

PARENT INTERVIEWS ON CO-PARTICIPATION OF PHYSICAL ACTIVITY WITH
THEIR PRESCHOOL-AGED CHILD: EXAMINING THOUGHTS AND RACIAL
DIFFERENCES

By

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ABSTRACT

Objective: This study aimed at understanding parent's perceptions about co-participation of physical activity with their preschooler and compared these perceptions between White and Black, Indigenous, and people of color (BIPOC) parents. **Methods:** A sample of 30 parents of preschool-aged children (2-to-5-years-old) were interviewed on their current physical activity interactions with their child and what future activities they would want to do. **Results:** The sample included both BIPOC (n=16) and White (n=14) parents. All parents were mothers with the majority of them being married and over half met physical activity recommendations. Parents mentioned it was important to be active with their child, as physical activity co-participation allowed bonding time, educational moments, and healthier lifestyles. Common barriers for physical activity co-participation were time, compromising for a preschoolers age and mood,

resources and availability of space, weather, and health. Common facilitators mentioned were social interactions, planned physical activity events, weather, and availability of space to be active. One unique theme discussed by the parents was the social aspect that physical activity co-participation provided. These social aspects for co-participation included: others being involved in physical activity, meaningful interactions between people, and the impact on others. Lastly, racial differences were found between the groups. Parent perceptions differed in thoughts on sedentary lifestyles in today's society, modeling physical activity, and using physical activity as a way to help expend their child's excess energy. White parents mentioned more concern about today's society being more sedentary compared to BIPOC parents, whereas BIPOC parents mentioned more that modeling physical activity as important and using physical activity as a way to improve health and expend energy for their child. As for barriers, White mothers noted that distractions due to screen time was an important barrier whereas BIPOC mothers mentioned inadequate resources for physical activity and health concerns. The one difference for facilitators of physical activity co-participation was due to availability of space for physical activity, where Whites mentioned having more space to be active and BIPOCs mentioning they would want more space to be active with their child. Lastly, regarding social aspects, White parents highlighted physical activity co-participation resulted in more educational moments, but BIPOC mothers highlighted the importance co-participation has for motivating others to be active and the need for setting goals to support future physical activity. **Discussion:** These findings can be used to create future interventions that meet the needs of parents and preschool-aged children when promoting physical activity co-participation. Because there were differences in perceptions between Whites and BIPOCs, certain areas should be considered over others when developing a parent-based physical activity intervention for specific races.

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CHAPTER 1: INTRODUCTION

Insufficient physical activity and unhealthy eating habits are positively associated with higher obesity rates in children. In the United States, overweight and obesity levels have increased in children less than 5 years old, where currently 13.9% of preschool-aged children are obese (Hales et al., 2017). Further, worldwide it is predicted 70 million children will be either overweight or obese by 2025 (WHO, 2017). Race also impacts obesity rates, where obesity levels were higher in non-Hispanic African American youth and Hispanic youth than in non-Hispanic White youth and non-Hispanic Asian youth (Hales et al., 2017). One reason why obesity in childhood is a concern is because it tracks well through childhood and into adulthood (Geserick et al. 2018). Given the negative impact of obesity on health and the high prevalence of obesity and inactivity in preschool-aged children, interventions are important to target this population and decrease the prevalence of obesity in preschoolers. Also, if there are racial differences in the obesity rates, then obtaining more data on these differences will be important for creating the best interventions to decrease obesity levels that tailor to individual races.

Physical activity participation in preschool-aged children plays a major role in a child's life that will lead them to be either more active or sedentary as they get older. Further, physical activity is associated with improved cardiovascular fitness, muscular strength, and academic achievement and decreased depression and anxiety (PAG, 2018). Because physical activity has many health benefits, it is recommended that children between the ages 2-5 years accumulate 3 hours of daily physical activity and participate in active play activities, ranging from light to vigorous intensities (PAG, 2018). However, many children do not achieve recommended physical activity levels. Pate et al. (2015) examined preschool-aged children's compliance with

physical activity guidelines and found that only half of the children were active for 3 hours of physical activity (i.e., meeting the recommend levels).

Although preschool-aged children are not participating in enough physical activity, it is possible that racial differences in physical activity levels exist putting some children at a higher risk for health issues over others. Research has consistently shown that African American children and adolescents are less active compared to Caucasians (Richmond et al., 2007; White & Jago, 2012; Miller et al., 2019). However, limited research exists examining the impact of race on physical activity participation in preschool-aged children. The few studies that have examined racial differences in preschool physical activity levels has been mixed. Chuang et al. (2012) examined differences between Hispanic and African American preschoolers and found that African American preschoolers were less likely to have access to equipment, less space at home, and spent more time in sedentary behaviors compared to the Hispanic preschoolers. In contrast, Pate et al. (2015) did not find any differences in physical activity participation among preschool-aged children of different races. Given racial differences in physical activity exist in children and adolescents and the limited research is inconclusive among the preschool-age population, additional investigation is warranted. This is because if there are racial differences present in this younger age group, then it would be important to learn how to encourage and implement physical activity for different races in preschool-aged children.

Although preschool center-based interventions are important for preschool-aged children, parents play a major role in the development of healthy habits among this age group (Tucker et al., 2008). Unfortunately, few studies have focused on physical activity interventions at home with parents. Parents play an important role in their preschoolers' life, as preschoolers are not able to survive on their own without their parent. Parents are the ones responsible for getting

them through their day-to-day lives and creating habits that their child may follow. A parent-based physical activity intervention by DuBose and Dlugonski (2018) studied how children's physical activity levels changed based on the intervention that aimed to increase parents' physical activity levels. The results showed that while not statistically significant, the intervention group had small decreases in light, moderate, and total physical activity whereas the control group had large decreases in light, moderate, and total physical activity levels. Another parent-based intervention that wanted parents to increase their physical activity levels by increasing step counts each day found that when a parent met their goal (increased daily steps by 2,000), it positively predicted the child's increase in step counts for that day (Holm et al., 2012). Overall, these studies suggest that encouraging parents to increase physical activity levels and participate in these interventions for their children may be an effective way to increase preschool-aged children's physical activity levels.

Due to the lack of adequate physical activity, high obesity rates, and possible racial differences in these factors among the preschool-age group, finding ways to positively impact physical activity and obesity levels is important. Since the current knowledge of racial differences in parent-based interventions is unknown, research in this area is crucial. Parent-based physical activity interventions might be a possible way to improve physical activity and potentially decrease obesity levels in this age group. With the at-home intervention, self-determination theory will be a good application for physical activity interventions. Self-determination theory focuses on internal sources of motivation, allowing people to take more responsibility to create their own goals and take action to meet those goals (Cherry, 2021). Therefore, the purpose of this study is to implement a parent-based physical activity intervention to increase preschool-aged children's physical activity levels. It is hypothesized that preschool-

aged children will increase their physical activity levels over the course of the intervention relative to their pre-intervention (baseline) physical activity levels. A second purpose is to determine the effect of a parent-based physical activity intervention on obesity markers in preschool-aged children. I hypothesize that obesity markers will decrease with the intervention relative to the level of markers prior to the intervention. The third and final purpose is to determine if the effect of this intervention is different between White and African American preschool-aged children. It is hypothesized that there will be no differences between the White and African American preschool-aged children and their physical activity outcomes.

Since no participants were recruited for the study described above, a new study was created with a new purpose, which was to understand parents' thoughts on co-participation of physical activity with their child and identify if there are any racial differences between White and Black, Indigenous, and people of color (BIPOC) participants. This study was created to understand what could help make an intervention more effective in racially diverse participants for future studies. This study idea is novel as past research has not focused on physical activity co-participation in parents and preschoolers. Further, not only is there a paucity of research examining racial differences in the preschool aged population, but the results are mixed regarding if there are racial differences in physical activity participation. Therefore, it is hypothesized that there will be racial differences between White and BIPOC participants. The literature review found in Chapter 2 relates to the original (intervention) study. The methods for the study that was originally planned are found in Chapter 3: Methods and the methods and results for the new study are found in Chapter 4: Results.

Significance of the Study

This study is needed in order to identify ways to increase preschool-aged children's physical activity levels through a parent-based intervention. The parent-based intervention is important because parents have a critical role in the child's lifestyle development and few studies have focused on this previously. In addition, obesity levels are important to focus on for this population due to the fact that the prevalence rates have increased to 13.9% and is expected to trend upward over the years. One way to decrease obesity levels is to implement regular physical activity into everyday life. This study will aim to create a more active lifestyle for both the parent and the child. Lastly, no studies to our knowledge have examined racial differences in a parent-based intervention for preschool-aged children. This stresses how important it is to examine this unknown area and find any evidence that can help individuals from any racial background achieve the best results for increased physical activity and decreased BMI levels.

Delimitations:

- Participants will be from eastern North Carolina
- Participants will be self-reported African American or White
- Children participants will be between ages 2-5 years old

Definitions

- Preschool-aged children – ages 2-5 years old
- Physical Activity – any bodily movement produced by skeletal muscles that requires energy expenditure (WHO, 2020)
- Moderate and Vigorous Aerobic Activity – moderate intensity will increase your heart rate and cause the person to breathe harder, but still be able to talk; vigorous intensity will push the body to give higher effort and the person won't be able to talk as much

without becoming out of breath (AHA, 2018). Examples of physical activities of this intensity for preschool aged children include games such as tag; playing on the playground; tricycle/bicycle; walking, running, jumping, dancing; playing games that require catching, throwing, and kicking; gymnastics/tumbling (PAG, 2018)

- Muscle Strengthening Activity – Muscle strengthening activities require the body’s muscles to work against either an applied force or weight. Examples of muscle strengthening activities for preschool aged children include games such as tug of war; climbing on playground equipment; gymnastics (PAG, 2018)
- Bone Strengthening Activity – Bone strengthening activities produce an impact or tension force on the bones that promotes bone growth and strength. Examples of bone strengthening activities for preschool aged children include hoping, skipping, jumping; jumping rope; running; gymnastics (PAG, 2018)
- Childhood Obesity – body mass index value that is equal to or greater than the 95th percentile based on the child’s age and sex (CDC, 2018)

CHAPTER 2: LITERATURE REVIEW

Obesity

There has been an increase in childhood overweight and obesity levels over the years and if these rates continue, it is predicted that 70 million children worldwide will be overweight or obese in 2025 (WHO, 2017). In the United States, 13.9% of 2-5-year-olds are considered obese (Hales et al., 2017). The increases in obesity levels are concerning as several diseases are associated with overweight and obesity in childhood, including type 2 diabetes, asthma and increased risk for cardiovascular disease risk factors (WHO, 2017). Given the prevalence and negative health impacts of obesity, interventions are needed.

While obesity is an issue for children of all ages, it is important to focus on preschool-aged children, as Geserick et al. (2018) found that almost 90% of children who were obese at 3 years-old continued to be overweight and obese in adolescence. Further, the authors reported that body mass index (BMI) levels increased the most among children aged 2-6 years old compared to BMI increases reported in older children (Geserick et al., 2018). This study also reported that 43.7% of children who were considered large for gestational age at birth continued to have a higher BMIs during childhood and adolescent compared to children who were small for gestational age ($p < .001$) (Geserick et al., 2018). The results from this study indicate that excess weight gain starts early and tracks throughout childhood, underscoring the importance of focusing on this age group.

Obesity can be caused by many different factors. In the pediatric population, obesity is often the result of behavioral factors (i.e., nutrition and physical activity). As a result, many interventions have focused on these behavioral factors in a variety of settings. As an example, Roth et al. (2015) had preschool teachers be more involved in their student's physical activity

levels and assign them exercise homework over 11 months. The authors found that compared to the 16 overweight/obese children in the control group, the 23 overweight/obese children in the intervention group had a decrease in the sum of the four skinfolds by 11.4 mm post-intervention ($p=.036$)(Roth et al., 2015). These results indicate that changes only in physical activity can reduce a marker of obesity in preschool-aged children.

Physical Activity & Preschoolers

After examining the prevalence of obesity for preschoolers, it is important to examine the physical activity levels in preschoolers. This is because physical activity is associated with a wide variety of benefits that promote health, growth, and development in preschool-aged children (3-5 years old). Some examples of the benefits provided by physical activity include improved cardiovascular health and fitness, muscular strength and endurance, motor skill development, and a positive association with academic achievement (Roth et al., 2015; PAG, 2018). Due to the benefits physical activity provides, it is recommended that preschool-aged children are physically active throughout the day and participate in a variety of active play (PAG, 2018). Further, the 2018 Physical Activity Guidelines states that the activities should vary from light to vigorous intensities (PAG, 2018). While the guidelines do not state a duration of physical activity participation for this age group, it is suggested that 180 minutes per day would be a good goal.

Before the 2018 Physical Activity Guidelines were released, another group, the National Association for Sport and Physical Education (NASPE), recommended that preschool-aged children participate in at least 60 minutes of physical activity and several hours of unstructured play (National Association for Sport and Physical Education, 2002). Tucker et al. (2008) reviewed 39 studies on physical activity levels in preschool-aged children to determine if they

were in accordance with NASPE guidelines. The results showed that 56% of preschoolers met the recommended guidelines while 46% of preschoolers did not. Further, the results showed that the time spent in physical activity was positively related to outdoor playtime ($p=.001$), with the average time spent outdoors being approximately 146 min/day (Tucker et al., 2008). The study also established how preschooler's activity levels were not sustained over a long period of time, noting that preschoolers not only lack in the attention span, but also the motor development for continuous activity bouts (Tucker et al., 2008).

Since this systemic review by Tucker was published, others have examined the physical activity levels in preschool-aged children. Pate et al. (2015) used data from two independent studies to examine if preschool-aged children were meeting recommended levels of physical activity. Out of the 286 preschool-aged children who participated in the CHAMPS study, 41.6% met the physical activity guidelines. Half of the preschool-aged children from the SHAPES study met the physical activity guidelines. Given about half the children met the guidelines illustrates the importance of physical activity in preschool-aged children since many are not participating in enough daily physical activity. The results from these studies underscore the importance of developing interventions to increase preschooler's physical activity levels.

Even though preschoolers may not be getting enough physical activity, adding physical activity into their daily schedule can increase the time spent in moderate-to-vigorous physical activity (MVPA) levels. Preschoolers who completed 30-minutes of physical activity lessons for one year during their preschool day increased their MVPA time by 15% of total daily measurement time compared to preschoolers who did not have physically active lessons ($p=.049$) (Roth et al., 2015). This shows that simple changes in their daily schedule can make a big difference.

Another study showed that changing the playground environment can positively impact physical activity participation in preschoolers. Toussaint et al. (2020) examined the effects on the PLAYgrounds for TODdlers program on preschooler's physical activity levels. Teachers in the intervention group were instructed to create different activity zones on the playground and give enthusiastic and positive encouragements to the preschool-aged children. Preschoolers in the intervention group had an increase in the number of different activities available to them in the post-intervention observations ($3.06 \pm .72$) compared to the pre-intervention observations ($1.91 \pm .75$; $p < .001$). Some examples of different activities created on the playground included obstacle courses, ball games, and guided physical activity. These modifications increased the estimated physical activity intensity ($p < .001$) compared to the pre-intervention levels for both boys and girls (Toussaint et al., 2020). These studies indicate that it is possible to increase preschooler's physical activity levels with interventions.

Racial differences

Racial differences for preschool-aged children have been very scarce between White and African American children. Results have showed that some studies find differences, some don't, and some have mixed results. The studies listed below on will illustrate what trends have been found and the gaps in the literature that have not been explored.

Obesity

The prevalence of obesity has been reported to differ by race/ethnicity. A study by Lutfiyya et al. (2008) examined the prevalence of overweight and obesity among 43 million children aged 5-18 years old by examining data from the 2003-2004 National Survey of Children's Health. This study found that 49% of African American children, 44.0% of Hispanic children and 32.2% of White children were in the overweight and obese category. More

recently, Hales et al. (2017) used NHANES data from 2015-2016 to examine the prevalence of obesity among youth (ages 2-19) living in the United States. The authors reported that the overall prevalence of obesity was higher in non-Hispanic African American youth (22.0%) and Hispanic youth (25.8%) than in non-Hispanic White youth (14.1%) and non-Hispanic Asian youth (11.0%). Finally, Skinner et al. (2017) conducted a study on the prevalence of obesity in United States children (aged 2-19) from the NHANES data between 1999-2016 and found that African American and Hispanic children had higher prevalence rates compared to White and Asian American children ($p < .001$). The study also reported a significant increase in severe obesity among 2-5-year-old children, jumping from 9.3% in the 2013-2014 cycle to 13.7% in the 2015-2016 cycle ($p < .005$) (Skinner et al., 2017). The studies above showed how the prevalence of obesity is higher in African American children compared to White children which should make them a targeted population to decrease this onset of obesity.

Throughout childhood years, body mass index (BMI) levels can fluctuate between children due to developmental age. A study by Akhabue et al. (2018) examined BMI demographic characteristics for children aged 5 to 20 years old by gender and race. There were 3274 girls with an average age of 10 ± 5.2 and 2429 boys with an average age of 8.5 ± 4.3 (Akhabue et al., 2018). Fewer Whites females were obese compared to African Americans and Hispanics (18.9% compared to 23% and 24.9%, $p < .01$) (Akhabue et al., 2018). In contrast, among boys no significant difference in obesity rates were reported between races, with White at 27.6%, Hispanic at 27.5%, and African American at 27.5% (Akhabue et al., 2018). The study also found that Hispanic females had a significant yearly increase in mean BMI percentile during the 5-9 age growth period compared to White females, with +2.42% per year (CI: .05, 4.79, $p = .045$). Both African American and Hispanic males had a significantly greater rate of change in BMI

percentile per year compared to White males, with African American vs White being +2.35% per year (CI: .76, 3.94, $p=.004$) and Hispanics vs Whites being +2.63% per year (CI: .31, 4.95, $p=.026$)(Akhavue et al., 2018). Overall, this study illustrated that BMI levels change through childhood years and at different rates between races.

By the preschool years, there are racial differences in the prevalence of obesity, but is it possible that racial differences in obesity exist earlier in a child's life? Taveras et al. (2009) examined the racial differences in early-life risk factors for childhood obesity in 1,826 mother-child dyads from the prenatal period to 4 years old. The study identified factors related to childhood obesity in African American and Hispanic populations compared to the White population. The mother's feeding habits for her infant was one factor that difference across the races, where African American and Hispanic mothers were less likely to breastfeed their infants until 6 months (African Americans OR=2.35, 95% CI, 1.57-3.52, and Hispanics OR=2.80, 95%, 1.39-5.66; $p<.05$) and were more likely to introduce solid foods before 4 months of age (African Americans OR= 3.09, 95% CI, 2.13-4.50 and Hispanics OR=3.33, 95% CI, 1.95-5.67, $p<.05$)(Taveras et al., 2009). African American and Hispanic mothers also had more control of their child's feedings at one year old by restricting and pressuring them to eat (African Americans OR=4.21, 95% CI, 2.75-6.43 and Hispanics OR=6.18, 95% CI 13.29-11.6; $p<.05$)(Taveras et al., 2009). When the children were 6 months to 2 years of age, African American and Hispanic children were sleeping less than the White children (African Americans OR=3.83, 95% CI, 2.52-5.83 and Hispanics OR=3.45, 95% CI, 1.68-7.11; $p<.05$)(Taveras et al., 2009). Once the children were older than 2, African American and Hispanic children had much higher chances of having a television in their bedroom (African Americans OR=2.69, 95% CI, 1.69-4.29 and Hispanics OR=.70, 95% CI, .21-2.35; $p<.05$) and higher consumptions of sugar-sweetened beverages and

fast food (African Americans OR=5.66, 95% CI, 3.66-8.76 and Hispanics OR=3.61, 95% CI, 1.74-7.51; $p<.05$) than Whites (Taveras et al., 2009). Overall, this study has showed that between races there are different parental factors that impact a child's health that are being promoted which increases the child's risk for obesity development. These health behaviors are possible targets for interventions among parents with young children.

A study by Gee et al. (2013) examined trends in the prevalence of obesity in children aged 2-19 years old from years 2003-2005 and 2009-2010 between races. When broken down into racial categories, there was a significant decrease in the overweight prevalence between the two study periods for 2–5-year-olds for Asian's (OR =1.13; 95% CI, 1.04-1.22; $p<.05$), African American's (OR=1.22; 95% CI, 1.11-1.34; $p<.05$), Hispanic's (OR=1.17; 95% CI, 1.08-1.27; $p<.05$), and White's (OR=1.18; 95% CI, 1.12-1.23; $p<.05$)(Gee et al., 2013). The prevalence of obesity had significantly decreased between the two time periods for 2-5-year-olds for Asians (OR=1.21; 95% CI, 1.12-1.30; $p<.05$) and Whites (OR=1.16; 95% CI, 1.11-1.2; $p<.05$), but not for African Americans or Hispanics (Gee et al., 2013). Overall, this study demonstrated that there is a difference between races in the prevalence of obesity, with Hispanic's having the highest of them all.

When examining trends in obesity for preschool-aged children, it may be important to look at families who have high BMI levels in their family history to see if there is a relationship. A recent study by Fuemmeler et al. (2015) examined racial differences in obesity-related risk factors in 2-year-old children born from overweight mothers. It had 142 African American and 151 White child-mother dyads who were surveyed on multiple risk-factors for obesity. Major points the study found were based off the home environment. White children had more access to healthy snacks in the house compared to African American children (98% vs 78%, $p<.001$)

(Fuemmeler et al., 2015). African American children had more sodas in their home than White children (42% vs 31%, $p < .036$), yet they had less fruits and vegetables in their home compared to White children (85% vs 93%, $p < .016$) (Fuemmeler et al., 2015). The number of toys for physical activity in their home environment was higher for White children compared to African American children (99% vs 91%, $p < .007$) (Fuemmeler et al., 2015). When it came to TV hours per weekday, White children had more TV time compared to African American children (86% vs 64%, $p < .001$). Weekend TV hours had the same pattern, with White children having more hours than African American children (87% vs 57%, $p < .001$) (Fuemmeler et al., 2015). Overall, this study presented data that expresses there are racial differences for risk-factors for obesity that start at an early age, and that implementing proper exercise guidelines will be needed to help decrease the rise in overweight and obesity and increase physical activity levels for preschool-aged children.

Overall, racial differences in preschool-aged children's obesity levels are present from past research. The data has shown mixed results on whether one race was always higher than others, but there were significant differences between races in each study. Now that obesity has been examined, physical activity levels will be reviewed to examine if there are any racial differences in that.

Physical activity

In adults, evidence indicates that physical activity participation differs across the races, where African Americans have lower participation rates than Whites (Hasson et al., 2017). Potential racial differences in physical activity levels among children and adolescents have been examined. A study by White and Jago (2012) explored racial differences between 1,148 girls (610 White and 538 African American) aged 12-14 in their physical activity levels and their

association with obesity prevention efforts. They found that at age 12, physical activity levels from an accelerometer were higher in White girls ((295.9 [229.2-362.5] counts per day) than in African American girls (253.7 [166.9-334.1] counts per day)($p < .001$)(White & Jago, 2012). A potential reason for these physical activity differences could be due to the family environment. White girls had more parents who completed college (53.3% vs 24.7%; $p < .001$) and had higher income levels (56.1% and 31%; $p < .001$) than African Americans. Being African American was positively associated with higher BMI levels (19.7 kg/m² vs 18.8 kg/m²; $p < .001$), more television watched each week (44.3hrs/wk for African Americans compared to 24.5hrs/wk for Whites; $p < .001$) and consumed more calories per day (1912.9 kcal/day for African Americans compared to 1906.8 kcal/day for Whites; $p < .05$)(White & Jago, 2012). Overall, this study concluded that White adolescent girls had higher levels of physical activity and lower sedentary behaviors than African American adolescent girls. Given the racial difference in physical activity, African American adolescent girls need tailored interventions to improve their physical activity participation.

Recently, Miller et al. (2019) examined sex and racial differences in MVPA levels in 2779 adolescents (mean age 14±2.0). The major results of the study were that boys had significantly more hours of MVPA (6.7 h/wk; 95% CI, 6.4–6.9; $p < .001$) than girls (5.0 h/wk; 95% CI, 4.8–5.2; $p < .001$). Once race was considered, the levels of MVPA differed significantly. White boys significantly spent more hours per week in MVPA (7.9 hr/week; 95% CI, 7.3-8.4; $p < .001$) compared to African American (6.8 hr/week; 95% CI, 6.3-7.2), Hispanic (6.0 hr/week; 95% CI, 5.4-6.6) and Asian boys (5.8 hr/week; 95% CI, 5.2-6.4) ($p < .001$). Likewise, White girls significantly spent more hours per week in MVPA levels (6.3 hr/week; 95% CI, 5.7-6.8) compared to African American (4.9 hr/week; 95% CI, 4.4-5.3), Hispanic (4.3 MVPA; 95% CI,

3.8-4.8) and Asian girls (4.4 hr/week; 95% CI, 3.9-4.9)($p < .001$)(Miller et al., 2019). This study exemplified that there were differences in adolescent's MVPA based on their race and sex.

Physical activity levels have been associated with racial difference in adolescents based on where they live. Richmond et al. (2007) examined racial differences in physical activity between 17,007 adolescents (grades 7-12). The results indicated that African American adolescents had the highest median for inactivity (23 hours/week) compared to Hispanic adolescents (17 hours/week) and White adolescents (15 hours/week; $p < .001$). Further, White adolescents were more likely than either racial/ethnic minority group to report feeling safe in their neighborhood (Whites=93.2%, Hispanics=81.7% and African Americans=83.7%, $p < .001$)(Richmond et al., 2007). The study also found that African American and Hispanic adolescents tended to reside in segregated neighborhoods, where more than 90% of African American and 70% of Hispanic adolescents lived in neighborhoods in which less than half of the population was White; whereas nearly 45% of White adolescents lived in neighborhoods where more than 75% of the population was White. Interestingly, the authors also reported that that African American adolescents had higher rates of inactivity no matter where they lived compared to Hispanic and White adolescents ($p < .001$). Overall, there is a racial difference in adolescents' physical activity levels based on the neighborhoods they reside. Further, African Americans had lower physical activity levels even among Whites living in the same neighborhood.

A more recent study by Bowser et al. (2016) examined the disparities in fitness and physical activity in 3,798 6th graders living in Wisconsin. Their sample contained 56% Whites/non-Hispanic students, 20.8% Hispanic students, 7.2% African American/non-Hispanic, 9.3% mixed race/non-Hispanic, 1.5% American Indian/non-Hispanic and 16.4% other (Bowser

et al., 2016). A self-report questionnaire was distributed during a physical activity class in school in order to obtain data for their MVPA levels. The MVPA levels were significantly different between the White/non-Hispanic population (73.9 ± 66.2 min/day), Hispanic population (66 ± 66.2 min/day), and the other/non-Hispanic population (48.5 ± 66.2 min/day; $p < .05$) but were similar to the African American/non-Hispanic population (70.7 ± 66.2 min/day). Overall, this study illustrated how there are differences between races in children's physical activity levels; however, unlike the studies highlighted above among adolescents, this study indicated that the disparity in physical activity levels may not be present among White and African Americans in a younger age group.

Another middle school study done by Kelly et al. (2010) examined racial differences in physical activity determinates among 1,180 6th grade girls through a supervised self-administered questionnaire. Out of all the girls, 24.5% were African American, 15.7% were Hispanic and 59.8% were White. The results found significant differences in the girls' enjoyment in physical activity levels and family support. Regarding physical activity enjoyment, 29.2 ± 6.6 of Hispanic girls stated they enjoyed it, 29.3 ± 6.1 of African American girls stated they enjoyed it, and 31.2 ± 5.1 of White girls stated they enjoyed it ($p < .001$) (Kelly et al., 2010). Regarding family support for physical activity, 16 ± 4.3 of Hispanics stated they had it, 16.2 ± 4.7 of African American girls stated they had it, and 17.7 ± 4.2 of White girls stated they had it as well ($p < .001$) (Kelly et al., 2010). The study also identified key barriers and motivators for physical activity between the races. Among Hispanic girls, a significant determinate for MVPA levels was transportation barriers ($\beta = .047$; $p = .010$) (Kelly et al., 2010). In contrast, African American girls' main determinates for MVPA were BMI ($\beta = -.015$; $p < .001$) and social support from friends ($\beta = .026$; $p = .006$). Finally, among White girls, the primary determinates for MVPA

levels were BMI (beta= -.016; p<.001), intrapersonal barriers (beta= -.009; p=.012), social support from friends (beta=.020; p=.010); participation in school sports (beta=.033; p=.009), and community sports (beta=.025; p=.025)(Kelly et al., 2010). Overall, this study found evidence of determinates for physical activity levels for the girls, stating how each race had different motivators and barriers, which could impact their overall physical activity levels.

The studies above indicate that racial differences in physical activity levels exist in adolescents but may not be present in older children. Among younger children a paucity of research exists examining racial differences in physical activity levels. One of few studies is by Chuang et al. (2012) who examined the resources promoting or inhibiting physical activity based on racial differences in 706 preschool-aged children. They found that African American preschoolers were 41.9% less likely to have accessibility to equipment (p=.019) and 72.3% less likely to have space at home (p=.004) compared to Hispanic preschoolers. African Americans also had more sedentary time than the Hispanic preschoolers, being 1.72 (95% CI: 1.05, 2.84) times more likely to have a TV in their room (p=.032) and 2.13 (95% CI: 1.14, 3.98) times more likely to play video games for 2+ hours per day (p=.018)(Chuang et al., 2012). Although this research did give significant results, more research is needed to understand if there are racial differences in physical activity participation among preschoolers.

More recently, a study by Pate et al. (2015) used data from the CHAMPS and SHAPES studies to determine if racial differences exist among the preschool-age population. The results from both studies indicated that racial differences did not exist in preschoolers. In the CHAMPS study, the total physical activity levels for White preschoolers were an average of 14.2 (SE=.4) minutes per hour compared to 14.7 (SE=.4) minutes per hour for African American preschoolers (p<.36). As for the SHAPES study, the total physical activity levels for White preschoolers were

an average of 15.5 (SE=.5) minutes per hour compared to 15.4 (SE=.4) minutes per hour for African American preschoolers ($p < .88$). Based on the two studies that have been completed in the preschool-age population mixed results have been reported on if racial differences in physical activity participate are present. Therefore, more studies are needed to identify the impact race has on physical activity levels in preschool aged children.

Determinants of Childhood Physical Activity

Now that past research has been examined on preschooler's physical activity levels and how they differ between races, it is important to examine determinates of childhood physical activity. This will allow some insight on what causes children to be more active and give an idea of what to incorporate in future research to help create physical activity changes.

There are many different factors that impact how much physical activity a child participates in, such as environmental factors like outdoor play time and safety, or developmental factors such as growth and physical fitness (Harold et al., 1997), but one large factor for preschool-aged children is the parent. Parents can influence children's physical activity by encouragement, facilitating, modeling, or partaking in physical activity with their child (Welk, 1999). Parental role modeling allows their child to see them being active and develop those same habits by watching their parents, whereas co-participation allows the child to participate in physical activity with their parent and create new experiences together that benefit both the child and the parent. Tucker (2008) noted the important role parents play in providing support toward healthy levels of physical activity and stated parents should increase their knowledge on preschool-aged children's physical activity levels. Because parents play a critical role in teaching children healthy behaviors, like physical activity, Hesketh, Lakshman, and Sluijs (2017) completed a systematic review to identify the facilitators and barriers in young children's

physical activity and sedentary behaviors. This study identified the role of parents as a determinant to young children's physical activity participation and analyzed data from 12 studies that express how parents who were active themselves acted as a role model for their child, which increased the likelihood of the child to be active. Seven of the articles reported a positive correlation between children's physical activity levels and parent participation in physical activity with the child. Unfortunately, parents can also serve as a barrier for children's physical activity due to lack of time and energy, cost of providing active opportunities, and using faster ways of transportation (Hesketh et al., 2017). The results from this study indicated that the role parents have on their child's physical activity levels is complex and can support but also impede physical activity levels. Therefore, a better understanding of ways in which parents can support a physical activity participation is warranted.

Recently, a qualitative study determined the physical activity parenting practices that either encourage or discourage physical activity levels in preschool-aged children (Lindsay et al., 2019). Focus group discussions with mothers of 2-5-year-olds were conducted to identify what impacted their child's physical activity levels. The results indicated that parenting practices that either encouraged or facilitated a child's physical activity had a positive effect on increasing that child's physical activity levels (Lindsay et al., 2019). Some themes that focused on encouraging physical activity included: modeling physical activity, engaging in physical activity with the child, encouraging and motivational support, etc. The researchers also noted that parenting practices that either discouraged or inhibited their child's physical activity included: modeling sedentary behavior, restricting children's outdoor time, etc. (Lindsay et al., 2019). Parental modeling was the top theme identified in this study and was viewed by mothers as ways to both

encourage (model physical activity) and discourage (model sedentary behaviors) their child's physical activity.

As highlighted above, parental involvement plays an important role for a child to reach daily recommended levels of physical activity. To obtain a better understanding of how to improve parental involvement, Rebold et al. (2016) studied 20 preschool-aged children's physical activity levels based on different parental involvement levels. This study used three different levels of parental involvement with their preschool-aged child's physical activity, no involvement (playing alone), watching the child, and participating in the activity with the child. They discovered that children accumulated higher accelerometer counts when the parents participated (10523 ± 32155 counts; $p \leq .02$) compared to either the child completing the activity alone (67938 ± 37857 counts) or the parent watching (85264 ± 44985 counts). This study also had sedentary activity stations set up for the preschool-aged children and found that more time was spent doing sedentary activities during the alone condition (16.6 ± 9.6 mins; $p \leq .008$) compared to the parent watching condition (9.6 ± 9.3 mins) or the parent participating condition (3.8 ± 5.1 mins). Finally, the preschool-aged children noted they enjoyed the parent participating condition more than either the alone or parent watching conditions ($p \leq .02$) (Rebold et al., 2016). This study concluded that parent interaction with their child's physical activity is important to maximize their child's physical activity levels.

The studies mentioned above illustrated how parents are a major determinant for preschool-aged children's physical activity levels. Parents serve as a role model for their children, especially when the children are young and rely on their parents in their day-to-day lives. Therefore, it is likely that parental-based interventions for preschool-aged children would

have a positive impact on their child's physical activity levels due to the major role parents play as a determinant in preschool-aged children's physical activity.

Physical Activity Interventions

Given the lack of physical activity participation in preschool-aged children, researchers have designed interventions to try and increase physical activity participation. Over the years, many interventions have been conducted in either preschool settings or childcare centers (Gordon et al., 2013; Roth et al., 2015). Different intervention types and settings are needed to determine which ones have positive outcomes on the children's physical activity levels and why they were effective. A meta-analysis by Gordon et al. (2013) examined how different physical activity interventions affected preschool-aged children's general physical activity levels and MVPA for both early learning and home-based environments. They reviewed 15 independent studies, containing a total of 2,618 children with an average age of 4.1 years. Each study had to examine physical activity in preschoolers, incorporate a physical activity intervention, and target preschool-aged children. The results indicated that interventions targeting preschoolers had a small-to-moderate effect on their general physical activity levels ($g=.44$; $p<.05$) and a moderate effect on their MVPA ($g=.51$; $p<.05$). This meta-analysis's results are promising in that it showed interventions for preschool-aged children facilitate increased physical activity.

Also, Ling et al. (2015) conducted a systematic review of 23 studies, of which 20 were interventions, to examine the effect the interventions had on preschool-aged children physical activity levels. Studies were included if they examined preschool-aged children, intended to increase physical activity levels or decrease sedentary behavior, have a control group, and reported physical activity measurements at baseline and postintervention (Ling et al., 2015). The authors reported that 21 of the studies were childcare center-based interventions, while only two

were home-based (Ling et al., 2015). The average length of the interventions were 6 months, ranging from 6 weeks to 12 months. Of those studies that were intervention designs, 8 of the 20 (40%) interventions significantly increased the children's physical activity or decreased sedentary time from pre-intervention to post-intervention (Ling et al., 2015). Unfortunately, they reported that none of the home-based interventions improved physical activity levels in the preschool-aged children (Ling et al., 2015). How physical activity was measured in the studies was varied. Out of the 11 studies that used accelerometers, 4 of them reported significant improvements in physical activity levels (Ling et al., 2015). Among the childcare center interventions that included parental involvement, 5 out of 9 (56%) interventions had a significantly positive effect on physical activity levels. These studies often included active parental involvement (e.g., goal setting, group discussions, homework assignments) compared to passive parental involvement (e.g., handouts, CD/DVD, flyers, texting)(Ling et al., 2015). In summary, this systematic review provides guidance regarding components that could be included in future interventions. Further, interventions that include a parental component may be an effective approach in this population.

Although many of the studies used in the systemic review above were child-care based, there are some home-based interventions. Designing interventions that target physical activity while the child is at home may be an additional way to increase a preschool-aged child's physical activity over the day. Gao et al. (2019) examined how exergaming-based physical activity at home effected preschooler's energy expenditure, fitness, body mass index (BMI), and cognition. Exergaming is movement-based video games that are also a form of exercise. The intervention was 12-weeks long and preschoolers were randomized into the intervention or control groups. The intervention group had children complete at least 30 minutes a day for 5 days a week of

exergaming beyond their usual physical activity whereas the control group just had preschoolers maintain their regular physical activity levels without any exergaming gameplay. A total of 32 preschool-aged children completed the study and the results expressed that cognitive flexibility did increase significantly in the exergaming group (Wilks' Lambda=.81; $p=.01$); however, energy expenditure (Wilks' Lambda=.92; $p=.14$), cardiovascular fitness (Wilks' Lambda=.96; $p=.31$), and BMI (Wilks' Lambda=.99; $p=.82$) did not significantly improve over the intervention. In summary, this home-based study illustrated how home-based settings might produce positive effects on preschoolers' development, but more research is needed for further understanding.

Parent-Based Physical Activity Interventions

Interventions that focus on the home environment but incorporate parental involvement may be beneficial to increase a child's physical activity levels, as this age group relies on a parent to survive everyday life. Moreover, half of preschool-aged children spend the majority of their time at home, therefore physical activity interventions focusing on the family as a target would be important. To better understand the role parents have on their child's physical activity levels, Holm et al. (2012) examined the influence a parent's physical activity had on their child. One hundred children aged 7-14 and 83 mothers and 34 fathers participated in the study. All parents were asked to increase their physical activity by 2000 steps per day for 18 weeks from their baseline measurements to determine what impact this had on their child's physical activity levels. The study found that the children increased their steps per day by 196 for every additional 1000 steps that a mother took per day ($p<.0001$). When examining the father's data, the children increased their steps per day by 82.4 for every additional 100 steps he would take ($p<.0001$). The study also examined the children's step count and on average, they took an additional 2117.6

steps above baseline on the days their mother met her goal compared to 1175.2 steps above baseline when the mother did not meet her goal ($p < .001$). For the father, the children's steps increased from baseline by 1598 steps when their father met his goal versus 1123.1 steps when their father did not meet his goal ($p < .001$) (Holm et al., 2012). This study illustrates how parents' modeling physical activity increases their child's physical activity levels.

Another study implemented a parent-based physical activity intervention in 26 young children (1-5 years old) by having parents' model physical activity for their children in order to promote moderate-to-vigorous levels of physical activity in both parent and child (DuBose and Dlugonski, 2018). The results indicated that children in the intervention group had small decreases in sedentary behavior ($d = -.24$), light ($d = -.23$), moderate ($d = -.13$) and total ($d = -.21$) physical activity levels and no change in vigorous levels, whereas the control group had a small increase in sedentary behavior ($d = .24$) and large decreases in light ($d = -.92$), moderate ($d = -.90$) and total ($d = -1.02$) physical activity (DuBose and Dlugonski, 2018). Although the results were not statistically different, the intervention still had positive effects for increasing physical activity and decreasing sedentary behavior.

The previous studies examined how parents acted as a role model, but what happens when a parent completes the activity with their child? Filanowski et al. (2021) examined predictors and acceptability of shared physical activity participation in preschool-aged children parent-child dyads. The study had 31 parent-child dyads complete five physical activities together and a questionnaire at a fitness center. After the fitness center, each parent-child dyad received a packet that contained detailed materials on how to complete each of the five activities together at home and had a log-sheet to record what they did together for one week. Once the week was up, the parents had a phone call interview to provide data based on what they have

done. The results expressed that four predictors had statistically significant relationships with the outcome variable of completing physical activities together. The predictors were: a) parent self-efficacy for exercise ($F_{1,26}=7.174$; $p=.013$), which explained 18.6% of the variance in the minutes of shared physical activity; b) family home chaos ($F_{2,25}=7.170$; $p=.003$), which explained 12.8% of the variance in minutes of shared physical activity, c) Parent BMI ($F_{3,24}=7.469$; $p=.001$), which explained 10.4% of the variance in the minutes of shared physical activity; and d) annual household income ($F_{4,23}=8.216$; $p<.001$) explained 9.9% of the variance in the minutes of shared physical activity (Filanowski et al., 2021). Regarding acceptability of shared physical activity, the proportion of parents who thought they could participate in jumping games (85.7%), body-weight exercises (78.6%), dancing (92.9%), and tag games (96.4%) compared with those who participated in these physical activities with their child during the week after their research fitness center session were significantly different. Only 39.3% of parents actually participated in jumping games ($p<.001$), 35.7% in body-weight exercises ($p=.004$), 64.3% in dancing ($p=.008$) and 60.7% in tag games ($p=.002$)(Filanowski et al., 2021). The results indicated that more parents thought they could engage in these shared activities compared to the percentage of parents who did engage in shared physical activity with their child. Overall, this study shows that while parents want to engage in physical activity with their child, they often do not and that parents might be willing to do certain activities with their child over other ones.

Not only can family-based interventions have an impact on physical activity, but they can also impact health outcomes such as obesity. Hawkins et al. (2019) examined the efficacy of the Developing Relationships that Include Values of Eating and Exercise (DRIVE) intervention. The DRIVE intervention was a 19-week structured parenting program made to promote healthy weight in preschool-aged children by working with parents to instill healthy habits early on in

life. The three main topics in the intervention were healthy nutrition, increased physical activity, and parent-child interaction. There were 16 parent-child dyads that were randomized into two groups: the DRIVE intervention and the health education control group. Changes in children's BMI z-scores were significantly different between the health education versus the DRIVE group at week 9 ($.4 \pm .1$ vs $-.3 \pm .1$, $p=.007$) and at week 19 ($.5 \pm .1$ vs $-.1 \pm .1$, $p=.004$). Changes in body weight and body weight percentages were also higher in the health education group versus the DRIVE intervention at 9 weeks (body weight: $1.5 \pm .3$ vs $.3 \pm .3$ kg, $p=.03$, and body weight percentage: $6.4\% \pm 1.5\%$ vs $1.3\% \pm 1.5\%$, $p=.03$) and 19 weeks (body weight: $2.3 \pm .4$ vs $.6 \pm .4$ kg, $p=.006$, and body weight percentage: $10.3\% \pm 1.5\%$ vs $2.7\% \pm 1.5\%$, $p=.004$) (Hawkins et al., 2019). Overall, the DRIVE intervention illustrated how an intervention targeting families and behavior change in preschool-aged children can promote changes in obesity markers.

However, not all interventions have found a positive impact on obesity. Soos and DuBose (2016) examined the effect of a parental modeling physical activity intervention on their preschool-aged children's BMI levels. Twenty-six parent-child dyads were randomized into an intervention group and a control group. The intervention group had an 8-week course where parents engaged in physical activity with themselves and their child in order to determine if there were any changes in the children's BMI z-scores. Their results indicated that the effect size for the children's BMI z-scores for both the intervention group ($-.03$) and the control group ($.07$) was similar to baseline to post-intervention or between the two groups (Soos & DuBose, 2016). Overall, this study expressed no major differences were seen in the children's BMI z-score from the parent-based intervention. Given the paucity of research examining the impact parent-based physical activity interventions have on child obesity related outcomes additional studies are warranted.

Racial Differences in Parent-Based Interventions

Physical activity interventions in older children and adults have suggested the importance of tailoring a physical activity intervention to the population (Hasson et al., 2017; Miller et al., 2019), as physical activity barriers can be different across different races (Kelly et al., 2010; Bowser et al., 2016). A few cross-sectional studies have examined if racial differences in preschool-aged children physical activity exists and found that the results are inconclusive (Chuang et al., 2012; Pate et al., 2015). Thus, more research needs to be done in the preschool-age group. To the best of our knowledge, no study has examined the if the impact of a parent-based physical activity intervention is different in families of different races. Based-off the parent interventions described above (DuBose & Dlugonski 2018; Filanowski et al., 2021; Holm et al., 2012), over half of the participants in each study were White and racial comparisons were not made in any of the studies. Therefore, more research needs to be completed within this intervention setting with a larger racial pool in order to determine if racial differences exist. The lack of research underscores the importance of designing studies that target a variety of races.

Summary

Overall, majority of preschool-aged children are not meeting the 2018 Physical Activity guidelines (Pate et al., 2015) and this lack of activity negatively affects their development and health (Roth et al., 2015; PAG, 2018) and can play an important role of maintaining their BMI z-scores. Some studies have found racial difference in BMI z-scores (Fuemeller et al., 2015) and others have found these BMI z-scores fluctuate from childhood to adulthood (Akhavue et al., 2018). Given the lack of physical activity participation in preschool-aged children, many studies have examined if physical activity changes after an intervention and have reported improvements

in children's physical activity levels; however, most of these interventions took place in child-care centers or preschools (Ling et al., 2015).

Interventions focused on the home may be a better environment for this population. Parents play a crucial role in preschool-aged children's development of health behaviors, like physical activity. A few studies have conducted interventions with parents and have reported positive results of children increasing their physical activity levels and decreasing BMI z-scores based off the changes in their parent's physical activity levels (Hawkins et al., 2019; Holm et al., 2012); however, not all studies have produced these changes (Soos & DuBose, 2016; DuBose & Dlugonski, 2018). Hence, parent-based interventions are needed to elucidate the impact physical activity targeting parents and child has on the children's obesity and physical activity levels.

Unlike data in older children, it is unclear whether racial differences in physical activity exists at the preschool-age (Chuang et al., 2012; Fuemmeler et al., 2015; Pate et al., 2015); however, to our knowledge there have been no studies done to investigate if a parent-based physical activity intervention has different effects on physical activity levels and obesity markers in families of different races. As a result, more studies are needed to address this issue. Therefore, the overall purpose of this study is to implement a parent-based physical activity intervention to increase preschool-aged children's physical activity levels among families of different races.

CHAPTER 3: METHODS

Participants

For this study, there were two populations: White and African Americans. There were parent-child dyads in each population, composed of a parent/guardian and their preschool-aged child (2–5-year-olds). Currently, 22 White parent-child dyads have data collected from the DuBose and Dlugonski (2018) study. The present study collected approximately 26 African American parent-child dyads. The parent qualifications were: 19+ years old; parent and child lived in the same household; the parent was not meeting physical activity recommendations; self-identifies as black/African American; the parent was neither pregnant nor < 6 weeks post-pregnancy. If the parent self-identified as more than one race (e.g., Black/African American and White), then they were excluded from the study. The child could be either black/African American or mixed racial decent, as long as the parent self-identified as black/African American.

Design

This study was an 8-week intervention, with participants randomized into either an intervention group or control group at a 2:1 ratio. The parents and children completed baseline measurements and both wore an accelerometer for 7 consecutive days. Once the accelerometers were returned, the randomly determined group placement were distributed and intervention parents were given a notebook with intervention materials and the name and contact information for their physical activity coach. During the 8-week intervention period, those in the intervention group had weekly phone calls with the physical activity coach and worked on increasing their and their child's physical activity levels. They were encouraged to be active, both with their child and independently. Those in the control group continued their normal activities. After the 8-week intervention, the participants returned for post-testing measurements, which was a

repeated measurement from baseline, and they wore an accelerometer again. Parents in the intervention group were invited to a focus group at the end of the intervention.

Intervention

The primary goal of the intervention was to increase children's physical activity by motivating the parent to be a role model for their child's behavior. The two components of this intervention were the weekly newsletters and weekly phone calls with physical activity coaches. A binder was distributed to each parent that included the weekly newsletters, a list of area parks, and suggested physical activities that a parent and child could engage in both inside and outside of the house. The newsletters and weekly phone calls from the physical activity coach focused on physical activity recommendations, goal setting, social support for physical activity, physical activity barriers, physical activity progression, lifestyle physical activity, physical activity motivators, and prevention of physical activity setbacks. The following items were completed each week: review of last week's goals; review reasons for success and/or challenges; development of new goals; and discussion of new content.

During the eight weekly phone calls, the physical activity coaches utilized motivational interviewing, which allowed the parents to make most of the decisions for their interventions. The phone calls were designed to last 20–30 min and the parents created their own physical activity goals to be active with their child at the end. The intervention was based on self-determination theory because its main concept was to let each person have the ability to make choices and manage their own life (Deci and Ryan, 1985), which is what we wanted the parent/guardian to do during the intervention. Self-determination theory was a good application for physical activity interventions, as it focused on internal sources of motivation, such as autonomy, competence, and relatedness, rather than external sources such as rewards (Cherry,

2021). The application of this theory was important because it made people feel more responsible to take action when they create their own goals rather than finding excuses or being told what to do in a controlling environment.

With the physical activity coaches there to provide help, the parents still had autonomy to set their own goals and develop their own strategies. For example, if the parent was having a hard time creating a goal, the physical activity coach would provide suggestions, but the parent made the final decision. The weekly newsletters also had blank spaces for the parents to fill in with their own answers based on they wanted to do with their child. To help guide the discussion during the phone calls, the physical activity coaches used open-ended questions, affirmations, highlight successes, and scaled questions. Therefore, both the newsletters and phone calls were aimed to be interactive for the parents, reinforced autonomy for their physical activity changes, and developed competence with the physical activity intervention material. To instill the concept of relatedness, the newsletters had a scenario of a parent working on that week's content material. These scenarios were used during the weekly phone calls to aid the parent in seeing how the information can be incorporated in a person's life.

Motivational interviewing is a goal-oriented style of communication between two people, designed to increase personal motivation toward a goal by learning the person's own reasons for change (Miller and Rollnick 2019). Incorporating motivational interviewing into the phone calls will allow the parents to be listened too rather than being directed by the coaches on what to do. This method is best for when a person's ambivalence is high and confidence is low as it will empower them to change since they are making the decisions themselves. The importance of this approach is due to the coaches listening to the participants rather than directing them what to do and helping them create their own ways to reach their goal.

The physical activity coaches were two ECU students from the Kinesiology Department. The two-Kinesiology students were trained by a researcher with over seven years of experience with motivational interviewing. The physical activity coaches completed this training before the intervention and continued to receive feedback in order to improve their skills throughout the intervention. Each week the coaches received questions and cues to discuss each weekly topic with the parents. Thirty percent of the phone calls were recorded, so that the delivery of the intervention and motivational interviewing techniques could be quantified. A researcher experienced with motivational interviewing, but not associated with delivery of the intervention reviewed the phone calls and scored the physical activity coaches' performance on reviewing material, discussing weekly content, developing weekly goals, using affirmation, reflections, and summarizing. They also kept track of how many questions were asked during each phone call and how many were open-ended vs close-ended questions.

Measures

Anthropometrics

Child weight and height were measured in duplicate with their shoes off. A wall-mounted stadiometer and a portable electronic scale were used to measure height to the nearest 0.1cm and weight to the nearest 0.5kg, respectively. The average values of height and weight were calculated and used to quantify body mass index (BMI). BMI was calculated by their weight divided by their height squared (kg/m^2). Height and weight were used to find the children's BMI z-scores and percentiles. The children's BMI z-scores and BMI percentiles were calculated with the BMI z-score calculator from the Children's Hospital of Philadelphia research institute website (<https://zscore.research.chop.edu/calcbmi.php>). This website uses national data from the Centers of Disease Control as the normative data to determine the BMI z-scores and percentiles

corrected for age and sex. Once the BMI percentiles are calculated the children will be categorized as healthy weight (BMI <85th percentile), overweight (BMI ≥85th percentile), and obese (≥95th percentile) (CDC 2020).

Demographics

Parents were given questionnaires at the beginning of the study to identify their race/ethnicity, biological sex, age, education, occupation, income level, marital status and health history. Parents also indicated the biological sex and age of their child.

Physical Activity (PA) Measurement

To determine physical activity levels, children wore an ActiGraph accelerometer for seven consecutive days, both at baseline and post-intervention. Accelerometer data was included in the analysis if the children wore the accelerometer for at least 2 days with at least 8 hours of wear time each day. Non-wear time was defined as 60 minutes of consecutive zero counts. The physical activity level ranged from sedentary, light, and moderate-to-vigorous physical activity (MVPA). Total physical activity was calculated as the total of light, and MVPA per day.

Based on previously published norms for child physical activity, two different cut points were used to assess the amount of time spent in different physical activity intensities. The cut points that were used for children age 2 were from Trost et al. (2012) where 0 to 195 counts per minute = sedentary activity, 196 to 1672 counts per minute = light physical activity, and 1673+ counts per minute = MVPA. Butte et al. (2014) cut points were used for 3–5-year-old children. Sedentary behavior ranged between 0 to 239 counts per minute, while 240 to 2119 counts per minute was the range for light physical activity, and 2120+ counts per minute for MVPA.

Statistical Analysis

For the demographics, mean, standard deviation, and percentages were calculated for the child's age, sex, race, and BMI classification. Percentages were also calculated from parental data on educational level, marital status, occupation, and household income level. A 2X2 (group x time) repeated measures ANOVA was completed to determine the impact of the intervention on the child's physical activity (sedentary, light, MVPA and total) in the total sample (e.g., regardless of race). To determine the effect of the intervention on the preschool children's BMI z-scores, a 2X2 (group x time) repeated measures ANOVA was completed for the total sample. A 2x2x2 (group x time x race) ANOVA was used to determine the impact of the intervention on physical activity measures (sedentary, light, MVPA, and total) between White and African American preschool aged children. Effect size (Cohen's d) was calculated and interpreted as >0.8 for a large effect size, 0.5 for a medium effect size, and <0.2 for a small effect size (Cohen, 1988). The data was considered statistically significant if $p \leq .05$.

CHAPTER 4: RESULTS

Intervention Recruitment

Recruitment for the intervention started in August 2021. Area preschool and childcare centers that were likely to have black/African American children attending were identified for recruitment. Eleven preschools/childcare centers in Greenville, NC were contacted to see if study personnel could recruit at the site and/or distribute flyers. Due to high COVID-19 rates at the time in person recruitment was not possible, but seven preschools agreed to pass out flyers and a total of 150 flyers were distributed. The flyer was also distributed on East Carolina University's (ECU) listserv and posted on a Greenville Mom's Group Facebook page. Finally, the study was shared with personal contacts. A total of three participants reached out for more information; however, two were ineligible due to meeting the physical activity recommendation guidelines. One parent met the criteria and the first visit was scheduled. Unfortunately, the participant canceled her first visit. The visit was unable to be rescheduled as the intervention would have ended during the Christmas/New Year holiday season.

Due to the challenges of recruitment in the Fall semester, different techniques were attempted for the Spring semester. An incentive for participating was added to the study in order to compensate participants for their time and encourage recruitment. Unfortunately, recruitment occurred during another large wave of COVID-19, therefore in-person recruitment was not possible. Local African American churches (n=5) and additional preschools (n=8) were identified and approached for recruitment. Overall, a total of 200 flyers were distributed to five preschools and three churches. One church would not accept hardcopy flyers but did send out the flyer in a mass email to the congregation and uploaded it on their Facebook page. The flyer was also posted on the ECU Black Alumni and Greenville Mom's Facebook pages. The local library

posted the flyer on their bulletin board in the children's library and uploaded it on their Facebook page. The flyer was also distributed on ECU's listserv, the local Target store, and the study was shared with personal contacts of the research staff. These recruitment methods resulted in one parent reaching out for more information. After sending the information and screening document, the parent did not return correspondence and thus was not scheduled. Finally, the participant from the fall was contacted again, but she was not interested in participating any more. Thus, no participants were recruited the second time for the intervention study. As a result, we decided to change the study to one-on-one interviews to understand parents (mothers) thoughts about physical activity co-participation with their preschool aged child. This study was approved by the university's institutional review board in March 2022.

Interview Training

For the one-on-one interviews, research staff training included reviewing four existing videos that focused on how to conduct virtual interviews, tips, what to do and what not to do during the interview process (Chrzanowska, 2014; Vindum, 2021; & Yale University, 2015). These videos were accessed on-line and were created from experts in conducting interviews for qualitative study designs. After the watching videos, learning and memorizing the interview questions was required to make sure the interviewer would know what to ask and use the questions as a guide. One of the committee member's expertise is in qualitative data, so she had meetings with the interviewer and thesis chair to teach the interviewer how to make the questions more like a conversation rather than asking direct questions. Three practice interviews were conducted to become familiar and develop the techniques needed to conduct the interviews. These practice interviews were observed by the qualitative expert and thesis chair so feedback could be given to the interviewer and determine if additional practice interviews were needed.

Interview Recruitment

Recruitment for the interviews started in March 2022. Recruitment was done by posting flyers on social media. Two Greenville mom group pages on Facebook were found and the flyer was posted with a brief summary of the interview along with contact information for the staff. One church was also contacted and passed out flyers to parents with preschool-aged children. Recruitment was also done by personal contacts and passing out flyers at an event for parents of babies and young children at the Greenville Convention Center. All interested participants were contacted and scheduled first come, first served. A total of 43 participants reached out, with 38 being interested. The first 30 were scheduled and the rest were waitlisted for any cancellations or no shows. A total of three participants cancelled after their appointments were scheduled. Even with a few participants canceling, 30 interviews were completed.

Interviews

Participants scheduled and met with the interviewer online for one-on-one interviews using Microsoft Team's video conferencing software. Participants were sent an email with instructions on how to join the interview and a link to join the interview. The day of the interview, the interviewer read the informed consent to the participant and the participant provided verbal consent to participate in the study. Next, the interview questions were asked. The interview questions were developed by the interviewer and thesis chair in consultation with the qualitative expert (Appendix C). The interview focused on parent and child physical activity co-participation. Topics included the parent's thoughts on physical activity in today's society, current activities they do with their child, activities they want to do more with their child, what their ideal world would look like to be active with their child, and barriers, benefits, facilitators and motivators for being active with their child. After the interview questions were completed,

the participants were then asked demographic questions about themselves and their preschool-aged child (Appendix D). Once the meeting was done, the participant was informed how they would receive the \$25.00 e-Giftcard for volunteering and then logged off. Each interview was recorded and completed in a private office space on ECU's campus. Each recording was saved and stored in a private storage folder on ECU's server.

Transcriptions

Transcriptions were completed in a private room on ECU's campus. Each interview was transcribed verbatim for the participants' responses to the interview questions and any comments the interviewer had. The transcripts were de-identified during transcription. Each transcription was saved and stored in a private storage folder on ECU's server.

Codebook

Once all interviews were transcribed, a raw codebook was created based on the responses to each question in the interviews. Once all interviews were reviewed, the raw codebook was completed. Next, the individual codebook items were condensed into broader items, where multiple items with similar responses were merged together into one code. To illustrate this process, if parents mentioned physical activity challenges such as finding time after work or having to do other life priorities (cooking; cleaning), then these were coded together into time management under physical activity barriers. Three individuals (KC, KD, and DD) reviewed the codes to make sure they were adequate. This codebook was used to aid the coding process of the transcribed interviews. The completed code book is found in Appendix E.

Coding

NVivo software (version 12, QSR International) was used to code the transcribed interviews. Coding was completed for each interview transcription. Two individuals

independently coded two transcriptions (KC, KD) and compared answers and reasoning to ensure both were coding for the same reasons. After the first two interviews were coded, both individuals agreed on their reasoning and continued to code the remaining interviews. One individual (KC) coded all the transcripts and the second individual (KD) coded 10 transcripts for reliability purposes. To determine reliability of coding between the two coders, for each of the transcripts, the codes assigned by each coder were examined to determine if they were coding the items in a similar manner. The reliability between the two coders was high.

Analysis

Demographic information was analyzed by calculating percentages, means and standard deviations. For the qualitative data, the analysis was completed with NVivo software (version 12, QSR International). Codes were categorized into themes and subthemes by two individuals (KC, KD). This was completed for all participants as a group and then key themes were also examined by racial group. Racial differences were determined if there was a difference of 2 or more participants between White and BIPOC codes.

Interview Results

A total of 30 participants completed interviews (Table 1). On average, the interviews were 19.50 ± 3.44 minutes long. All the participants were female/mothers. Overall, the sample had more BIPOC mothers (53%) than White mothers (47%), and the majority were married and over half met PA recommendations. Further, 23% had one child, 67% had 2 or 3 children and 10% had more than 3 children. The average age for the children was 3 years with over half being female.

When examining demographic information between the races, differences were noted (Table 1). More participants in the White group meet PA recommendations, had higher

education, and were married compared to the BIPOC population. Additionally, more of the BIPOC mothers lived in a medium sized city compared to the White mothers (63 vs 36%, respectively), whereas more White mothers lived in a rural city compared to BIPOC mothers (64% vs 31%, respectively).

Table 1.

Demographic Characteristics of the Parents and Children Overall and by Race

Characteristics	All	White	BIPOC
	(%)	(%)	(%)
	<i>n=30</i>	<i>n=14</i>	<i>n=16</i>
Sex of Parent			
Female	100	100	100
Male	0	0	0
Race of Parent			
White	47	100	0
African American	40	0	75
Hispanic	3	0	6
Asian	7	0	13
Other	3	0	6
Meeting PA Recommendations			
Yes	57	64	50
No	43	36	50
Highest level of education			
Highschool/GED	17	14	19

Attended college/vocational school	23	14	31
College degree	30	43	19
Graduate degree	30	29	31
Marital Status			
Married	70	100	44
Never married/Single	23	0	44
Separated	7	0	13
Location			
Large city (>100,000 people)	3	0	6
Medium city (30,000-100,000)	50	36	63
Rural city (<30,000)	47	64	31
Number of Children			
1	23	14	31
2	40	43	38
3	27	29	25
4	7	7	6
5	3	7	0
Average Age of Child (yrs)			
mean(sd)	3.08(1.08)	2.82(0.88)	3.29(1.19)
Sex of Child			
Female	58	59	57
Male	42	41	43

At the beginning of the interview, parents discussed what types of physical activities their children participated in. Although some parents mentioned sports that their child participated in, such as soccer or tennis, majority of the parents mentioned unstructured physical activities, such as walking, riding bikes, and playing in the backyard. This was followed by sedentary activities, such as screen time, and educational activities, such as reading or learning. The main environment where the physical activity took place was either in their backyard or neighborhood. Finally, parent's stated that in the future they wanted to spend more time in outside physical activity with their child.

Regarding the main findings from the interviews, the following four main themes emerged: a) parent perceptions on physical activity; b) physical activity co-participation barriers; c) physical activity co-participation facilitators; and d) social aspects of physical activity. Once these themes were noted, subthemes identified key findings from their responses. Table 2 shows the main themes and the subthemes that were identified.

Table 2.

Themes and Subthemes Across Interview Responses

Parent Perceptions on Physical Activity	Co-Participation Physical Activity Barriers	Co-Participation Physical Activity Facilitators	Social Aspects of Physical Activity
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PA in Today's Society	Time Management	Social	Others Involved
Feelings Pre/Post-Activity	Compromising	Planned	Meaningful Interactions
Difficulties	Weather	Availability	Importance with Others
Benefits	Distractions	Weather	Impact on Others
	Lack of Resources		Support Needed
	Health		

Parent Perceptions on Physical Activity

Parent perceptions on physical activity was identified as an indicator that either promoted or inhibited co-participation of physical activity. When asked about their thoughts on physical activity in today's society, parents mentioned how they knew physical activity was important and good for a person's health. Many parents emphasized both the physical and mental health benefits when it comes to physical activity. Some parents mentioned how modeling physical activity to their child is important; they know their child is watching and learning from what they do as parents and that it is important for them to be active together. They also noted a strong positive association between physical activity and outside time, mentioning if they could just get their children outside, then they were active and moved their bodies. However, they also noted that sedentary lifestyles have a large negative impact on today's society, with strong reasoning due to technology and screen time making it harder to be active.

"In today's world I think that kids are robbed of their physical activity. Like I really think with the way technology is great, but the way that it's brought us to, is that there are so many things that they can do than rather go outside and play" (Mother, White)

“We’re in a world with technology now so it’s hard to get your child off of technology. And it’s evolved a lot. Cause I remember when I was growing up, we were outside all day. My son would rather be watching Cars, Disney, playing Roblox than being outside.” (Mother, BIPOC)

In addition to examining subthemes for the entire sample, racial differences between the Whites and the BIPOC participants were explored. Some differences arose regarding their thoughts on physical activity in today’s society. More White parents were concerned about sedentary lifestyles, especially technology, compared to BIPOCs (13 vs 6 parents, respectively); however, BIPOC parents voiced more importance about physical activity being a way to release excess energy for their children (3 BIPOC vs 0 White parents). Finally, among the BIPOC participants, modeling physical activity was an important part of physical activity in today’s society compared to Whites. (5 vs 3 parents, respectively).

“Children do model their parents. And so I think it’s important for them to see me making better choices. And hopefully in turn, they can make better choices.” (Mother, BIPOC)

When thinking about co-participation of physical activity, parents’ feelings before and after activities could have an important impact on whether they engage in physical activity with their child. For the entire sample, parents had negative feelings before the activity and then positive feelings afterwards. These feelings were similar between the races, so regardless of race most parents will have negative feelings before being active with their child and then have positive feelings afterwards. The majority of parents noted negative feelings before an activity, such as feeling anxious, or tired.

“A lot of the time I’m tired. It’s the end of the day and I mean I look forward to it, but sometimes it’s kind of just one more thing I have to do or he wants to do.” (Mother, White)

In contrast, after the activity, parents overwhelmingly mentioned positive feelings, such as energized, happy, or accomplished.

“Yeah it's fulfilling because you know you've been able to bring joy to your child and you feel good because you've been able to participate and making memories for that day for them. But really the fulfillment of making them happy is one of the best things.” (Mother, BIPOC)

Some parents' perceptions also focused on the difficulties that could affect them being active with their children. Differences in energy levels between the parent and child were mentioned as a difficulty. Most parents stated they did not have as much energy as their child. This statement was similar between the races.

“It's definitely harder to get outside after work and sometimes you're just tired and it's easier to just throw them a tablet and relax for a little bit.” (Mother, White)

Parents also mention transitioning as another difficulty for engaging in physical activity with their child. The issues with transitioning occurred before, during, or after the activity. Some reasons that transitioning was hard for them was due to screen time and pulling the child away, getting the child ready for the activity, getting the child to stop the activity, or getting ready for bedtime. The difficulty noted about transitioning activities was similar between White and BIPOC participants.

“I just think that transitions are hard for her in general. You know like even if I say let's go to the playground, she's not always like yeah let's do it, she's like no I'm busy I'm playing. She'd rather sit on the floor and play with whatever she's playing with, her little glass stones and easter eggs now, like she doesn't want to stop what she's doing, it hard for transitioning.” (Mother, BIPOC)

Finally, while parents perceived it important to be active with their child, at times they felt that their participation in physical activity was not as important as the child being active with either siblings or peers.

“Together its important but it’s not an up most important I guess like I said because she’s in her situation she does have the two older brothers. So if were not active together she definitely has two other people at home to do something with.” (Mother, White)

While parents noted many difficulties with co-participation of physical activity, they were also able to identify benefits from engaging in physical activity with their child. Some of the benefits mentioned were social in nature, such as increased bonding time between them and their child, making their connections stronger, and creating new memories. Further, many mentioned health benefits for the parent and child such as releasing their energy, better moods, sleeping better, eating better, and lowering stress levels for the parents. Finally, parents observed that engaging in physical activity could be a learning opportunity for their children, with some mentioning hopes that learning to be active at a young age would teach them to carry it on into their everyday life as they grow older.

“Being physically active with my child shows that we have a better emotional bond. I feel like they come and talk to me more. When we do more things together it shows that we can connect on different levels” (Mother, White)

“Some of the things help her learn. Like she, you now, she’s at the stage where she should know how to throw a ball, kick a ball, catch, do things with her hands and body. So starting that and doing that with her definitely is a plus, because, like they say, teaching starts at home” (Mother, BIPOC)

Regarding racial differences in benefits to physical activity, both groups mentioned bonding with their child and better health as primary benefits from physical activity (12 White parents and 10 BIPOC parents). There were some differences in benefits between the races. For example, more White parents mentioned the educational benefits of physical activity (7 vs 4, respectively) and using physical activity as a way to decrease screen-time (2 vs 0, respectively) than the BIPOC parents.

“She learns leaps and bounds, vocabulary words, she’ll learn just society things like taking turns and manners, saying please. You know what to do with something once you’re done, put it away. Just like normal life lessons. Just learn from being physical.” (Mother, White)

“It’s just a way for them to be creative without being on the phone or the computer or their tablets.” (Mother, White)

Co-Participation Physical Activity Barriers

Another theme was how barriers could influence physical activity co-participation. The barriers mentioned were grouped into categories to help identify the major overall barriers. The most discussed barrier among parents, regardless of race, was time management (10 White parents and 10 BIPOC parents). Managing time from other life priorities, work, and planning physical activity into their schedules were the main reasons time was an issue.

“Just other time restrictions. I mean, during household work, laundry, even just cooking dinner. I do have a 6-month-old so sometimes I can’t just do all the stuff he wants me to outside. And, or even just in general, he just has to do some things himself.” (Mother, White)

“Also time because of, you know the weekends, they’re supposed to be weekends, and you’re supposed to enjoy them. But there’s so many other things you need to do... if I had less to do on the weekends, to like do around the house, so that we could have more time. Like I

wouldn't have to fold clothes or washing or do all this other stuff when I could have the whole day.” (Mother, BIPOC)

Another major barrier parents, across the races, mentioned was compromising with their children. Compromising with the children involved items like working around their child's mood, accommodating the activity to meet the child's skill level, being aware for the child's safety during the activity, and finding that perfect scenario where it would all work out.

“He is a two-and-a-half-year-old so, he, depending on if he's tired or moody or he throws a tantrum, sometimes we have to, you know, push through those or get through, or otherwise we just have to quit the activity if he is just not being receptive with what I'm doing with him” (Mother, White)

“Besides being able to tell my 2-year-old, you know, getting her to understand it's just two times then it's the next person, that's the only thing. Just getting her to understand the concept of what we're doing, it's an actual game, you know, there's rules and stuff” (Mother, BIPOC)

Lack of resources were also mentioned by parents as a barrier for physical activity. Parents mentioned the following items as ways not having the appropriate resources would limit co-participation of physical activity with their child: lack of equipment to do the activities, limited space to move around in, the distance to get to certain activities, the availability of activities in town, and the financial costs of doing the activity.

“A lot of it is proximity, where you're at. I'm constantly looking for things to do in Pitt County or Beauford County with him” (Mother, White)

“I know there's a lot of places you can take your kids indoor on rainy days, and there's not as many options here. I know there is [local trampoline park]. So people can do like the

trampoline park and stuff like that. But I wish we had more options. Indoor options.” (Mother, BIPOC)

However, once the responses were analyzed by groups, there were some racial differences for the resource barriers. BIPOC parents mentioned more issues with resources for financial costs (6 vs 3, respectively) and availability of equipment or places to be active (5 vs 2, respectively) compared to the White parents.

“I mean cost is a big factor, our economy. We’re a one income family right now so, but we make do. We take care of us.” (Mother, BIPOC)

Weather was also mentioned as a barrier that was similar between the groups. Many parents mentioned if it’s raining, too windy, too hot, or too cold, it can act as a barrier.

“As long as it’s not extreme weather, not too hot or too cold” (Mother, White)

At times keeping the child engaged in the activity and not get bored or distracted by other people or other things was a challenge when being active together. Another common distraction mentioned were screens and trying to get their child off of screens or away from screens in order to be active.

“They don’t want to leave the technology that they’re in the middle of right now or watching right now. So sometimes I’m like come on, we have to go and they’re like five more minutes. And you know five minutes turns into an hour” (Mother, White)

“Like enticing her and saying, “we can pick flowers”. We have started like scavenger hunts, so things like, like we’ll do an alphabet scavenger hunt. So we’ll have to find things of each letter of the alphabet on our walk. Or things like pick up trash and make art with the trash. So that is what it’s like on our walks. So trying to get creative to get them and make it fun you know.” (Mother, BIPOC)

When comparing the responses between races, White parents mentioned more issues with distractions than BIPOCs (5 vs 3, respectively). This was mainly due to screen time, expressing it is hard to get their children off of the screens.

“I think the biggest challenge of being active in our situation is just technology works against us.” (Mother, White)

Finally, health was another barrier mentioned by parents. If either the child was sick or if the parent had mobility issue, it makes co-participation of physical activity more challenging. However, when compared between groups for racial differences, more BIPOC parents mentioned health barriers than White parents (4 vs 2, respectively).

“I have a lot of physical challenges. So mine is with my hips and my right knee and my feet and my ankle. So I have arthritis in my hips, and I had problems swelling with my feet and ankle so my challenge is limited with me, how much I can actually do with them.” (Mother, BIPOC)

“Oh with COVID and germs, that’s a major factor right now. Because with little kids, the want to touch everything.” (Mother, BIPOC)

Co-Participation Physical Activity Facilitators

When discussing co-participation of physical activity with the parents, many physical activity facilitators were mentioned. One major topic brought up across the interviews by parents from both races was the social aspect of physical activity (13 White parents and 13 BIPOC parents). Having social support to be active, whether it’s the spouse, other siblings, or friends, many parents mentioned this as a facilitator. Also, seeing the enjoyment from their child during the activity was another social facilitator of co-participation. A final social facilitator mentioned were the memories created from the activities they did together.

“So it’s definitely easier when my husband is around. It’s definitely easier when there’s two of us that can wrangle both of them” (Mother, White)

“I think those new experiences. That’s a big thing for me. Just having a new experience together and exploring things in the world together is really special.” (Mother, BIPOC)

Another facilitator that was commonly mentioned was planning; this facilitator was similar across the racial groups (6 White parents and 6 BIPOC parents). Parents mention when things were planned ahead of time and time wasn’t an issue, activities were easier to get done. They also mention having more time as a facilitator for future activities done with their child.

“I had everything ready. So it was a big day but if you think about it, it took some preparing to get ready and things like that.” (Mother, White)

“I guess setting up a play date. Just making it happen in general. Go ahead and plan it instead of trying to do it last minute” (Mother, BIPOC)

Availability of activities was another facilitator. Many parents mentioned location as a major facilitator, due to the fact they could either do activities in their backyard or in their neighborhood. Parents also mentioned having activities available would facilitate future activity involvement. However, the availability of space to be active was different between the races, with Whites having more availability than BIPOCs. Many Whites mentioned having the space right in their backyard or house as a facilitator, whereas BIPOC parents mentioned wanting an increased availability of places to be active with their children (9 vs 4, respectively).

“Easier just in the sense that it’s convenient and at our house. We’re lucky to have a space to play outside.” (Mother, White)

“Finding places around here that offer those water activities. So I know right now they’re building a new pool, so like getting like a pool pass to go and get over there and get in the water.” (Mother, BIPOC)

While weather was indicated as a barrier for co-participation of physical activity, it also can serve as a facilitator for physical activity between parent and child. Parents stated if the weather was good and it was nice outside, it was easier to be active with their children. No racial differences existed for this facilitator.

“I’d say like perfect weather all the time. Cause moods are better and you’re more outdoorsy in the summer, spring and fall time. It’s not like super cold and rainy” (Mother, White)

“Just it being a beautiful day and that we’re both going to be able to enjoy it” (Mother, BIPOC)

Social Aspects

A final theme that was noted focused on social aspects of being active with their child. When discussing if others would be involved in their ideal world of physical activity, majority of the parents mentioned having their family members involved, and a few mentioned having friends and neighbors. This response was similar between races.

“Well dad is always at work during the day hours, yeah so I guess in an ideal world he can come and participate too.” (Mother, White)

“Well I have three kids, so probably just them and my husband would be great. If he came along too. Certainly the grandparents if they were able to keep up. Mostly family like family or extended family I would keep it at” (Mother, BIPOC)

Another social aspect that can influence co-participation of physical activity were meaningful interactions that occurred as a result of doing activities together. Parents mentioned interactions with others helped make their physical activity meaningful. They noticed more connections between each other, enjoyment in the activity itself, better cooperation from the child, and educational lessons during activities.

“He’s very affectionate, it was very sweet because he does say, when I notice when we are doing stuff, he’ll always say ‘mommy I love you’. So I notice that cause he’s pretty vocal about that. It’s always that he’ll make a point to mention that when he’s doing stuff he enjoys.”
(Mother, White)

“She enjoyed seeing mom and dad out there. Those things seem to be far and in between because parents are working. But yesterday being able to have an opportunity for that, I think that it’s very special to the kids.” (Mother, BIPOC)

When examining the racial differences for meaningful interactions, one difference noted was that White parents noticed that co-participation of physical activity provided educational moments with their child more than the BIPOC parents (6 vs 2, respectively).

“There’s a lot of lessons. Like for example, the turn taking. Explaining the rules of the game and how the rules of this game area different from soccer, which is a team sport. You know it has a lot of that in it. Don’t touch things when you don’t know what they are you know; off to talk to an adult, that kind of stuff.” (Mother, White)

Another social aspect discussed was how parents perceived the importance of physical activity with others. Majority of the parents stated it was important for them to be active with others because it allows for more bonding time between individuals, they get to model physical

activity for their children, and they are all enjoying it more together. This response was similar between races.

“Because I guess I’ve always been raised this way and it’s something that I value, is being physically active. It just bonds the family. You grow together, you learn from each other. I think there are so many aspects about health wise, there’s so many health benefits to being physically active and it teaches and shows the kids a sense of accomplishment like if they go do something, like learning how to ride a bike. You build confidence and also helps other kids and motivates other kids.” (Mother, White)

“That I realize is very important as well. Because I desire to demonstrate to them, what, why that’s important. That it’s just not because I have all this energy right now, because what if when you don’t, when you get older, I need them to know that taking care of yourself in that way and getting out and getting that fresh air and moving your body, it’s a form of also stress management. I just think starting young, it gives them the foundation to see, it’s something to carry on, it makes them feel good.” (Mother, BIPOC)

Not only did the parents think being active with their child would benefit each other, but they also noted that co-participation could positively impact others as well. One of the main impacts of co-participation of physical activity that parents mentioned was motivation; stating if others saw them being active with their child, they feel like it would motivate the other person to be active as well. Other parents mentioned they thought their physical activity with their child would create stronger bonds with the other people around.

“It probably makes interactions with others around you better. Cause I think obviously being active, it elevates your mood and makes you more patient. So I think as a family, as a

whole, our interactions are heightened in terms of respect and patient and overall a better sense of well-being.” (Mother, White)

Interestingly enough, when discussing the impact physical activity had on others, both races stated motivating others as their top responses; however, BIPOCs mentioned motivating others around them more than the White parents (9 vs 6, respectively).

“I think it’s positive because it’s like a lady I notice who stays a couple houses up and now sometimes when we go walking, she’s outside and she’s like ‘I was waiting for y’all to come pass’ so sometimes it makes other people come outside even if they don’t do much” (Mother, BIPOC)

“Definitely a positive. I think sometimes, you know, people just need to see other people doing it. So, I think when others see, ‘oh wow they’re having family time, that’s something maybe we should do’ or ‘they’re spending time with their child, that’s something we should do’.” (Mother, BIPOC)

With all these social aspects being mentioned, support was a main factor stated across the interviews that would help parents be more active with their children. Parents stated having social support to hold them accountable or help with their children could help them with physical activity co-participation (9 White parents and 8 BIPOC parents). Financial support for costs of activities or equipment was also mentioned to aide in future physical activity co-participation (3 White parents and 4 BIPOC parents). Lastly, social support from others to help set goals in order to achieve activities in the future was also found as a social aspect. All these factors could help support physical activity co-participation. However, when comparing responses between races, BIPOCs mentioned needing help with setting goals to be active more than the White parents (5 vs 3, respectively).

“I just got to make the time and set the goals for it.” (Mother, BIPOC)

CHAPTER 5: DISCUSSION

Physical activity in preschoolers is important because it improves cardiovascular fitness, muscular strength, and mental health (PAG, 2018). However, even with the knowledge of the benefits, many preschool-aged children are not meeting the current physical activity recommendations (Pate et al., 2015). Therefore, it is important to explore ways to increase this populations' physical activity levels.

Parents play an important role when it comes to preschool-age children's physical activity levels. Past research has found parents act as both facilitators and inhibitors for their child's physical activity levels (Hesketh et al., 2017), noting that when parents participated with their child or acted as role models, the child was more active. However, when parents were not active with their child, the child was not as active. Lindsay et al. (2019) also found that parental modeling was a facilitator and inhibitor for physical activity. Parents stated that when they modeled physical activity to their child, their child was more active. But the parents also mentioned themselves as a barrier for their child's physical activity levels, noting they were not active due to time, energy, and travel. Another study found when the parent is involved in the activity with the child, the child was the most active compared to when the parent watched or was not present (Rebold et al., 2016). Therefore, it is important for parents to not only model physical activity for their children, but participate in it as well.

Past parent-based interventions that focused on increasing preschooler's physical activity levels have had mixed results. One study found that when either parent (mother or father) increased their step counts more per day (2000+), their child increased theirs as well (Holm et al., 2012). When discussing parental engagement, one study found that parents think they will

engage in more physical activity with their child than they actually do and choose to participate in certain activities over others (Filanowski et al., 2012). However, not all interventions produced promising results. A parent-based physical activity intervention by DuBose and Dlugonski (2018) did not significantly increase time spent in physical activity or decrease sedentary time for the child. These mixed results highlight the need for a better understanding of what is needed to design parent-based interventions that will increase the activity levels of both parent and child.

Summary of Findings

This study aimed at understanding what parent's thought about co-participation of physical activity with their child. The study also aimed to identify if there were any major racial differences between White and BIPOC parents. From the interviews, themes regarding parent perceptions on physical activity, physical activity barriers and facilitators, and social aspects of physical activity were found to impact co-participation in physical activity among parents and children. When responses were examined between races, there were similarities and differences found between the groups for all four themes. Some of the key differences included the perceptions on today's society, barriers such as distractions and resources, the availability to do activities, educational moments, and the impact on others. Understanding the role parents' views on co-participation of physical activity could be useful when designing parent-based physical activity interventions.

Parent Perceptions

Four main topics emerged regarding parent perceptions on physical activity. First, majority of parents mentioned how physical activity is very important for their child; however, they noted how physical activity has changed since they were children. Irwin et al. (2005)

reported a similar response from parents, who thought it was harder to be active today than in the past. These findings express that our society is not becoming more active friendly and can lead to serious declines in physical activity levels. Parents in this study also mentioned how they perceived today's society more sedentary and children wanted to spend long periods in screen times. The technological changes, including increased screen time, may be a physical activity barrier for preschoolers. Technology as an inhibitor for physical activity has also been reported among older children, as Bentley et al. (2012) reported that parents expressed screen viewing as an indicator of low levels of physical activity in 6- to 8-year-old children. Given these findings it would be important to find ways to help make being physical active easier for parents and their children.

A novel finding from the study was that an important aspect of physical activity co-participation could be the parent's feelings before the activity. The majority of parents felt tired before doing an activity with their child, stating they had a busy day or just got off work. It is important to highlight that after doing the activity with their child, almost all the feelings reported by the parents were positive. This finding is important because if a parent has negative feelings before, it can become a barrier; but if they know how good they feel afterward, it may be easier for them to do the activity in the future.

Other parent perceptions that could potentially impair physical activity co-participation were energy level differences and transitioning challenges. Joseph et al. (2019) also reported that parents of 3-to-5-year-olds mentioned having no energy after work was a challenge for being active with their child. As for the transitioning issues mentioned by the parents, these could happen before, during, and after physical activity. Past research has reported challenges with transitioning from sedentary activities to physical activities in preschool-aged children (Bentley

et al., 2012; Irwin et al., 2005). These difficulties are important to note, as they could be targeted with ways to overcome in order to increase physical activity co-participation. For example, parents could be taught developmentally appropriate strategies for transitioning from one activity to another.

Lastly, parents reported many perceived benefits from co-participation with their child. Parents stated more benefits than perceived difficulties. This indicates that parents understand the importance of being active with their young child. The main benefits included bonding time, health improvements, and educational moments. The benefits of bonding time and health are similar to what Thompson et al. (2009) found when examining family physical activity with 10-11-year-olds. They reported that parents perceived family physical activity as a positive aspect for sustaining parent-child communication and spending time together in addition to improved health and well-being. Although, past research has not mentioned educational benefits as a parent perception on co-participation for physical activity, it is still important as it could be a reason parents enjoy being active with their child.

Co-Participation Physical Activity Barriers

Physical activity barriers were important to discuss because it allowed parents to mention everyday issues that future interventions can target. Time management was the most common barrier mentioned. Parents stated that finding time between working, school, cooking, cleaning, and other life activities, was very difficult. This finding is similar with other studies, that stated lack of time, especially for working parents, was a barrier for participating in physical activity with children (Hesketh et al., 2017; Irwin et al., 2005; Thompson et al., 2009). With time being a common barrier across studies, it will be important to help parents manage their time or focus on completing small activity bouts to increase physical activity co-participation. This is supported

by DuBose and Dlugonski (2018), who found that parents learned that small bouts of light-to-moderate physical activity were beneficial for themselves and their child.

Compromising was another barrier mentioned, noting that dealing with a preschool-aged child's mood and adjusting the activity to their level can be difficult. This barrier was also reported in older children by Thompson et al. (2009), who examined barriers for parents of 10-11-year-olds, and stated having to negotiate between the diverse ages and interests of their children would make doing family physical activity difficult. Another way parents mentioned compromising related to physical activity was related to their child's safety when completing the activity. Some parents mentioned their concern of their child's safety based on the environment they were in, such as busy roads or crowded parks. This issue has also been found in other studies, where Irwin et al. (2005) and Joseph et al., (2019) also mentioned society being less safe as a barrier for preschooler's physical activity. This barrier provides insight that parents need more ideas for activities to do with their preschooler that they would both enjoy and perceive as either safe activities or safe locations to be active with their child.

Many parents also mentioned weather as a barrier, specifically during the weather extremes such as hot, cold, and rainy days. This finding was similar to other studies (Hesketh et al., 2017; Irwin et al., 2005; Joseph et al., 2019; Thompson et al., 2009), who mentioned extreme weather as a physical activity participation barrier. Hence, parents need to be able to engage in a variety of activities, including both indoor and outdoor activities. Based on the findings from this study and past research, it would be important to include ideas for indoor activities, so that they can still be active when the weather does not permit outside time.

Another barrier mentioned for completing physical activities with their child was resources, such as space, cost, and availability. Others have also reported these resource barriers

being present especially for single income families (Bentley et al., 2012; Irwin et al., 2005). Due to resource barriers being reported across studies this would be an important consideration when designing future parent-based interventions. It would be helpful for future interventions to require as little resources as possible or providing these resources within their program to help promote co-participation.

Yet another barrier mentioned was keeping the child engaged in the activity and not getting distracted. To our knowledge, no other study mentioned distractions as a barrier for physical activity. This could be due to this study focusing on co-participation, whereas other studies focus on older children (Bentley et al., 2012; Thompson et al., 2009) or only the preschooler's activity in general (Irwin et al., 2005). Therefore, because children in this age group have a short attention span either developing strategies to keep the child engaged during the activity or limiting the time the activity lasted would be beneficial to consider when promoting physical activity co-participation.

Finally, health was the last barrier mentioned by parents for co-participation, with concerns for either their child getting sick or parent mobility issues. Previous studies have not mentioned health as a barrier for physical activity. Past studies have not focused on co-participation of physical activity in this age group, so this could be a unique barrier for when parents and children are being active together. It is also possible that this is a unique finding for the population in the present study as it was a racially diverse sample of mothers, whereas past studies were primarily comprised of White participants (Hesketh et al., 2017; Irwin et al., 2005). Health status of the parents and child was not obtained in the current study, so it is not known how many parents or children had health issues. Yet, it is important to note some parents

mentioned concerns due to the pandemic and the spread of COVID-19. This concern would be important to consider when creating interventions beyond the acute phase of the pandemic.

Co-Participation Physical Activity Facilitators

Physical activity facilitators are important to consider because they can help promote physical activity in future interventions. The most common mentioned facilitator was the social aspect. Parents mentioned having support from others, seeing the enjoyment from their kids doing the activity during co-participation, and creating new memories made it easier to do physical activity together. One study in 6-to-8-year-old children found similar responses from parents, who mentioned their child will naturally be active if they're doing something they enjoy (Bentley et al., 2012). Also, others have reported that if other children are involved, such as a sibling, it made doing to activity easier (Bentley et al, 2012; Irwin et al., 2005). As for parent and child co-participation, DuBose and Dlugonski (2018) found that parents mentioned family interaction as a benefit from doing physical activity together. Overall, the social impact could promote physical activity co-participation by making it easier to be active for both the parent and child.

The next facilitator discussed was planning, with parents mentioning if they planned activities with their children ahead of time or just had more time overall, it was easier to be active with their child. This factor had promising results in a study by Rhodes et al. (2010), who found that the planning intervention resulted in higher family physical activity compared to the standard condition. Hence, it is important to note that if activities are planned or could have a variety of time slots, then it would be easier for parents to put it in their schedules or make time for co-participation with their child.

Availability was another facilitator mentioned by parents, stating that the location of their backyard or neighborhood made it easier to be active with their child. They also mentioned it was easier to be active together because of having either the space to be active in or any necessary equipment. This is similar to Spurrier et al. (2008) reported who found that preschooler's physical activity levels were positively associated with outdoor play equipment and larger backyard size. Another study also stated that having access to community resources, such as parks and sidewalks, promoted physical activity in preschoolers (Hesketh et al., 2017). Therefore, it is important to make sure space and equipment is available to parents or having options for small spaces or no equipment when implementing physical activity ideas in this population.

Social Aspects

Lastly, we found the strong need for social aspect of doing PA together for all mothers. Parents frequently mentioned the desire of having other family members, like sibling, spouse, and grandparents involved while they are being active with their preschool aged child. As mentioned earlier, research has demonstrated that having siblings involved helped increase physical activity levels in children (Bentley et al., 2012; Irwin et al., 2005). While past qualitative studies have not indicated that including other family members would impact preschool aged children's physical activity levels, an intervention study found that regardless if either the mother or father increased their step counts, the preschool aged child's steps increased as well, indicating that either parent can influence a child's physical activity (Holm et al., 2012). This finding is important because involving others, like family or friends, could increase accountability for the parent to be active with their child and others, and give them something to look forward to as a family activity.

Meaningful interactions that occurred while the parent was being active with their child was another positive social factor reported. Parents mentioned feeling connection and enjoyment while being active with their child that made their interactions meaningful. This is similar to what was found by Thompson et al. (2009), who reported that parents expressed the importance of social aspects, such as bonding and communication, when being active as a family. These meaningful interactions are important to bring to light, as it illustrates positive experiences above health benefits that occur during co-participation of physical activity. If parents are aware/experience these benefits it might encourage families to be active together.

Parents were also asked what they thought was important about of being active with others, either their child or other individuals. Many parents mentioned it was important to be active with their child to have those bonding moments and teaching them new things. Furthermore, the parents felt that it was more important to be active with immediate family (spouse, child's siblings, and grandparents) more so than distant family members (aunts, uncles, nieces and nephews). This could be due to the proximity and closeness of the immediate family making it easier to be active with compared to the distant family. This finding is similar to the results from DuBose and Dlugonski (2018), who found that the main reason parents signed up for an at-home intervention was to increase their family's physical activity levels. Also, Thompson et al. (2009) found that majority of parents considered family engagement in physical activity important or very important for family life but did not mention if it was immediate or distant family. This aspect is important to note, as highlighting the importance can help identify a drive to be active together as a family than individually.

A unique part of this study was that the mothers were asked about their thoughts on the impact their physical activity co-participation had on others. Many parents thought there would

be a positive impact on others from being active with their child. They mentioned it was a modeling aspect for other families, meaning if other families saw them being active together, they might be active as well. This could be due to seeing the enjoyment and experience the family is having, making other families want to be active with their kids as well. To our knowledge, this a novel finding and expands on the knowledge regarding the social aspect physical activity can have on inter-personal relationships.

Support needed for physical activity was the last social aspect mentioned, as parents stated social support, financial support, and setting goals as factors that can help increase co-participation. Although other interview-based research has not mentioned support needed to help increase physical activity, they have mentioned financial costs, social support, and time management as barriers (Bentley et al., 2012; Hesketh et al., 2012; Irwin et al., 2005). One parent-based physical activity intervention did incorporate support in forms of providing physical activity ideas and weekly telephone calls with a physical activity coach to aid in goal setting and other behavior change strategies to increase co-participation of physical activity among parents and their young child (DuBose & Dlugonski, 2018). Based on qualitative data from the parents after the intervention they stated that the support given especially the physical activity ideas as an aspect of the intervention that they really liked. Taken together, these findings suggest that providing different methods of support to parents would be important to help reduce possible barriers and increase co-participation.

Racial Differences

Another unique aspect of this study was the ability to compare responses between Whites and BIPOC participants. As for the racial comparison, this study found some differences in parents' responses for co-participation of physical activity. The most differences noted between

the races was regarding parent perceptions for the role physical activity has in today's society. White parents were more concerned about sedentary lifestyles and stated more educational benefits during physical activity. Among BIPOC parents, modeling physical activity was important and they perceived physical activity as a good way for their children to burn off excess energy. Physical activity barriers were another area where racial differences were observed. White parents mentioned more issues with distractions with screen time, whereas BIPOC parents mentioned more issues for resources and health problems. The only racial difference noted for physical activity facilitators was that White parents mentioned having more availability, in terms of location, to be active with their child than BIPOC parents. A final area where racial differences were noted was related to social aspects of co-participation physical activity. White parents noticed more educational moments with their child during co-participation; however, BIPOC parents discussed more about how their co-participation could motivate others to be active and they expressed a greater need for support by setting goals than White parents.

Comparing these results with other studies is challenging given few studies have been conducted on this age group. Further, previous qualitative studies were based in the UK, Australia, and Canada where majority of their populations were White participants and if they had BIPOC parents as participants the numbers were too small to do racial comparisons. As for preschool-aged children, it is unclear if racial differences in physical activity participation exists (Chuang et al., 2012; Pate et al., 2015), but in older children, White children spend more time in MVPA (Miller et al., 2019) and BIPOC children spend more time in sedentary activity (Richmond et al., 2007). The findings from the current study are important as they might help explain why there may be differences in physical activity levels across different races in preschool aged children. Additional research is needed to better understand not only the physical

activity habits of preschool aged children from different races, but also what factors might facilitate and inhibit physical activity participation in this age group.

Future Interventions

The findings in this study are very important for future interventions that target co-participation between parents and preschoolers. Highlighting the positive feelings parents experience after doing an activity with their child could motivate parents to be active even when they are experiencing negative feelings before the activity. A lack of parental energy or differences in energy levels would also be a key item to work with parents on. Suggesting smaller activity bouts may be a good strategy to help parents work around this potential barrier. This would allow parents to fit activity sessions into their daily schedules. Identifying and considering each barrier that the parents have would be important and then to aid them with developing create solutions. For example, creating a variety of activities to do together that have different time limits can help with time management and having activities that can be done inside and outside would allow them to be active even when the weather does not permit outside time. Also, considering the lack of resources (equipment, space, distance, costs) expressed by some participants, creating options for at home activities that require no equipment, local parks, and low cost or no cost activities could prevent this barrier from occurring. As for the facilitators mentioned, all four should be discussed to help promote physical activity and make it easier for co-participation. For example, planning was a facilitator found in this study; as a result, it may be important to have a timeline or schedule of activities to do or go about for future interventions. Also, future interventions can teach parents how to schedule family physical activity into their day to help promote co-participation. Given the importance of the social aspect of co-participation of physical activity, this would be important to include as well. First, developing

physical activity interventions that are inclusive for multiple family member to participate would be good to highlight, as this study found that parents would rather have family than friends or neighbors engage in the physical activity. Also, if we focused on these social aspects it could encourage people to focus on the social qualities and make it easier to do the part that they might not enjoy (the physical activity) or maybe it would at least get them started so they can realize that they enjoy physical activity. Additionally, incorporating different types of support, such as social support from those who are implementing the intervention or setting goals with the parents during the intervention, could help make an intervention focused on co-participation more likely to be successful. Finally, due to specific racial differences noted in how parents perceive physical activity and barriers for physical activity these would be important to take into consideration when designing future interventions that target parents, both White and BIPOC. Overall, considering these findings can aid in developing an effective intervention.

Strengths and Limitations

This study has many strengths that further the body of research focusing on physical activity in preschool aged children. To the best of our knowledge this is the first study that examined parent's perceptions of co-participation of physical activity in preschool aged children. Past research has focused on parent's perceptions of their child's physical activity in general (Bentley et al., 2012; Irwin et al., 2005; Joseph et al., 2019). The parents who participated in the study were from a broad demographic background for race, meeting PA guidelines, educational background, marital status, and number of children, these factors increase the generalizability of the findings. Further, of the limited qualitative research completed in this age group, this is the first study to include a large sample of BIPOCs. Lastly, this diverse sample was similar to the population found in eastern NC, with majority being Caucasian, followed by African American,

and a few Asian and Hispanic parents. This similarity increases the generalizability of the findings for eastern NC.

However, there were some limitations with this study. This study had all mother participants; therefore, it does not include insight on the father's perspectives or participation. Also, when identifying racial status, participants were grouped as either White parents or BIPOC parents, and unfortunately did not explore potential differences across the other races. Therefore, future research should intentionally recruit enough participants in the different races so they could be assessed independently from one another. It is also possible that parents who participated in the study may also have higher regards for physical activity, thus not reflecting responses for parents who do not consider physical activity as important. Furthermore, this qualitative study asked interview questions that only gave insight based on the parent's responses, without measuring the level of physical activity co-participation between the parent and child. Another limitation is that parents were not asked their employment status, which would have been interesting to know as majority of the White mothers mentioned being stay-at-home moms during the interviews and majority of the BIPOC mothers mentioned work. This could have been another factor that impacted co-participation if it was explored in more detail. Lastly, the COVID-19 pandemic could have impacted parents' perceptions due to the change in society in the past two years.

Conclusion

The findings presented provides insight on what parents think about physical activity in today's society and the importance of being active with their child. Parents know physical activity is important for their child and it is important to do together because it gives them bonding time and learning moments. However, today's world has become more sedentary which

makes it more difficult for parents to help their children establish a physically active lifestyle they can carry into adulthood. They mentioned many benefits of being active with their children, but also many difficulties due to everyday life. Major barriers found in this study, like time management and resources, should be considered when making future interventions, as they are not impossible to overcome. The facilitators for co-participation in physical activity mentioned, such as planning and social support, should also be incorporated in future interventions, as they could help parents engage in more activity with their child. Moreover, incorporating the social aspects of co-participation of physical activity need to be supported in interventions with this population. Finally, understanding the differences that exists among races are important to understand and target when designing a parent-based physical activity intervention.

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Appendix A – IRB Approval

	<p>EAST CAROLINA UNIVERSITY University & Medical Center Institutional Review Board 4N-64 Brody Medical Sciences Building · Mail Stop 682 600 Moxe Boulevard · Greenville, NC 27834 Office 252-744-2914 · Fax 252-744-2284 rede.ecu.edu/umcirb/</p>
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Notification of Amendment Approval

From:	Social/Behavioral IRB
To:	Katrina DuBose
CC:	
Date:	3/25/2022
Re:	Ame1_UMCIRB 22-000339 UMCIRB 22-000339 Physical Activity Interviews with Parents of Preschool Children

Your Amendment has been reviewed and approved using expedited review on 3/25/2022. It was the determination of the UMCIRB Chairperson (or designee) that this revision does not impact the overall risk/benefit ratio of the study and is appropriate for the population and procedures proposed.

Please note that any further changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must adhere to all reporting requirements for this study.

If applicable, approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Document	Description
demographics revised(0.01)	Data Collection Sheet

For research studies where a waiver or alteration of HIPAA Authorization has been approved, the IRB states that each of the waiver criteria in 45 CFR 164.512(i)(1)(i)(A) and (2)(i) through (v) have been met. Additionally, the elements of PHI to be collected as described in items 1 and 2 of the Application for Waiver of Authorization have been determined to be the minimal necessary for the specified research.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418 IRB00001781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

Family Physical Activities

Looking for Parents with Preschool-Aged Children (2–5-year-olds)



We want to know your thoughts on physical activity with your child.

The Research Study:

We want to understand how families are physically active together. Will you participate in a one-on-one virtual interview?



What to Expect:

The interview will last about 45 minutes. We will ask about your thoughts on your child's physical activity, what your family is currently doing, and what you might want to change. After completing this interview, you will receive an e-gift card for your time.

Interested?

Contact Us: Kristen Cook

Email: cookk16@students.ecu.edu

Phone: 762-822-0600

This study is under the direction of

Dr. Katrina D. DuBose

Department of Kinesiology



Appendix C – Interview Questions

Introduction:

Thank you for agreeing to talk with us. During this interview we want to understand what types of activities parents do with their 2-5 year old child. Children learn from their parents and doing activities together, especially physical activity, is something that can give benefits to both the parent and child. The questions we are going to ask will help us better understand your thoughts on physical activity for you and your child. The information you share will also help us plan future interventions that meet the needs of families.

Interview Questions:

1. Can you tell me about activities that you do with your child on a regular basis? (big general not only focused on PA)
2. Are there other activities that you would like to do more with your child? (big general not only focused on PA)
3. Given all the concerns you may have in raising your child in today's society, describe your thoughts on physical activity.
4. How important is it for you and your child to be physically active together? Clarification: physical activity means any movement your body makes, exercise. (then have them elaborate on their answer)
 - a. If yes, why?
 - b. If not, why?
5. Describe some of the benefits of being physically active with your child.
6. Describe some of the challenges of being physically active with your child.
7. We are interested in families are active together, can you tell a time when you were recently active with your child? You can talk about the setting and what you were doing
 - a. Can you tell me about what you felt like before doing this physical activity with your child
 - b. Can you tell me what you felt like after doing this physical activity with your child
 - c. Can you tell me what your child liked about being active together
 - d. What kind of meaningful interactions happened during being activity together?
 - e. Please describe where you and your child were physically active (environment)
 - f. Can you tell me what made this activity harder (challenges/barriers) (for the parent and/or the child)
 - g. Describe what made it easier to do this activity with your child
8. In your an ideal world what would it look like to be active with you child.
 - a. In what ways do you imagine others being involved? (other families, just your family, siblings, whole family, you/child)
 - b. In what settings do you see your-self being active with your child? (at home, neighborhood, play ground, park, church, etc)
 - c. What keeps you from having this ideal parent-child experience?
 - d. What type of support would you need to have this ideal parent-child experience? (social support – other people, people to be active with, activity ideas, goal setting, help with behavior change...?)

9. What would motivate you to be closer to the ideal world you just described about being more active with your child?
10. In what ways would being active with your child life impact others in your life [positively or negatively]?
11. Is there anything else you would like to add?

Appendix D – Demographic Questions

ID #: _____ Date: _____

Parent Interview about Family Physical Activity

Demographics

I would like to ask you a few questions about your and your child's background

1. What is your sex? (check one) [PIPA0201]
 1. Female
 2. Male
2. What is your race/ethnicity? (check one) [PIPA0202]
 1. African American 3. Hispanic 5. Native American
 2. Non-Hispanic white 4. Asian 6. Other
3. Are you currently participating in either 150 minutes of moderate aerobic physical activity per week or 75 minutes of vigorous aerobic physical activity per week? [PIPA0203]
 1. Yes
 2. No
 7. Don't know/Refused to answer
4. Which best reflects your highest level of education? (check one) [PIPA0204]
 1. Did not complete high school
 2. Graduated from high school or earned GED
 3. Attended college or vocational school
 4. Earned a college degree (Bachelor's)
 5. Earned a graduate degree (Masters, Doctoral, Professional)
 7. Don't know/refused
5. Which best describes your marital status? (check one) [PIPA0205]
 1. Married
 2. Living as married
 3. Widowed
 4. Divorced
 5. Never married/single
 6. Separated
 7. Don't know/refused

6. Which best describes the place you live? (check one) [PIPA0206]
- 1. Large city [>100,000 people; like Raleigh, NC]
 - 2. Medium city [30,000-100,000 people; like Goldsboro or Greenville, NC]
 - 3. Rural city [<30,000 people; like Havelock or New Burn, NC]
 - 4. Small city [<1,000 people; like Black Creek or Bath, NC]
 - 5. In the country, no city
 - 7. Don't know/refused
7. How many children do you have? _____ [PIPA0207]
8. What is the age of the 1st child? _____ years [PIPA0208]
9. What is the sex of your 1st child? (check one) [PIPA0209]
- 1. Female
 - 2. Male
10. What is the age of the 2nd child? _____ years [PIPA0210]
11. What is the sex of your 2nd child? (check one) [PIPA0211]
- 1. Female
 - 2. Male
12. What is the age of the 3rd child? _____ years [PIPA0212]
13. What is the sex of your 3rd child's? (check one) [PIPA0213]
- 1. Female
 - 2. Male
14. What is the age of the 4th child? _____ years [PIPA0214]
15. What is the sex of your 4th child? (check one) [PIPA0215]
- 1. Female
 - 2. Male

Appendix E – Codebook

Variable	Description
Regular Basis Activities	
Sports	Activities that were sports related (ex: soccer, tennis, etc.)
PA	Activities that consisted of body movement that used energy; both indoors and/or outdoors (walks; bike rides; dancing; cleaning)
Sedentary	Activities that consisted of little to no body movement; mostly stationary; both indoor and outdoor (screen time; arts and craft; etc.)
Education	Activities that consisted of teaching the child and/or the child learning new things
Traveling	Activities that consisted of traveling with child
Activities parents want to do more with child	
Sports	Activities that are sports related (ex: soccer, basketball, etc.)
Outside PA	Activities that are outdoors that consisted of body movement (walk; skate; etc)
Education	Activities that are more educational, where they can teach the child new things and the child can learn more things
One-on-One	Activities that are more one-on-one based, allowing that bonding between the parent and child
Activities w/Others	Activities that involve other children; Activities that are more community based
Parents thoughts on PA in Today's Society & PA w/ Child	

Active Lifestyles	Parent notes people should be living an active lifestyle and create it as a part of their everyday life
Sedentary Lifestyles	Parent notes PA is important to decrease time spent in sedentary behavior; Screen time is a big factor in today's society; PA is declining
Health	Parent notes overall physical health, mental health and sleep are affected by PA
Weather	Parent notes weather can be a barrier and facilitator for PA
Time Management	Parent notes managing time can affect PA levels in today's society
Energy Output	Parent notes PA is a safe energy output for both them and their child
Modeling	Parent notes modeling PA can help society and their child be more active
Education	Parent notes PA is important for the child's educational factors
Outside Time	Parent notes outside time as a PA location
Enjoyment	Parent notes they want child to enjoy PA
Engagement	Parent notes using PA to keep child engaged and allow them to use imagination
Bonding	Parent notes PA as a time for bonding with child
PA Facilitators	
Bonding	Parent notes bonding with parent or others as a facilitator for PA
Education	Parent notes the child having a teaching/learning experience as a facilitator for PA
Energy Output	Parent notes a healthy way to release energy as a facilitator for PA
Health	Parent notes overall benefits for physical health, mental health and sleep are facilitators for PA

Active Lifestyle	Parent notes creating/having an active lifestyle as a facilitator for PA
Enjoyment	Parent notes child enjoyment and enjoying the activity itself as a PA facilitator
Screen Time	Parent notes decreasing screen time as a facilitator for PA
Time	Parent mentions time can make activity easier
Weather	Parent mentions weather can make activity easier
Location	Parent mentions location can be a convenience for doing the activity
Planned	Parent mentions planning activity beforehand makes it easier
Support	Parent mentions having support from others makes activity easier
Other	Parent mentions other things make activity easier
PA Barriers	
Weather	Parent mentions weather
Time Management	Parent mentions managing time, including working, and prioritizing other activities as a barrier for PA; planning to do the activity and being intentional to be active
Screen Time	Parent mentions child wanting more screen time instead of activity as a barrier for PA
Compromising	Parent mentions compromising with the child to do the activity as a barrier for PA (child's mood; patience)
Safety	Parent mentions safety concerns and issues for the child as a barrier for PA
Energy Levels	Parent mentions the energy level difference between them and their child as a barrier for PA

Transitioning	Parent mentions transition before, during, and/or after the activity as a barrier for PA
Engagement	Parent mentions keeping the child engaged as a barrier for PA
Health	Parent mentions health concerns and issues as a barrier for PA
Availability	Parent mentions the availability of activities as a barrier for PA (sports; clubs)
Accommodations	Parent mentions accommodations for other people and/or their child as a barrier for PA
Resources	Parent mentions not having resources from the city, for equipment, and help from others as a barrier for PA
Location	Parent mentions the location for activities as a barrier for PA
Financial	Parent mentions financial concerns as a barrier for PA
Other	Parent mentions other reason for barrier to PA. (getting back in shape)
Recent activity with child	
Outdoor PA	Activities that are outdoors that consisted of PA (walks, bike rides, etc)
Indoor PA	Activities that are indoors that consisted of PA (dancing, bowling, trampoline park)
PA Environment	
Neighborhood	Activity environment is in their neighborhood
Backyard	Activity environment is in their backyard
Park	Activity environment is at a park
Home	Activity environment is in their home
Indoor Locations	Activity environment is indoors somewhere besides home

Outside	Activity environment is outside
Feelings Before/After Activity	
Negative	Parent mentions negative feelings before/after activity (antsy, tired, nervous, annoyed, etc)
Positive	Parent mentions positive feelings before/after activity (happy, energized, accomplished, etc)
Other	Parent mentions other feelings
Meaningful Interactions	
Enjoyments	Parent notices joy, happiness and laughter from child
Connections	Parent notices meaningful connections during activities from child (conversations, physical gestures, vocalize feelings, bonding)
Cooperation	Parent notices child is more cooperative during activity
Education	Parent notices child has more educational moments and opportunities during activity
Ideal World Activity	
Outdoor Activity	Parent mentions an outdoor activity as an ideal activity (walks; bike rides; etc.)
Sports	Parent mentions more sports as an ideal activity
Destination	Parent mentions a destination specific activity as their ideal location (Disney world; aquarium; etc.)
Others Involved in Ideal World	
Family	Parent mentions other family would be involved in their ideal world
Neighbors	Parent mentions neighbors would be involved in their ideal world

Friends	Parent mentions friends would be involved in their ideal world
Ideal World Support Needed	
Financial Support	Parent mentions financial support would help reach ideal world
Social Support	Parent mentions social support from other family, friends, and the community would help reach the ideal world
Environment	Parent mentions environmental changes like more parks would help reach ideal world
Safety	Parent mentions safety assurance would help reach ideal world
Setting Goals	Parent mentions planning their activity would help reach ideal world
Other	Parent mentions other support to reach ideal world
Ideal World Motivation	
Support	Support from others (family, friends, others)
Planning	Planning activity and getting started
Availability	The availability to do the activity would help motivate parents
Child Enjoyment	Seeing the enjoyment from the child help motivate parents
Longevity	Having long healthy lifestyle; active with their children's children
Time	Having more time to do activities
Memories	Creating memories for them to have and look back on
Energy	Having more energy to do activities with kids
Other	Other reasons are their ideal motivation
Impact Others	
Engagement	Parent mentions being active with others helps with engagements, interactions, moods, and behaviors

Accomplished	Parent mentions being active with others makes them feel accomplished
Health	Parent mentions being active with others makes them feel better health wise
Bonding	Parent mentions being active with others helps with bonding with others
Motivating	Parent mentions being active with others makes them motivated to be active
Releases Energy	Parent mentions being active with others helps them release energy
Other	Parent mentions being active with others helps with other reasons
Importance w/Others	
Important	Parent mentions it is important to be active with others due to positive reasons (bonding, health, education)
Not Important	Parent mentions it is not as important to be active with others due to other reasons (other priorities, distance)

