcom, Legos, crayons and coloring books, floor puzzles and books. Overlooking the racquetball court, the researcher observed the participants every 30 seconds.

The researcher was prompted by an iPod or cell phone timer to observe for 20 seconds followed by 10 seconds to record; this process continued for the 30 minute session with a total of 60 observations recorded. The researcher used a modified SOFIT observation form and circled whether the parent and child engaged in physical activity either together or separately; if the parent and child are engaged in sedentary activity either together or separately; if parental positive encouragement took place (did the parent encourage physical activity); if parental negative encouragement took place (did the parent encourage sedentary activity); or if no communication took place. The researcher also noted whether the child and parent were lying down, sitting, standing, walking or were very active.

Measures

Body Mass Index

Parent and child had their height and weight measured to assess body mass index (BMI). Height was measured using a portable stadiometer (Seca Corp, Model 213, Hamburg, Germany) and weight was measured to the nearest millimeter. Weight was measured in kilograms using a digital scale (Seca Corp, Model 876, Hamburg, Germany). Both height and weight were measured two times, and if they differed by more than 5mm or 0.1kg, respectively, a third measure was taken. The two closest measures were averaged and used to calculate BMI. BMI results for each parent and child were

determined based on the BMI index from the Center for Disease Control, (Kuczmarski et al., 2002). (See Appendix F for Height and Weight data sheet).

Physical Activity

Physical activity and energy expenditure were assessed for both the parent and child. The SenseWear Pro Armband (BodyMedia, Pittsburgh, PA) was worn on an adjustable elastic belt on the non-dominant tricep and measured sedentary behavior (0 METS), moderate (<3 METS), and vigorous (<6 METS) physical activity. Both parents and children wore the accelerometer during their thirty minute session. After completion of the thirty minute session, the data was collected from each accelerometer and downloaded into a physical activity data file located on a secure computer. The data collected was used to assess the amount and intensity of physical activity the parent and child engaged in.

Parent and Child Activity Observation

Physical activity and behavior was also assessed through an observation component; similar to other physical activity observation research, (Ornelas & Rosenkranz, 2009; McKenzie, Sallis & Nader, 1991). The researcher observed physical and verbal behavior for a 30 minute increment and recorded an observation every 30 seconds; observing for 20 seconds and recording for 10 seconds. Observations assed different parenting practices and encouragement level. The observation form was a modified observation form the System for Observing Fitness Instruction Time (SOFIT) (McKenzie et al., 1991). Observations included what the child and parent were doing. For example, was the child engaging in an active activity or a sedentary activity, was the parent engaging in an active activity or a sedentary, were both the parent and child

engaging in an activity together and was it active or sedentary, and was the parent verbally encouraging or discouraging sedentary or active behavior (See Appendix E for complete form and operational definitions).

Parent Survey

Demographics. Parents completed a survey that measured demographics and parenting practices related to their children's physical activity or sedentary behavior. Child demographic information included: age, gender and race/ethnicity. Parent demographic information included: age, gender, race/ethnicity and education level (see Appendix D).

Parenting practices. Parental role modeling of physical activity and parental policies for physical activity was measured using the Home Environment Survey (Gattshall et al., 2008). The "Physical Activity Parental Role Modeling Scale" (Gattshall et al., 2008) consisted of eight items: Your child sees you being physically active, your child sees you doing house/yard work, your child sees you use physical activity as relaxation, your child sees you on the computer, your child sees you watching TV/movies, your child hears you talk about sports or physical activity, your child hears you say you were too tired to be physically active, how often are you physically active with your child. A five point Likert scale that ranged from "never"= 0 to "always" = 4 was used (see Appendix D). Scoring consisted of a higher score representing a positive response; and when a question consisted of a negative influence, the scoring was reversed. All scores were added up and divided by the number of items in the section to represent an average for the whole section.

The "Physical Activity Parental Policies Scale" (Gattshall et al., 2008) consisted of six items: How often do you encourage your child to be physical active, how often do you transport your child for physical activity, how often do you send your child outside to play, how often do you give your child physical activity options, how often do you praise your child for being physically active. A five point Likert scale that ranged from "never"= 0 to "always"= 4 was used, (see Appendix D). Scoring consisted of a higher score representing a positive response; and when a question consisted of a negative influence, the scoring was reversed. All scores were added up and divided by the number of items in the section to represent an average for the whole section.

Measure Validity

Parent and child physical activity was observed using a modified observation form of SOFIT (Systems for Observing Fitness Instruction Time). SOFIT was designed to be a "direct observation instrument," that allows observers to assess different variables related to physical activity levels (McKenzie, Sallis and Nader, 1991). Validation of SOFIT was done with a coding system of physical activity involving five different physical activity levels and then compared to 19 children's heart rates (4 to 9 years old) while they participated in a variety of activities wearing the UNIQ Heart Watch. Reliability was tested by training six graduate assistance to use the SOFIT system. They were trained on definitions and coding conversions and practiced the coding with videos as well as within a mock setting. Coding was done with two observers independently coding 31 out of 88 classes simultaneously. Inter-observer reliabilities indicated agreements of 88.3% (student activity level), 91.8% (lesson context), 89.9% (teacher

behavior) using strict interval by interval comparisons (McKenzie, Sallis and Nader, 1991).

Parental practices and parental policies was assessed using two scales from the Home Environment Survey. The Home Environment Survey was created for the Family Connections study. Items that were originally a "yes/no" answer were modified by changing the question to a five point scale of "never" to "always" (Gattshall et al., 2008). Two different scales were used for scoring survey responses; for all sections besides the "Availability of Physical Activity resources," a zero to four scale was used, with a higher score indicating a greater positive response. The sections that were on the zero to four scales were added up, and then divided by the number of items answered in each section. Each section had to have at least a 75 percent response in order for the scores to be summarized. The validity of each score summary was then compared to either, RAPA, BLOCK or Accelerometer data," obtained from the Family Connections study" (Gattshall et al., 2008).

Data Analysis

All data was analyzed using SPSS 21. Paired t-tests were used for the association of parenting practices (observed and survey), parent BMI and parent physical activity; to examine whether parent practices were associated with child physical activity. Paired t-tests were also used for the association of parent practices (observed and survey), parent BMI and parent physical activity; to examine whether there were associations with child weight status (normal, overweight).

CHAPTER IV

RESULTS

The primary aim of our study was to observe parenting practices and to examine the relationship with children's physical activity. Our secondary purpose was to examine the relationship between parent weight status and physical activity with children's weight status and physical activity. We had a total of 40 parent and child dyad volunteers participate in the study. Child participants had a mean age of 10 years (SD= 1.6), 23 were male (57.5%), 17 female (42.5%), 27 were white (67.5%), 17 were eligible for free or reduced lunch (42.5%) and 29 were normal weight (72.5%) with the mean BMI percentile of 61.97 (SD=29.3) Parent participants had a mean age of 37.25 years (SD= 6.2), 4 were male (10%), 36 were female (90%), 21 reported college as the highest level of education completed (52.5%), and 8 were normal weight (20%) with the mean BMI of 30.24 (SD= 6.3) Participant demographics can be found in table 2.

Table 2. Participant demographics		
Participant Demographics	n	Mean
Child demographics		
Average age		10
Sex		
Male	23	57.5
Female	17	42.5
Ethnicity		
White	27	67.5
Non-white	13	32.5
Weight Status		
Normal weight	29	72.5
Overweight/obese weight	11	27.5
Parent demographics		
Average age		37.3
Sex		
Male	4	10
Female	36	90
Ethnicity		
White	30	75
Non-white	10	25
Eligible to receive free/reduced lunch		
Yes	17	42.5
No	23	57.5
Highest level of education		
Grade school	1	2.5
High school	8	20
College	21	52.5
Graduate school	10	25
Weight Status		
Normal weight	8	20
Overweight/obese weight	32	80

Parent and Child Activity and Communication

Parents and children were quite active during the 30 minute session. Accelerometer data indicated that children engaged in moderate to vigorous physical activity a mean time of 24.35 minutes (SD= 4.8), meeting just under half of the daily recommendation of engaging in 60 minutes of physical activity per day. While parents engaged in a total mean time of 15.72 minutes of moderate to vigorous physical activity (SD= 9.6) meeting half of the daily physical activity recommendations (Physical Activity Guidelines for Americans, 2008).

Parents and children had 52.5 (out of 60) interactions of engaging in activity together compared to 7.5 interactions alone. Total mean amount of steps for children were 1215.6 compared to the total mean of steps for parents at 772.2. Encouragement of activity took place 47.6 (out of 60) times compared to encouragement of sedentary taking place 11.4 (out of 60) times. Verbal encouragement of activity occurred 5.3 (out of 60) times compared to verbal encouragement of sedentary activity occurring 0.15 (out of 60) times. Discouragement of activity only took place 0.05 (out of 60) times compared to discouragement of sedentary activity taking place 0.28 (out of 60) times. Further breakdown of activity can be found in table 3.

Table 3. Mean for each activity for parent and child

Category	Mean	(SD)
Child Activity (observation)		
Lying down	0.53	1.6
Sitting	17	30.6
Standing	9.8	8.1
Walking	27.2	13.4
Very Active	9.8	10.8
Parent Activity (observation)		
Lying down	0.15	0.4
Sitting	11.7	14.7
Standing	12.2	8
Walking	26	13
Very Active	10.1	11.9
Together and alone activity		
Engaged in activity together	52.5	13.2
Engaged in activity Alone	7.5	13.2
Parent communication		
Encouragement of activity	47.6	15.2
Encouragement of activity verbally	5.3	4
Discouragement of activity	0.05	0.2
Discouragement of activity verbally	0.05	0.2
Encouragement of sedentary	11.4	15.2
Encouragement of sedentary verbally	0.2	0.4
Discouragement of sedentary	0.3	0.7
Discouragement of sedentary verbally	0.3	0.7
Steps taken		
Child	1215.7	557.3
Parent	772.2	576.5
Kcal expanded		
Child	91.4	39.7
Parent	123.5	47.4
Minutes of sedentary activity (accelerometer)		
Child	5.5	4.9
Parent	14.3	9.6
Minutes of moderate-vigorous activity (accelerometer)		
Child	24.4	4.8
Parent	15.7	9.6

Primary Aim

To address our primary aim to observe parenting practices and to examine the relationship with children's physical activity; we found that parent practices were not associated with children's physical activity. Specifically, both the self-reported parent policies scale (3.1 <1130 steps; 3.0 > 1130 steps; p = 0.88) and parent behaviors scale (2.2 > 1130 steps; 2.4 <1130 steps; p= 0.2) with children's physical activity. However, there was statistical difference with self-reported parent behaviors compared to child's weight status (2.3 normal weight; 2.4 overweight/obese; p=0.01). There was also statistical difference with observed encouragement of activity and children's physical activity. Physical activity of children was grouped into two categories; children who engaged in less than 1130 steps (less amount of physical activity; n=20) and children who engaged in more than 1130 steps (more amount of physical activity; n=20). We broke children into < or > 1130 steps, as we had half the participants meet one of the two categories. Results showed that children who engaged in more physical activity (>1130 steps) had parents encourage them more compared to those children who engaged in less physical activity (<1130 steps) 54.3 vs 40.9 times; p=0.002). Discouragement of activity verbally was statistically significant, meaning, children who engaged in less physical activity (<1130 steps) had parent's discourage them verbally of engaging in activity compared to children who engaged in more physical activity (0.10 vs 0.00 times; p=0.002). Children who engaged in less physical activity (<1130 steps) compared to those who engaged in more physical activity (>1130), had parents that encouraged sedentary activity more (18.8 vs 3.9 times; $p \leq 0.001$). Table 4 illustrates the discussed

relationship between parent communication and practices with children's physical activity and weight status.

Secondary Aim

To assess the secondary aim of examining the relationship between parent weight status and physical activity with children's weight status and physical activity, we found when comparing parent's BMI with both normal weight children (29.2 kg/m^2) and overweight/obese children (33 kg/m^2; p=0.13) to not be significant. Parental BMI value was also found to not be significant with children engaging who engaged in less physical activity (<1130 steps) (29.7 kg/m^2) or with children who engaged in more physical activity (>1130 steps) (30.8 kg/m^2; p=0.88). Parent's physical activity (the amount of steps they engaged in) was also found to not be significant when compared to normal weight children and overweight/obese children (789 vs 729; p=0.431). Our results indicate that parent's weight status does not have a relationship with children's physical activity and weight status.

Children who were overweight/obese had parents discourage sedentary activity more compared to children who were of normal weight status (overweight: 0.73 vs normal weight: 0.10 times; $p \leq 0.001$). There was also a statistical difference when it came to discouragement of sedentary activity verbally. Children who were overweight/obese had parents verbally discourage sedentary activity more compared to children who were of normal weight status (overweight: 0.64 vs normal weight: 0.10 times; $p \leq 0.001$). Table 4 shows further results with parent communication compared to children's weight status and physical activity.

Table 4. Paired t-tests examining parent communication and practices and children's physical activity and weight status

Category	Child Weight Status					Child Physical Activity				
	Normal = 29		Overweight/Obese = 11		p	<1130 Steps = 40.90		>1130 Steps = 54.30		p
	Mean	(SD)	Mean	(SD)		Mean	(SD)	Mean	(SD)	
Parent Communication										
Encouragement of activity	46.7	16.5	49.9	11.6	0.055	40.9	16.9	54.3	9.9	0.002**
Encouragement of activity verbally	5.5	4.2	5	3.7	0.751	5.7	4	5	4.1	0.843
Discouragement of activity	0.1	0.3	0	0	0.065	0.1	0.2	0.1	0.2	1
Discouragement of activity verbally	0	0.2	0.1	0.3	0.161	0.1	0.3	0	0	0.002**
Encouragement of sedentary	12	16.5	9.8	11.7	0.089	18.8	17.2	4	8.1	<0.001**
Encouragement of sedentary verbally	0.1	0.4	0.2	0.4	0.512	0.1	0.4	0.1	0.4	1
Discouragement of sedentary	0.1	0.4	0.7	1.1	<0.001**	0.3	0.8	0.3	0.6	0.622
Discouragement of sedentary verbally	0.1	0.4	0.6	1	<0.001**	0.3	0.8	0.2	0.5	0.299
Parent Practices										
Parent policies scale	3.1	0.5	2.9	0.6	0.509	3.1	0.6	3	0.6	0.878
Parent behaviors scale	2.3	0.5	2.4	0.3	0.011**	2.2	0.5	2.4	0.4	0.19
BMI Value	29.2	5.3	33	8	0.127	29.7	6.6	30.8	6.1	0.876

*$p \leq 0.05$; **$p \leq 0.001$*

CHAPTER V

DISCUSSION

Childhood obesity affects approximately 17% of children and teens in the U.S. and can lead to psychosocial problems and cardiovascular risk factors (CDC, 2011). It is recommended that children engage in physical activity at least 60 minutes each day including strengthening exercises (Physical Activity Guidelines for Americans, 2008). However, children are not meeting physical activity guidelines with about one fifth of 9 to 13 year olds engaging in no free time physical activity and only 38.5% of 9 through 12^{th} graders meeting the national standards while 9.6% report engaging in no vigorous physical activity at all (Duke, Human, & Heitzler, 2003; CDC, 2006). Research has shown that children spend a majority of their young years with their families and families may have a significant influence over their child's physical activity including encouragement, attitude and beliefs towards physical activity (Edwardson & Gorely, 2010; Lau, Quadrel & Hartman, 1990; McEloy, 2002).

The present study investigated parenting practices and children's physical activity in an observational setting. Parental communication was observed and specifically looked at physical activity encouragement or physical activity discouragement and sedentary activity encouragement or sedentary discouragement. The primary purpose of the study was to observe parenting practices and the relationship with children's objectively measured physical activity. Our results showed that there was a statistical difference when it came to encouragement of activity. Children who engaged in more

physical activity (>1130 steps) had parents encourage them to participate in physical activity more compared to children who engaged in less activity (<1130 steps). Additionally, children who engaged in less physical activity (<1130 steps) had parents verbally discourage physically activity compared to children who engaged in more activity (>1130 steps); and children who engage in less physical activity had parents encourage sedentary behavior.

Although there was statistical difference with observed parental communication, we found no statistical difference with the self-reported parent policies scale or the self-reported parent behaviors scale and the relationship with children's physical activity. The findings of this study support the notion that parents who support their children and facilitate them to participate in physical activity will have children who are active (Gustafson & Rhodes, 2006). Results from other studies have shown that parent modeling is consistent with positive health behaviors (Pearson et al., 2009). These results suggest that parents who participated in healthy behaviors with their children are more likely to have children who also participated in positive health behaviors (Pearson et. al, 2009). In a review by Gustafson and Rhodes (2006) they found that in the 19 studies reviewed all but one showed strong positive associations between children's physical activity level and parental support. This data suggests that parental support could directly or indirectly affect children's physical activity level.

The secondary purpose of this study was to examine the relationship between parent weight status and physical activity with children's weight status and physical activity. In the present study, we found that the mean BMI value for parents was 30.2, categorized as obese, compared to the mean BMI percentile of 62 for children,

categorized as normal weight. Parents engaged in a mean time of 15.7 minutes of moderate to vigorous physical activity, while children engaged in a mean time of 24.4 minutes of moderate to vigorous physical activity. We found significance with parent's discouragement of sedentary activity and verbal discouragement of sedentary activity compared to children's weight status. There was also significant difference with parental behaviors and children's weight status. Parent's BMI value was not significant with either normal weight children or overweight/obese children. Parent's BMI value was also found to not be significant with children engaging in less physical activity or with children who engaged in more physical activity. Our results are similar to other studies; one which found that overall physical activity at one and two year follow ups showed that parental physical activity and encouragement were not related to children's overall physical activity (Barnett, O'Loughlin, and Paradis, 2002). Similarity, our study shows that parental policies and parental behaviors were not associated with children's physical activity. Parent's BMI also didn't show a correlation with children's physical activity. Edwardson & Gorely (2010) found in their review parental involvement was the only variable that showed a positive relationship with children's overall physical activity. Although we found that parent's physical activity was not significant we did find that parent communication showed a positive relationship with children's physical activity. Gustafson & Rhodes (2006) found that out of 14 studies looking at parental physical activity, that parent's physical activity was a moderate predictor when it came to children's physical activity; and seven studies did not support parent physical activity as a predictor, reporting no correlation or weak correlation.

Again, our results are supported by the meta-analysis conducted by Pugliese & Tinsley (2007) that concluded that parental influences of children's physical activity were inconsistent; and found a small but positive significance between parental behavior and children's physical activity. However, Gustafson & Rhodes (2006) found studies in their review that supported parental physical activity and involvement as a direct correlation; children's physical activity levels increased with parental encouragement (Anderssen & Wold, 1992; Biddle & Goudas, 1996; McGuire et al., 2002). Our findings are consistent with these results because we did have a significance with parent communication with both children's physical activity and weight status. Parental encouragement was significant with children who engaged in more physical activity. However, some of our results are inconsistent with previous studies, there are some consistencies. Differences may be present because it took place in a controlled laboratory setting compared to a free range setting. We also observed parent practices versus self-reporting. Height and weight for both parents and children were measured by a trained research assistant and weren't self-reported and physical activity was gathered using an accelerometer, and again was not self-reported.

To our knowledge, this is the first observational study that investigated parenting practices and children's physical activity. This study was important to examine whether self-reported parenting practices and observed parenting behaviors had an impact on children's physical activity because parents play a major role in their children's lives. Parents can influence their children and by understanding whether parent practices and observed behaviors affect children's physical activity we can help bridge the gap with childhood obesity and children and parents can meet the daily physical activity

recommendations. Understanding our results and knowing that communication does have significance can help parents provide more encouragement of physical activity and discouragement of sedentary activity. Other studies support that parent practices and behaviors can directly affect children's physical activity and weight status and by providing positive communication we can have children who engage in positive physical activity.

Strengths and Limitations

There were several strengths of this study. First we were able to observe a large sample size (n=40 dyads) with close to an equal amount of boys and girls, 23 and 17, respectively. Second, a trained research assistant objectively measured height (cm) and weight (kg) rather than rely on parent and child self-reports. Third, an accelerometer was also worn to accurately measure physical activity. Fourth, the parent and child did not know what was being observed. They were told to engage in any activity available for the 30 minute duration and could change activities whenever they felt. Some limitations to this study included the short amount of time being observed. A longer duration may have changed how active/inactive both parent and children were. Increasing the study to 60 minutes of observation may have changed the amount of sedentary activity that was observed due to fatigue or boredom of engaging in a physical activity for a longer duration. Another limitation of the study may have been the addition of the elliptical and exercise bike. Without these two pieces of equipment, the results may also change with more sedentary activity or different physical activities being engaged. These pieces of equipment were chosen because they are a popular form of physical activity for adults, but we found that children also used the bike and elliptical frequently. This could have

been due to the average home not having these pieces of equipment readily available and they could have peaked more interest out of curiosity rather than just for the physical activity aspect. Research has shown that physical activity increases with environmental variables; such as access to treadmills, indoor gyms, and other exercise equipment (Parks et al., 2002), so this may help explain the high amount of moderate to vigorous physical activity the children accumulated. However, we do not have evidence of these and they may not affect the outcome at all. This study was also held during a convenient time for both the parent and child; and sometimes that meant after sports practice or a long day at school. Children could have been more tired and normally would engage in physical activity, but due to a previous activity engaged in a sedentary activity instead.

Conclusion

In conclusion, this was a novel study to examine whether parenting practices have an impact on children's physical activity. Our results showed that parent communication had statistical difference with children's physical activity and weight status. However, when examining the relationship between parent's physical activity and weight status with children's physical activity and weight status we found no statistical difference. Again, this supports other study findings that parents play an important role in their children's lives and have important influences on their children's behavior (Jago et. al, 2011). Parents may have significant social influence with their child's involvement with physical activity through a variety of different ways, including, encouragement and attitudes and beliefs towards physical activity, role modeling, and providing transportation and paying for fees associated with physical activity (Edwardson & Gorely, 2010). However, further research needs to continue to be conducted to examine

the relationships between parent practices and children's physical activity and weight status. More specifically, examining the relationships between specific parent gender (mother/father) and the encouragement or discouragement of physical activity. Further research could also incorporate whether children are involved in outside curriculum, including sports, and see if there is a correlation with parental communication and physical activity and weight status. It could also be beneficial to examine same sex parent with same sex child and see if there are difference between parent practices and child physical activity.

APPENDICES

Appendix A: Parent Consent and Child Permission Form

Project Title: **Parent and child physical activity**

Principle Investigator: Analee Hokkala
Research mentor: Dr. Tanis Hastmann (phone # 701-777-2994; email: tanis.hastmann@und.edu)

A person who is to participate in the research must give his or her informed consent to such participation. 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.

You are invited to be in a research study about parent and child activities. The purpose of this research study is to find out whether parents and their child choose similar or different activities, and what things influence their activity choice. You and your child will have your activity measured via accelerometer, which is a small device that measures your activity. We are trying to find out how much activity you and your child engage in when playing various activities and what influences your activity.

If you want to be in this study, we will ask you to do the following things:

1. **YOU WILL:**
    - Have your height and weight measured in a private setting
    - Take a short survey on parental practices
    - Choose what activities you want to engage in during the 30 minute period (e.g., watch TV/movie, use the elliptical, soccer, jump rope, reading books/magazine, board games)
    - Wear a small device on your non-dominant arm that tells us how much activity you are getting
2. **YOUR CHILD WILL:**
    - Have his/her height and weight measured in a private setting.
    - Choose what activities your child wants to engage in during the 30 minute period (e.g., watch TV/movie, use the elliptical, soccer, jump rope, reading books/magazine, board games)
    - Wear a small device on their non-dominant arm that tells us how much activity they are getting

NOTE: You and your child will pick what activities you want and don't want to do.

<u>We want to tell you about some things that may happen to you if you choose to participate.</u>

Participation and Confidentiality
Participating in the study is voluntary. All of your information and your child's information that will be collected is confidential and no one else will know except you and the researcher. When the study is complete, a report will be written up on what was found. Use of your name or your child's name will not be in the report. You and your child may choose to withdraw at any time during the study. Your decision whether or not to participate will not affect your or your child's current or future relations with the University of North Dakota.

Potential benefits and concerns
You and/or your child could potentially feel uncomfortable during height or weight measurements. During activities, lightheaded or dizziness may occur, but you and your child may stop participating in the activities when you choose.

What do I benefit from this study?
Each parent/child will receive a twenty dollar gift card for participating in this study. New enjoyment for different activities may also occur upon completion of this study.

Questions/comments? This project will be approved by the Institutional Review Board at the University of North Dakota (701-777-4279); they will be able to answer any question you have about your rights when participating in this study. If you have any other question about this study please feel free to contact Analee Hokkala (320-333-3426).

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

_____
Print your name

_____ _____
Sign your name Date

Do you allow your child to participate in this study?

☐ Yes ☐ No

Appendix B: Child Assent Form

Project Title: **Parent and child physical activity**

Principle Investigator: Analee Hokkala
Research mentor: Dr. Tanis Hastmann (phone # 701-777-2994; email: tanis.hastmann@und.edu)

We are doing a research study; a research study is a special way to find out about something. You are invited to be in a research study about activities that you and your parent choose to play with. The purpose of this research study is to find out if your parents encourage you to participate in a certain activity or if they tell you not to participate in a specific activity. You will wear a small device on your waist that measures activity. We are trying to find out how much activity you are doing when you are playing the various activities.

If you want to be in this study, we will ask you to do the following things:

1. You will:
   - Have your height and weight measured in a private setting.
   - Choose what activities you want to play with during the 30 minute period (e.g., hockey, soccer, jump rope, reading books/magazine, board games)
   - Wear a small device on your non dominant arm that tells us how much activity you are getting.

   NOTE: You can pick what activities you want and don't want to do.

We want to tell you about some things that may happen to you if you choose to participate.

Participation and Confidentiality (will not be shown to anyone else)
Participating in the study is voluntary, meaning it is up to you. All of your information that will be collected will not be shown to anyone else and no one else will know except you and the researcher. When the study is done, a report will be written about what was found. Your name will not be used in the report.

Are there any bad things that might happen during the research study?
There is a chance that you might feel uncomfortable when we measure your height or weight. You may experience dizziness or get tired while doing the activities, but you can stop playing the activities when you want to.

What do I benefit from this study?
Not everyone who is in this study will benefit. A benefit means that something good will happen to you. We hope you will enjoy the activities and maybe find a new activity that you like to do

What if I don't want to do these activities?
You do not have to be in this study. It is up to you. If you do not want to be in this study or if you say you want to and change your mind, that's OK. No one will be mad, including the researcher, your parent, and the University of North Dakota if you don't want to do it.

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

Sign your name	Date

Appendix C: Recruiting Flyer

Volunteers Needed!

Researchers at the University of North Dakota Department of Kinesiology and Public Health Education are seeking healthy parents and children (aged 8-13 years) to examine parent/child activities.

What you will do: Parent and child will attend **one 30 minute session** and have your choice of different activities to participate in.

What to wear: Please wear athletic shoes and comfortable clothes (shorts, sweats, t-shirts, etc.)

When: Your choice of nights or weekends in November-January

Compensation: $20 for each set of parent/child participant

For More Information Contact:

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Appendix D: Parent Survey

Please fill out the information to the best of your ability. Your information will remain confidential.

ID:_____

Child Demographics:

Age:_____

Gender: Male ☐ Female ☐

Race and Ethnicity (select one or more):

White ☐ Black ☐ Asian ☐ American Indian ☐ Latino ☐ Other ☐

Parent Demographics:

Age:_____

Gender: Male ☐ Female ☐

Race and Ethnicity (select one or more):

White ☐ Black ☐ Asian ☐ American Indian ☐ Latino ☐ Other ☐

Highest education level achieved:

Grade school ☐ High school ☐ College ☐ Graduate School ☐

Is your child eligible to receive lunch for free or at a reduced cost? Yes ☐ No ☐

Parent Behaviors

For each of the following questions please circle the response that best answers the question.

	Never	Rarely	Sometimes	Most Times	Always
1. Your child sees you being physically active	0	1	2	3	4
2. Your child sees you doing house/yard work	0	1	2	3	4
3. Your child sees you use physical activity as relaxation	0	1	2	3	4
4. Your child sees you on the computer	0	1	2	3	4
5. Your child sees you watching TV/movies	0	1	2	3	4
6. Your child hears you talk about sports or physical activity	0	1	2	3	4
7. Your child hears you say you were too tired to be physically active	0	1	2	3	4
8. How often are you physically active with your child	0	1	2	3	4

Parent Policies

For each of the following questions please circle the response that best answers the question.

	Never	Rarely	Sometimes	Most Times	Always
1. How often do you encourage your child to be physically active	0	1	2	3	4
2. How often do you transport your child for physical activity	0	1	2	3	4
3. How often do you send your child outside to play	0	1	2	3	4
4. How often do you give your child physical activity options	0	1	2	3	4
5. How often do you praise your child for being physically active	0	1	2	3	4

Appendix E: Observation Form

ID: _____ Date: _____ Observer: _____

Accelerometer # _____ Accelerometer Time On: _____ Time Off: _____

Parent: smoker Yes No Child: Smoker Yes No

Parent: Left handed_____Right handed____Child: Left handed____Right handed_____

	Child Activity					**Parent Activity**					**Together/Alone**	**Parent Communication**							
Interval	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**T A**	EA	V	DA	V	ES	V	DS	V
1	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
2	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
3	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
4	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
5	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
6	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
7	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
8	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
9	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
10	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
11	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
12	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
13	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
14	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
15	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
16	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
17	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
18	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
19	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
20	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
21	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
22	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
23	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
24	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
25	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
26	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
27	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
28	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
29	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
30	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
31	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
32	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
33	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
34	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
35	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
36	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
37	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
38	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V

39	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
40	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
41	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
42	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
43	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
44	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
45	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
46	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
47	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
48	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
49	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
50	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
51	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
52	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
53	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
54	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
55	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
56	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
57	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
58	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
59	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V
60	1	2	3	4	5	1	2	3	4	5	T A	EA	V	DA	V	ES	V	DS	V

Code Summary

1: Lying

2: Sitting

3: Standing

4: Walking

5: Very active

Code 1-4 (lying, sitting, standing, walking) should be used unless the participant is expanding more energy than required for a walk.

If the participant is lying down, but moving their arms/legs moderately then it should be coded as 2. A person sitting, but moving their arms/legs should be coded as 3 (standing). For example someone sitting while stretching, twisting body, arm wrestling, clapping hands, etc. should be coded as 3. Standing while moderately moving arms should be coded as 4 (walking), along with any stretching, throwing objects, body twists, etc.

Level 5 (very active) should be coded when the participant is expanding more energy than they would during ordinary walking. For example, when the participant is running, jogging, skipping, hopping, using an elliptical or stationary bike, etc. Walking while using arms moderately is also coded as very active. Other examples include: carrying heavy objects, throwing objects such as a ball while walking will also be coded 5.

When there is a transition from one category to another, the higher category will be coded. For instance, a participant moves from sitting to the standing position, the standing position (code 3) would be used.

(T)-Together

Together will be coded when both parent and child are engaging in an activity together.

(A)- Alone

Alone will be coded when the parent and child are engaging in separate activities with no interaction.

(EA)-Encouragement of physical activity

Encouragement of physical activity can include both verbal and nonverbal encouragement. Encouragement can include verbally telling the child to engage in a sport activity, showing them the physical activity and participating in the physical activity with their child, or participating in physical activity by themselves.

(DA)- Discouragement of physical activity

Discouragement of physical activity can include both verbal and nonverbal discouragement. Discouragement can include verbally telling the child to stop playing a sport or physical activity and directing them to a sedentary activity.

(ES) – Encouragement of sedentary behavior

Encouragement of sedentary behavior can include both verbal and non-verbal encouragement. Encouragement can include telling the child to sit down and read or watch a movie or TV. It can also include encouraging the child to lie down or when the parent participates in sedentary behavior or is participating in the sedentary behavior with their child.

(DS) – Discouragement of sedentary behavior

Discouragement of sedentary behavior can include both verbal and non-verbal discouragement. Discouragement can include telling the child to stop watching a movie/TV or stop reading or lying down.

Appendix F: Height and Weight data sheet

Parent ID:_____ Parent Gender: M F

Date: _____

Measure 1	**Measure 2**	**Measure 3**
Height: (in centimeters to 0.5 cm)	Height: (in centimeters to 0.5 cm)	Height: (in centimeters to 0.5 cm)
Weight: (in kilograms to 0.1kg)	Weight: (in kilograms to 0.1kg)	Weight: (in kilograms to 0.1kg)

Child ID:_____ Child Gender M F

Date: _____

Measure 1	**Measure 2**	**Measure 3**
Height: (in centimeters to 0.5 cm)	Height: (in centimeters to 0.5 cm)	Height: (in centimeters to 0.5 cm)
Weight: (in kilograms to 0.1kg)	Weight: (in kilograms to 0.1kg)	Weight: (in kilograms to 0.1kg)

$$\text{BMI} = \frac{\text{(weight in kilograms)}}{\text{[(height in meters x height in meters)]}}$$

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