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Parental Practices And Home Environmental Influences On Children's Physical Activity In A Controlled Lab Setting: An Observational Study

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PARENTAL PRACTICES AND HOME ENVIORNMENTAL INFLUENCES ON CHILDREN'S PHYSICAL ACTIVITY IN A CONTROLLED LAB SETTING: AN OBSERVATIONAL STUDY

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May, 2020

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ABSTRACT

There has been a rise of obesity in children, adolescents, and adults over the past decades. This rise in obesity has led to many health concerns such as cardiovascular disease, diabetes, hypertension, some cancers and depression. Physical activity [PA] has been shown to decrease these risks and aid in positive growth and development for children and adolescents. The primary aim of this study was to examine the relationship between parental and child PA in a controlled lab experiment. The secondary aim was to examine parental practices (physical and social home environment) and their influences on children's PA in a controlled lab setting. Participants of this study completed a survey (n=27 parent/child dyads, parent age = 39.8±5.7 years, child age in months = 122.9±16.7, parent BMI = 29.9±5.3, child BMI percent= 68.5±23.42.9) examining PA and sedentary behaviors daily, along with home environmental practices. Participants were recruited through email, flyers, and newsletters and these participants partook in the experiment on two different days. Day one, participants signed a consent form and completed their survey and had height and weight taken for BMI. Day two consisted of the one-hour lab experiment. The controlled lab setting provided age appropriate PA/SB activities for the child/parent lab and when complete, the dyads were compensated for volunteering to our study. Data was analyzed by Pearson correlations and t-tests in SPSS v26. Results showed there was not a significant association between physical activity and obesity ($p>0.05$). However, overweight/obese children

did have a parent with a higher BMI compared to normal weight children (28.6 vs. 32.5; p=0.046). Children who participated in higher PA in the lab also had higher amounts of screen time reported (226.6 vs. 131.3; p=0.024). This study suggests that parental practices and weight status can influence children's PA and SB. Future research should examine whether parents and children participating in PA together to reduce obesity is a potential strategy to improve both child and parent health and quality of life.

Introduction

a. Background

Obesity is a critical public health concern in adults and children in the United States and globally (Ash et al., 2017; Fuemmeler et al., 2011). Data from 1999 to 2018 indicates that obesity in adults has grown from 30.5 to 42.4 percent, while children increased from 13.9 to 18.5 percent (Centers for Control Disease and Prevention [CDC], 2019). In 2013, the World Health Organization [WHO] reported that 42 million children globally under the age of 5 years old were either overweight or obese (McMurrary et al., 2017), while in 2014, 18 percent of U.S. children and adolescents (ages 6-19) were overweight and 17 percent were obese (McMurray et al., 2017). Prevalence rates of obesity are also climbing, ranging from 35.7 to 42.8 percent in adults aged 20-39 to 40-59 years, respectively (CDC, 2017). In children (2-5 years old) 13.9 to 20.6 percent of adolescents (12-19 years old) (CDC, 2017). Obesity is a multifactorial problem (Fuemmeler et al., 2011); however, studies have shown that low physical activity [PA], and high amounts of sedentary behavior [SB] have negative effects on children's health; physically and

psychologically (Ash et al., 2017; Garriguet et al., 2017; Jago et al., 2010; McMurray et al., 2017). Prevention of childhood obesity is of critical importance due to the increased chronic health risks that continue into adulthood, ultimately leading to premature mortality (Pyper, Harrington & Manson, 2016). The medical care cost per obese individual rose 14.3 percent from 2005 to 2010, resulting in a 48.7 percent increase for the United States population – rising from 212.4 billion dollars increased to 315.8 billion dollars (Beiner et al., 2017). So, studying the effects, along with the prolonged effects of physical inactivity could help aid in lowering these medical costs and decrease the continuous rise of obesity.

Childhood obesity is associated with increased health risks for a variety of chronic diseases (CDC, 2017), and specifically to cardiovascular disease, certain cancers, osteoarthritis, poor glucose tolerance increasing risk for type 2 diabetes, sleep apnea, hypertension, and depression (Jago et al., 2010 ; Lobstein, Baur, & Uauy, 2004; Schoeppe & Trost, 2015). Furthermore, overweight and obese children are more likely to become overweight adults (Serdula et al., 1993; Whitaker et al., 1997). Physical activity aids in positive growth and development and reduces risk for chronic disease (CDC, 2019; Laukkanen et al., 2017; Schoeppe & Trost, 2015). PA guidelines recommend 2.5 hours (30 minutes, 5 days per week) of moderate-vigorous aerobic activity, while children and adolescents are recommended to achieve 60 minutes of PA daily (National Heart, Lung, and Blood Institute [NIH], 2013). Screen time for children over two years of age should not exceed two hours (American Academy of Pediatrics [AAP], 2011), and as they age, parents must set limits on screen time for children making sure it does not affect PA, sleep, or social skills (Wu et al., 2015). Children who are overweight also engage in more TV viewing (Grund et al., 2008). Many children do not meet the recommended PA guidelines (Dunton et al., 2012; Fuemmeler et al., 2011; Jago et al., 2010), yet seem to have

an excessive amount of sedentary behavior (SB), with screen time being the largest factor (Jago et al., 2010). As children grow older, especially during adolescent years, PA levels decline dramatically (Jago et al., 2010; O'Connor et al., 2013). Less than 50 percent of children (6 to 11 years) and only 6 to 11 percent of teenagers (12 to 15 years) meet the recommended PA guidelines and reach up to 7.5 hours of SB daily (Jago et al., 2010; Rosen, 2014). Children are accumulating too much screen time, with 60 percent of youth watching more than two hours of television plus over 90 minutes of internet per day. Additionally, screen time has been shown to increase with age (Brindova et al., 2014). Increasing PA among children while decreasing SB has many positive benefits for children's overall health and alleviates risks for future health risks (Dunton et al., 2012; Fuemmeler et al., 2011).

Parents play an important role in creating a healthy lifestyle for their children by being a role model for PA and SB behaviors, co-participation in activities, and encouraging children to participate in PA (Ash et al., 2017; Dunton et al., 2012; Fuemmeler et al., 2011; Garriguet et al., 2017; Jago et al., 2010; McMurray et al., 2017; Schoeppe & Trost, 2015; Stearns et al., 2016). Numerous studies have shown a positive association between children's PA level and parental modeling, with social support and encouragement being the most influential factors (Dunton et al., 2012; Garriguet et al., 2017; Jago et al., 2010; McMurray et al., 2017; Schoeppe & Trost, 2015). Additionally, parental support has also been shown to maintain this increased PA over time (Dunton et al., 2012). Many strategies exist for parents to increase child PA and decrease SB. Specifically, by creating a healthy, active home; enrolling their children in sporting activities; transportation to activities; and encouragement to continue living an active lifestyle are linked to increased children's physical activity (Garriguet et al., 2017; McMurray et al., 2017). Physically active parents have been shown to be highly correlated with having physically active

children (Dunton et al., 2012), while it is more likely that obese parents will have obese children (McMurray et al., 2017). Some research also suggests that having physically active parents is more strongly associated with boys PA compared to girls (Fuemmeler et al., 2011). When children have two parents who are physically active, girls are four times more likely to be physically active and boys are eight times more likely to participate in sporting activities compared to their sedentary parental counterparts (Dunton et al., 2012). To reduce the risk for chronic disease and premature mortality in adulthood, we will examine the parent-child relationship of PA and SB. Understanding the family and home environment relationship is important as parents provide healthful options and build children's skills to promote healthful behaviors to prevent obesity. Children's decisions to be active or sedentary, are made in the context of the choices parents and adults provide for them (Davidson & Jago, 2009; Rosenkranz & Dzewaltowski, 2008).

A gap exists to understand the parent-child PA and SB relationship (McMurray et al., 2017). Some studies have shown mixed results with either a positive association or no association when examining parent-child PA and SB (Dunton et al., 2012; Garriguet et al., 2017; O'Connor et al., 2013). While some evidence illustrates a consistent pattern of SB between parent-child relationships, a meta-analysis of screen time and PA found a negative, and weak association (O'Connor et al., 2013). There is still little information known about PA between obese parent-child relationships (McMurray et al., 2017), and to what extent parental influence will affect children is still being studied to create new interventions to increase PA to lower future health risks (Fuemmeler et al., 2011).

There is a plethora of evidence examining the relationship between parent and child PA and SB; however, it is unknown what type of influence the parents portray for the child, meaning

is it important for the child to see their parent being active, the parent being involved in PA with the child, the child knowing the parent is being physically active, or merely the parent being active without the child's knowledge. Thus, we aim to examine the mechanism to which active parents may have more active youth.

b. Purpose of the study

The primary aim of this study was to examine the relationship between parental and child PA in a controlled lab experiment. The secondary aim was to examine parental practices (physical and social home environment) and their influences on children's PA in a controlled lab setting. We hypothesized that normal weight parents and parents that were more physically active will have higher active children. We also hypothesized that parents who encourage their children and provide a physically active home environment (both physical and social) will result in more physically active and normal weight (as compared to overweight/obese) children.

Methods

a. Participants and Design

Participants included a volunteer sample of parent and child dyads (n=27) with the parent being self-identified as primary care giver and children ranging in age from 8 to 13 years. Recruitment was conducted throughout the Grand Forks community through flyers, emails, list-serves, and the Grand Forks Public School newsletter. The flyer explained what department needed volunteers for research, the age range, what they will be participating in, clothing attire, when it will take place, and contact information for further questions or concerns. Each dyad was

compensated sixty dollars after they had completed both stages of the study for their willingness to participate in the research study. The University of North Dakota IRB approved this study.

b. Procedure

Two racquetball courts were converted into separate research laboratories for this study. As participants arrived in the lab, the procedure was discussed, and a consent form was handed out and signed for both the parent and child. Parent-child dyads completed two separate one-hour sessions on different days. On day one, parent and child were asked to complete a survey that included physical activity, sedentary behavior, and eating behaviors, as well as physical and social home environment. Measures, such as height and weight, were used to calculate body mass index [BMI]. The graduate assistant [GA] had each participant try on an accelerometer, to demonstrate and explain the equipment that would be in the rooms during the day of the study. Parent physical activities included a stationary bike, jump rope, boxing, step aerobics with video, and an elliptical. Parental sedentary activities include puzzles, magazines and books, cards, small games, and a television with DVDs to watch. Child physical activities included a basketball with hoop, hockey with net, hula hoop, jump rope, and yoga mat with video. Child sedentary activities include puzzles, magazines and books, cards and small games, coloring books, and a television with child DVDs to watch. Participants were asked to try each of the equipment with the accelerometer on to ensure they felt comfortable using each activity. After they tried each activity, both parent and child were given another survey to rank the level of enjoyment for each activity.

Upon arrival for the second session, GAs assisted the participants in putting on their accelerometer and provided information regarding the study procedures. Participants were given

instructions for what they could do for the next 60 minutes. The parent was in one racquetball court and the child was in a separate racquetball court next door. The parent and child could not see each other or communicate with each other during the hour session. The parent and child waited for each GA to go to the observing station (above the racquetball court) and once the GAs were in place to observe each racquetball court, the participants were instructed that the hour was to start and that they could do "whatever they wanted". At the time the study was to start, the GAs were prompted by an iPod or cell phone timer to observe for 20 seconds followed by 10 seconds to record; this process continued for the 60 minute session with a total of 120 observations recorded. The GAs used a modified SOFIT observation form (See Appendix A) and circled whether the parent and child were active (A) or sedentary (S), and GAs were able to write specific observations, such as if a parent was on the elliptical while watching TV, or if the child was laying down doing a puzzle, etc.. Active behavior was operationalized as the participant was moving their body and not merely sitting or standing. Sedentary behavior was coded when the participant was lying down, sitting, or standing (without movement).

Measures

a. *Body Mass Index*

Parent and child had their height and weight measured to asses BMI. Height was measured to the nearest millimeter, using a portable stadiometer (Seca Corp, Model 213, Hamburg, Germany), while weight was measured to the nearest 0.1 kg using high precision digital scales (Seca Copr, Model 770, Hamburg, Germany). Each measurement was obtained twice; however, if they differed more than 5mm for height or 0.1 kg, a third measure was taken, and the two closest measures were averaged to assess BMI. BMI was calculated for adults by

dividing weight (kg) by height² (m), and for children dividing weight (kg) by height² (m) and adjusting for child's age and sex. Results of BMI for both parent and child were determined from the Centers for Disease Control and Prevention index (Kucamarski et al., 2000).

b. 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 sixty-minute session. After completion of the 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.

c. Parent Survey

Parents responded to a survey that assessed the home physical environment for the availability of fruits and vegetables, physical activity equipment, and media; child behaviors such as screen time, physical activity, and food consumption; parenting practices such as, active/passive (monitoring and limit setting) mediation for children's eating and activity; parent social support for physical activity and screen time; parent screen time and physical activity; parent enjoyment for physical activity; parent self-efficacy for physical activity and parent/child demographics. Items on the parent survey were used or adapted from existing measures and from constructs used in similar populations.

Home Physical Environment was assessed via physical activity equipment availability in the home using a yes/no format, and equipment items were selected from previously validated

surveys for school-aged children (Gattshall et al., 2008; Ward et al., 2008). The number of media items available in the home and in the child's bedroom was chosen from several measures, including the Physical Activity and Media Inventory (Sirard et al., 2008); Healthy Home Survey (Bryant et al., 2008); and Spurrier and colleagues (2008) instrument. Seven media availability items for the home and children's bedroom were assessed as available (yes/no) separately: television, cable, digital video recorder, DVD player, computer internet, and video game systems.

Child Behaviors were parent reported for children's PA and screen time was used, as evidence suggests that parents are able to accurately assess children's behavior (Sithole & Veugelers, 2008). Child screen time behavior was assessed using a modified SMART Questionnaire (Robinson et al., 1995). The SMART Questionnaire has been shown to be a valid instrument to assess child-reported screen time behaviors. In a sample of 80 children, observations and survey items had excellent correlations (r=0.94). Four items assessed screen time behavior yesterday and last Saturday, and scores were averaged. Screen time behaviors included: watching television, watching movies or videos, playing video games, and playing on a computer. Appropriate examples were provided for each screen time behavior. Responses were given on a 9-point scale from none, 15 min, 30 min, 1 hour, 2 hours to 6 or more hours.

Child PA was assessed using the PACE + PA measure (Prochaska, Sallis & Long, 2001). Parental report of child PA has been shown to more accurately assess child PA than child self-report in this age group (Sithole & Veugelers, 2008). Children were categorized as meeting guidelines if they performed MVPA five or more days per week for at least 60 minutes.

Parental passive (monitoring) and active (limit setting) mediation for children's PA and screen time behaviors were assessed. Two items assessed monitoring for two child behaviors, physical activity or sports and screen time. An example item is, "How often do you keep track of the time your child is watching TV or videos?" Two items assessed limit setting for the same two child behaviors, such as, "How often do you place limits on the amount of time your child spends watching TV or videos?" Monitoring and limit setting are commonly assessed parenting practices (Arredondo et al., 2006; Birch et al., 2001; Larios et al., 2009). Five-point response scales that ranged from "never" to "always" were used.

Parent Support for Child Physical Activity was assessed via the frequency in which parents supported their child to participate in physical activity. An example question, "During a typical week, how often would you encourage your child to do physical activity or play sports" (Trost et al., 2003). To assess parent support for screen time behaviors, five items were used. An example question, "During a typical week, how often would you watch TV or DVDs with your child?" Parents responded using a six-point scale from never to daily.

Parent Physical Activity Enjoyment was assessed using the PA Enjoyment Scale (Kenrierski & De Carlo, 1991). A total of 17 questions assessed PA enjoyment. Responses were scored on a five-point scale. Examples of the PA enjoyment scale was, please rate how you feel when you participate in physical activity: I enjoy it versus I hate it; I feel bored versus I feel interested.

Parent Physical Activity Self-Efficacy was assessed with five items using a five-point Likert Scale from Not at All Sure to Very Sure (Bandura, 1986). An example of the parent PA

self-efficacy questions was, “How sure are you that you can be physically active even if it is hot or cold outside?”

Data Analysis

All data were analyzed in SPSS 26. To assess the primary aim, a pearson correlation was used to examine the relationship between accelerometer parent and child physical activity. To examine the relationship between accelerometer versus observation physical activity, a paired t-test was used. Lastly, to examine parental practices that are associated with child PA, we split the children into two groups based on their PA (high PA and low PA), and conducted independent t-tests. Similarly, children were categorized as normal weight or overweight/obese and analyzed using independent t-tests to examine differences in parental practices.

Results

A total of 27 parent-child dyad volunteers participated in our study. Parent participants include 7 males and 20 female participants with an average age of 39.8 years (SD=5.7). Four of the participants (14.8%) were eligible for free-reduced lunch. A total of 23 parents (85.2%) were White, two were non-White (7.4%) and two preferred not to answer (7.4%). The average parent BMI was 29.9 (SD=5.3) with 13 of 27 parents being obese (48.1%), and 11 out of 27 being overweight (40.7%). Child demographics included 16 males and 11 female participants with an average age of 119.6 (SD=13.7) months old. Twenty-three of the 27 children were white (85.2%) and the average BMI percent was 68.5% (SD=23.4). Eighteen (66.6%) of the children were normal weight and 9 were overweight or obese (33.3%). Participant demographic characteristics are reported in Table 1.

a. Parent and Child Physical Activity and Obesity

Contrary to our hypothesis, there was not a significant correlation between parent and child physical activity measured by accelerometer in a controlled laboratory setting (r=0.234, p=0.240). Similarly, there was not a significant association between physical activity and obesity (Table 2). The majority of parent population was overweight or obese; however, parents partook in higher amounts of PA compared to children in the lab setting.

To examine accelerometer versus observed physical activity, a paired t-test was used (Table 3). As hypothesized, there was not a significant difference between parent physical activity assessed by accelerometer and observation (47.8 min vs. 48.0 min, p=0.161). Similarly, there was no difference between accelerometer and observed child physical activity (39.8 min vs. 39.8 min, p=0.587). Thus, the observational instrument was validated in a controlled lab setting as it did not significantly differ from the accelerometer data.

b. Parental Practices and Child BMI

Children were categorized as normal weight (n=18) or overweight/obese (n=9) from height and weight measurements (Table 4). Variables from the parent survey: physical equipment in the home, screens in the home and child's bedroom, child screen time per day, parent limit setting, parent social support for physical activity and screen time, parental enjoyment for PA, parent self-efficacy for PA and parent BMI. Normal weight children had less PA equipment in the home (M=13.5 ±1.6) compared to overweight/obese children (M=15.0 ±2.1; *p*=0.031). Parents of normal weight children had a lower average BMI (M=28.6 ± 4.2) compared to parents of overweight/obese children (M=32.5 ±; *p*=0.046). Normal weight children reported less screen time minutes per day (M=154.2 ± .2) compared to overweight/obese

children (M=244.3 ± 119.1; p=0.045). Child PA reported by their parent was higher for normal weight children (M=5.4 ± 1.9) compared to overweight/obese parents (M=3.9 ± 1.6; p=0.041).

c. Parental Practices and Child Physical Activity

Child PA was determined from accelerometer time collected in the controlled lab. Variables from parent survey were the same from parental practices and child BMI. Children were categorized into two group, the first as being active for less than 40 minutes (n=12) and 40 or more minutes of MVPA time (n=15). Those children who participated in < 40 minutes of PA in the lab reported an average of 131.3 (SD=78.8) minutes of screen time per day and children who participate in ≥ 40 minutes of PA in the lab averaged 226.6 (SD=117.7, p=0.024) minutes of screen time per day (Table 4).

Discussion

To our knowledge, this was the first study to examine parent and child PA in a controlled laboratory setting. Contrary to our hypothesis, we were not able to support our primary aim that more active parents were associated with more active children in a controlled laboratory setting. There was a high percentage of overweight and obese parents in this experiment, and these parents showed higher amounts of PA in the lab compared to children. Perhaps, parents lack the time to be active on their own, but when given the opportunity to have an hour of time to themselves, they chose to be active. Child SB could be due to our age group of these children, because they seem to define their own independence and decision making (Jago et al., 2010). Jago and colleagues (2010) also found that an absence of association between parent and child PA with our age group is not due to modeling behaviors, but it more highly impacted by parent to child influence: signing children up for PA/sporting activities, transporting them to and from,

along with supervision and encouragement to participate. Additionally, there was not a significant association between parent and child physical activity. Interestingly, several parent-reported variables were associated with child physical activity and weight status in our study.

The secondary aim was to examine the relationship between parenting practices and the home environment on children's physical activity and weight status. Lab experiment and survey data showed normal weight children reported having less PA equipment items in the home compared to overweight/obese children. This suggests that overweight/obese children had more opportunities to be physically active inside the home compared to normal weight children. This is contrary to our hypothesis, where we anticipated that homes that were more physical activity promoting, would have more normal weight and physically active children. One reason for these overweight/obese children to have a higher BMI could be due to food consumption, rather than PA/SB time (Emery et al., 2015). Also, as shown in this experiment and past literature, overweight/obese children typically spend more time being sedentary rather physically active, thus it may have been more "novel" to them to have ample opportunity to engage in physical activity during the one-hour laboratory study. In turn, these children may have more opportunity to be active; however, if they are not using the PA equipment and continuing to be sedentary for longer periods of time, the likeliness for them to overweight/obese will continue to increase.

Interestingly, we expected that children who engaged in less screen time at home, to be more physically active in the lab. However, our hypothesis was not supported. Children who engaged in more PA in the lab also reported more screen time in the home. We hypothesized that those who normally have higher screen time did not have as many opportunities to be physically active at home. Thus, when given more opportunities in the controlled lab to use PA equipment, they chose to be more physically active rather than being sedentary. Research has

shown that PA and screen time is unrelated in children and adolescents. Meaning, children can engage in high amounts of both PA and screen time (Taveras et al., 2007). Additionally, screen time and SB are separate/individual constructs than PA, and essentially found to have no relationship (Taveras et al., 2007). Recent studies found that an increase in PA does not necessarily lower SB in children and adolescents (Greca, Silva & Loch, 2016). Nelson and colleagues (2005) suggests that regulating PA/SB is a "complex series of decision-making mechanisms" and even if parents were to limit and discard screen time, that will not guarantee an increase of PA (Nelson et al., 2005).

Overweight/obese children were more likely to have an overweight parent, however, physical activity status in the lab did not significantly relate to parent weight status. One possible explanation could be food consumption. Overweight/obese individuals are more likely to intake higher caloric diets than those of normal weight (Emery et al., 2015). Another possible explanation could be parental BMI. Emery and colleagues (2015) suggest that parent BMI has a strong influence on child BMI. This was corroborated in our study, whereas overweight children were significantly more likely to have a parent with a higher BMI compared to normal weight children. Parent lifestyle choices also correlate as a strong predictor of children's lifestyle choices and ultimately their BMI (Emery et al., 2015). Normal weight children also reported fewer minutes of screen time per day compared to the overweight/obese children, showing correlations with previous literature stating higher levels of screen time or SB increases the likeliness of becoming overweight or obese (Garcia et al., 2018; Rosen et al., 2014). Parents of normal weight children reported they participated more days each week of PA compared to children who were overweight/obese. This also correlates with previous literature stating the less

time spent being physically active increases risks for overweight and obesity/obese increase (Garcia et al., 2018).

a. Strengths and Limitations

This study had several strengths. First, this study utilized objectively measured height and weight used to calculate BMI in parent and their child. Second, an accelerometer was worn to objectively assess physical activity in a controlled laboratory setting. Third, the parent and child did not know what was being observed. They were told to engage in any activity available for the 60-minute duration and could change activities whenever they felt. Fourth, age appropriate PA/SB equipment was provided for the child or parent to choose what they prefer. This study exhibited an example of a home environment with child and parent in separate rooms to compare child PA to parent PA, and without prompting, the parent-child dyads could engage in any type of activity that they chose. Last, all parent-child dyad who completed the first session completed the study, and thus, there was zero attrition rate. In addition to the strengths, every study is not without limitations. First, the sample size for our study was smaller than anticipated, so finding significant relationships may not be as accurate with a bigger sample size. Second, a lot of the independent variables was analyzed from self-reported surveys, which may have increased bias and less generalizability. Last, there is a gap in the literature in parent-child PA in a controlled laboratory setting. We were unable to compare our data to previous studies since there have not been many studies that have been conducted in a controlled laboratory setting.

b. Future research

Previous studies have shown that physical activity/inactivity in youth and adolescence is associated with future BMI and health risks (Garcia et al., 2018). This should be a topic of concern due to prevalence and continuous rise of obesity rates within children/adolescences and adults. Our research explores a novel area to examine the relationship between home environment to parent and child PA/SB relationships in a controlled laboratory setting. Previous studies have shown that parenting styles shape children's lifestyle behaviors and choices for food consumption, PA/SB, and obesity risk (Elder et al., 2015). Thus, studying parent behaviors for PA/SB and home environment to improve the likeliness of their child being physically active could help decrease the obesity rise and lower chronic health risks for the future. Furthermore, preventing childhood obesity is an important public health concern, and targeting parents and adults may be one way to stop the increase of child obesity.

Conclusion

The prevalence of childhood obesity is an important public health concern requiring immediate attention. Children's decisions to be physically active or sedentary are made in the context of the choices parents and adults provide for them. From a public health perspective, the ability to positively impact the physical and social home environment to increase physical activity in children is critically important. As previous research suggests, parent influence on children is an important factor to increase PA among children. Increasing parental encouragement and influence for child PA is beneficial for a child's overall physical, and ultimately mental health compared to just parent modeling. Public health strategies using evidence-based practices is warranted and promoting parent and child physical activity together as an intervention is needed (Rhodes & Lim, 2017).

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Appendix

Table 1: Parent and Child Demographic Characteristics (n=27)

Parent	N=27 (%)
Mean Age in Years, (SD)	39.8 (5.7)
Gender, n (%)	
Male	7 (25.9)
Female	20 (74.1)
Socioeconomic status, n (%)	
Not eligible	23 (85.2)
Eligible for free-reduced lunch	4 (14.8)
Ethnicity, n (%)	
White	23 (85.2)
Non-White	2 (7.4)
Preferred not to answer	2 (7.4)
Marital Status, n (%)	
Married	27 (100)
Mother Education	
High school	0
Some college	8 (29.6)
Graduated college	6 (22.2)
Masters degree or above	12 (44.4)
No Answer	1 (3.7)
Father Education	
High school	5 (18.5)
Some college	7 (25.9)
Graduated college	10 (37.0)
Masters degree or above	5 (18.5)
BMI, mean (SD)	29.9 (5.3)
Normal weight	3 (11.1)
Overweight	11 (40.7)
Obese	13 (48.1)
Child Demographics	N=27 (%)
Gender	
Male	16 (59.3)
Female	11 (40.7)
Mean Age in Months, (SD)	122.9 (16.7)
Ethnicity	
White	23 (85.2)
Non-White	1 (3.7)
Preferred not to answer	3 (11.1)
BMI, mean (SD)	68.5 (23.4)
Normal weight	18 (66.7)
Overweight or obese	9 (33.3)

Table 2: Pearson correlation matrix table

Variables	1	2	3	4
1. Parent PA min (Accel)	-			
2. Child PA min (Accel)	0.234	-		
3. Parent BMI ml/kg^2	-0.314	-0.283	-	
4. Child BMI %	-0.010	0.062	0.120	-

*$p < 0.05$
**$p < 0.01$

Table 3: Parent and Child Physical Activity and Sedentary Behavior in the Laboratory Experiment

	Accelerometer		Observation		*t*	*p*
	Mean (SD)	% (SD)	Mean (SD)	% (SD)		
Parent						
Active Minutes	47.8 (15.7)	80.1 (26)	48 (15.7)	80.4 (25.9)	-1.442	0.161
Sedentary Minutes	11.6 (15.3)	19.6 (25.9)	11.6 (15.3)	19.6 (25.9)		
Child						
Active Minutes	39.8 (13.6)	67.8 (23.1)	39.8 (13.7)	67.9 (23.1)	0.550	0.587
Sedentary Minutes	18.8 (13.6)	32.2 (23.1)	18.8 (13.6)	32.2 (23.3)		

Table 4: Paired t-tests examining parent communication and practices and children's PA and weight status

	Child Weight Status			Child Physical Activity		
	Mean	Mean	*p*	Mean	Mean	*p*
PA equipment in the home	13.5 ± 1.6	15 ± 2.1	0.031*	14.2 ± 1.8	13.8 ± 1.9	0.61
Screens in Home	6.6 ± 1	6.9 ± 0.4	0.49	6.8 ± 0.6	6.6 ± 1.1	0.46
Screens in Child's Room	1.4 ± 1.7	1.5 ± 1.7	0.88	1.3 ± 1.5	1.5 ± 1.8	0.44
Child Screen time (min/day)	154.2 ± 97.2	244.3 ± 119.1	0.045*	131.3 ± 78.8	226.6 ± 117.7	0.024*
Child Physical Activity parent-report) days/wk	5.4 ± 1.9	3.9 ± 1.6	0.041*	4.6 ± 2.1	5.2 ± 1.9	0.43
Keep track of child Screen Time	2.9 ± 0.7	2.9 ± 1.3	1	2.8 ± 0.8	2.9 ± 1	0.79
Keep track of PA or Sports	3.00 ± 1.1	3 ± 1	1	2.9 ± 1.1	3.1 ± 1.1	0.72
Place limits on child TV	2.9 ± 0.83	3 ± 1	0.76	2.9 ± 0.7	2.9 ± 1	0.96
Encourage Child PA or Sports	2.9 ± 1.3	3.6 ± 0.7	0.14	3.2 ± 0.8	3.1 ± 1.5	0.94
Parental Social Support for PA	15.2 ± 4.5	14.4 ± 3.7	0.68	14.1 ± 4.1	15.6 ± 4.3	0.36
Parental Social Support for Screen Time	9.4 ± 2.5	9.2 ± 3.7	0.89	9.3 ± 3.3	9.3 ± 2.6	1
Parent PA Enjoyment	67.1 ± 13.1	67.8 ± 13.5	0.91	69 ± 14.8	66 ± 11.6	0.56
Parent PA Self-Efficacy	2.5 ± 0.9	2.7 ± 0.9	0.64	2.3 ± 0.9	2.8 ± 0.9	0.14
Parent BMI	28.6 ± 4.2	32.5 ± 6.4	0.046*	31.1 ± 6.8	28.9 ± 3.6	0.34

*p<0.05

Appendix A: Observation Form:

Name: _____ Parent or Child *(circle)*

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

Start Time	End Time	Active or Sedentary *(circle)*	Equipment playing with	Comments
		A S		
		A S		
		A S		
		A S		
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