HHS Public Access

Author manuscript

Am J Prev Med. Author manuscript; available in PMC 2018 April 01.

Parent's Physical Activity Associated With Preschooler Activity in Underserved Populations

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Abstract

Introduction—In the U.S., children from low-income families are more likely to be obese. The impact of parent modeling of physical activity (PA) and sedentary behaviors in low-income American ethnic minorities is unclear, and studies examining objective measures of preschooler and parent PA are sparse.

Methods—This cross-sectional study examined 1,003 parent–child pairs who were of low income, largely Latino and African American, and living in one of two geographically disparate metropolitan areas in the U.S. Parents and children wore GT3X/GT3X+ accelerometers for an average of >12 hours/day (7:00AM–9:00PM) for 1 week (September 2012 to May 2014). Analysis occurred in 2015–2016.

Results—About 75% of children were Latino and >10% were African American. Mean child age was 3.9 years. The majority of children (60%) were normal weight (BMI 50th and <85th percentiles), with more than a third were overweight/obese. Children's total PA was 6.03 hours/

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day, with 1.5 hours spent in moderate to vigorous PA (MVPA). Covariate-adjusted models showed a monotonic, positive association between parent and child minutes of sedentary behavior (β=0.10, 95% CI=0.06, 0.15) and light PA (β=0.06; 95% CI=0.03, 0.09). Child and parent MVPA were positively associated up to 40 minutes/day of parent MVPA, but an inverse association was observed when parental MVPA was beyond 40 minutes/day (p=0.002).

Conclusions—Increasing parental PA and reducing sedentary behavior correlate with increased PA-related behaviors in children. However, more work is needed to understand the impact of high levels of parental MVPA on the MVPA levels of their children.

Introduction

Physical activity (PA) is a critical factor for the prevention of childhood obesity and the promotion of cardiovascular health.[1-4] Moderate to vigorous PA (MVPA) is associated with lower odds of overweight in young children,[5-8] but evidence is mixed concerning whether preschool children engage in sufficient amounts of MVPA.[9-11] A recent report shows that less than half of preschoolers obtain the recommended 3 hours/day of total PA (light, moderate, and vigorous), with at least 1 of these hours in MVPA, recommended by leading international organizations.[12,13] Some studies indicate that Latino and African American youth are at lower odds of meeting daily PA recommendations[14,15] and higher odds of being overweight/obese.[16] For example, nationally representative U.S. data of children aged 6–11 years show that Mexican Americans engage in less MVPA.[17] However, other research suggests that children from lower-income households engage in more weekday MVPA[18] than children from higher-income households. Identifying key determinants of PA in early childhood could contribute to the development of culturally appropriate, effective PA promotion strategies.

Data from Mexican American children aged 8–10 years found that increases in maternal BMI predicted decreases in children's MVPA and increases in sedentary behavior. Family lifestyles and shared environments are important,[19,20] but it is unclear if parental PA contributes to preschool children's PA.[21,22] Understanding how parents influence child PA is necessary for developing effective early childhood interventions.

In studies of preschool children in the United Kingdom[23] and New Zealand,[24] parental PA was significantly associated with child PA. However, because most prior studies had small sample sizes, did not represent underserved populations, and, in many cases, did not utilize clear minimum accelerometer wear time requirements, it is uncertain the extent to which the findings generalize to U.S. populations at high risk for pediatric obesity.[25] The purpose of the present research was to examine the associations between accelerometer-measured parental and preschool child PA, among low-income black, white, and Latino families in the U.S. This study hypothesized that parental time in PA of varying intensities and sedentary behavior would be associated with their preschooler's PA and sedentary behavior.

Methods

Study Sample

Baseline data from two ongoing pediatric obesity prevention RCTs with the same data collection protocols for preschool child–parent pairs were examined.[26,27] The Growing Right Onto Wellness Trial (NCT01316653) was conducted in Nashville, Tennessee, and the Now Everybody Together for Amazing and Healthful Kids Trial (NCT01606891) was conducted in Minneapolis/St. Paul, Minnesota. Parents were eligible if they had a preschool-aged child (2–5 years) with a BMI 50th percentile, no medical conditions preventing PA, received some type of federal assistance (e.g., Special Supplemental Nutrition Program for Women, Infants, and Children), and spoke either English or Spanish. Of eligible parent–preschool child pairs, 75% completed baseline data collection and were enrolled in the study. From the full sample of 1,143 parent–child pairs, 1,003 had valid accelerometer-measured PA data (defined below) for both parent and child; this constituted the analytic sample. This represents an 87.7% participation/response rate. The analytic sample compared to the full sample did not differ in child gender (p=1.00), child race/ethnicity (p=0.54), adult race/ethnicity (p=0.82), and adult education (p=0.79).

Measures

Study designs and data collection procedures have been published.[26,27] Informed consent was delivered in the participant's language of choice (English or Spanish), in written and verbal form for parents. Participants received a monetary incentive of $50 at Minnesota and $40 at Vanderbilt for participating in all baseline data collection.[26,27] Objective anthropometric measurements were obtained from both the parent and child before accelerometry data were collected.[26,27] Data were collected from September 2012 to May 2014. Protocols were approved by Vanderbilt University (No. 120643) and the University of Minnesota (No. 1005S81634) IRBs.

Parent–preschool child participants were asked to wear an ActiGraph GT3X or GT3X+ accelerometer (ActiGraph LLC, Pensacola, FL), on the right hip for 7 days, including when sleeping. The accelerometry data were collected at a frequency of 40 Hz and were downloaded using ActiLife software, versions 6.1.1–6.9.2. The adherent wear time criterion was 4 days (3 weekdays and 1 weekend day) of at least 6 hours of wear time/day, but in most cases, parent–child pairs wore their accelerometry for >12 hours/day. Non-wear was defined by an interval of 90 consecutive minutes of zero counts. Any non-zero counts (except allowed short intervals of up to 2 minutes) were considered awake wear time.[28] Accelerometry recordings from 7:00AM to 8:59PM were used to capture the typical daily wake time cycle for young children.[29,30]

To explore total volume of PA, average counts/minute were assessed, followed by analysis of time spent in each category of PA and sedentary behavior, using vertical axis counts:

1. children: 0–25 counts/15 seconds=sedentary, 26–419 counts/15 seconds=light, 420–841 counts/15 seconds=moderate, and 842 counts/15 seconds=vigorous[31]; and

2. adults: 0–100 counts/minute=sedentary, 101–2,019 counts/minute=light, 2,020–5,998 counts/minute=moderate, and 5,999 counts/minute=vigorous.[32-34]

All analyses were repeated using the percentage wear time spent at different intensities instead of time to account for different durations of wear times; conclusions remained unchanged. Also, no differences were found in the associations between child and parent PA intensities on weekdays as compared to weekends; thus, PA was averaged over all days of the week. Lastly, to explore total volume of PA, average counts/minute were assessed.

Parents reported on age, gender, and race/ethnicity of children and parents; parent education; and country of origin.

Body weight was measured, after voiding and wearing light clothing and no shoes, to the nearest 0.1 kg on a calibrated digital scale. Height without shoes was measured to the nearest 0.1 cm using a standard stadiometer. BMI was calculated (weight [kg]/height [m^2]) and weight classifications were assigned using the Centers for Disease Control and Prevention calculator and guidelines,[35] respectively.

Statistical Analysis

All analyses were conducted in 2015–2016. To determine if combining data across the two trials was appropriate, the interaction between parent's total PA and study location on the outcome of child's total PA was tested. In addition, interactions between study location and both child and parent accelerometer wear time were examined. None of these interactions were statistically significant (p-values ranged from 0.07 to 0.46). Also explored were three-way interactions among parent's PA, study location, and alternatively child's age, gender, or race/ethnicity with child's total PA as an outcome. None of the interactions were significant (all p-values >0.10), leading to the conclusion that a pooled analysis was appropriate.

Descriptive statistics were calculated. Multiple linear regression analyses were conducted using parents' PA (minutes/day) spent in sedentary behavior, light, or MVPA as the main predictor variable and child's PA (minutes/day) spent at that same PA intensity level as the outcome variable, with parent and child accelerometer wear time as covariates. Additional covariates included child's age, gender, race/ethnicity, and BMI; parents' age and BMI; and study location. Parent's race/ethnicity, education, and employment did not contribute to any of the models (p>0.10 and had no impact on key associations); therefore, they were not included in final modeling. Analyses were conducted using SAS, version 9.3.

Results

The average child's age was 3.9 (SD=0.9) years (Table 1). Seventy-five percent of participating children were Latino, and >10% were African American. Most parents (56%) had at least a high school level education. The majority of children (60%) had normal weight (BMI <85% for gender and age), about 30% were overweight, and 10% obese. More than three quarters (76%) of participating parents were overweight/obese. Noted in Table 1 are the child demographic differences in the two participating sites that reflect the differences in their eligibility criteria.[26,27] Appendix Table 1 provides parental demographic information.

On average, parents and children wore accelerometers for >12 hours/day (Table 2), with a median wear time of 803.0 minutes/day for children and 801.3 minutes/day for adults. Children's total time spent in PA was 361.9 minutes/day; parents averaged 328.5 minutes/day. Children spent about 50% of their wear time in sedentary behavior (410.5 minutes/day), and their parents spent close to 60% in sedentary behavior (442.4 minutes/day). About 30% of children's wear time was spent in light PA; parents spent 40% in light PA. Almost 13% (98.2 minutes/day) of wear time among children was spent in MVPA, whereas parents spent 2.3% of wear time in MVPA (18.0 minutes/day). Mean MVPA minutes for boys was 113 minutes/day and 99 minutes/day for girls. The distributions of sedentary behavior and light PA minutes were approximately normal in parents and children, but the distribution of MVPA minutes was highly skewed in parents, with most parents having low minutes/day of MVPA and few parents having high minutes/day in MVPA.

Associations of time spent by parents and their children in sedentary behavior and light PA were described using linear models, but quadratic terms were needed to describe the association for MVPA. Table 3 shows results from both unadjusted and adjusted linear models for sedentary behavior and light PA. In adjusted models, for every minute that a parent spent in sedentary behavior, child's sedentary behavior increased by 0.10 minutes ($p<0.001$). Similarly, for every minute a parent engaged in light PA, child's light PA increased by 0.06 minutes ($p<0.001$).

The relationship between parent's and child's daily time spent in MVPA is shown in Figure 1. As parent MVPA minutes go from 1 to 10 minutes, child's mean predicted MVPA minutes increases from 95 to 98.5, when the parent MVPA minutes go from 30 to 40 minutes, child's mean predicted MVPA minutes increases slightly, from 103 to 103.5, and when parent MVPA minutes go from 40 to 50 minutes, child's mean predicted MVPA minutes begin to decrease, from 103.5 to 102.5 minutes. The parent data are sparse (5.98%) above the MVPA level of 50 minutes. Nevertheless, the quadratic coefficient was negative and the overall quadratic association was significant ($p=0.002$, F-test).

Discussion

Determinants of PA in underserved Latino and African American preschool-aged children have not been well studied, but are important to understand because of their elevated obesity risk.[36] Several studies have linked parental PA to young children's PA.[21,22] However, the present study is the first to examine the association using accelerometry in a large sample of underserved, mostly Latino parent–preschool child pairs. With a mean wear time of 12 hours/day for both parents and children, the current study better describes time spent in all types of PA and sedentary behavior.

This sample of more than 1,000 racially and ethnically diverse preschool-aged children spent an average of 98 minutes/day in MVPA daily. This amount is higher than previously reported[37-40] and could reflect the benefit of collecting data with longer accelerometry wear times. In a study conducted by Ruiz et al.,[41] Latino preschoolers took an average of 11 hours to achieve their full MVPA, highlighting the importance of longer wear times to collecting accurate measurements of MVPA in this population. Importantly, no gender differences in

achieving MVPA recommendations (60 minutes/day)[42] at these young ages were observed. In fact, both boys and girls achieved a mean of greater than 90 minutes of MVPA/day; however, boys had a mean average of 13 minutes more in MVPA/day than girls (p<0.001). Cross-sectional studies using older samples of children[12,43-45] found that boys engaged in significantly greater amounts of accelerometry-assessed PA than girls. The present study's finding highlights the opportunity at this developmental period to enhance PA and reduce sedentary behaviors among all children before PA levels begin to decline as they reach adolescence, particularly among girls given this decline begins in early adolescence.[46]

These findings also indicate that, on average, low-income black, white, and Latino preschool-aged children achieve recommended levels of MVPA (mean of 98 minutes/day in MVPA daily) despite their parents' low mean levels of MVPA (mean of 18 minutes/day). The relationship between parent and preschool MVPA appears to be nuanced. A curvilinear relationship was noted: a positive association at fewer than 40 minutes/day of parent MVPA but an inverse relationship if parents spent longer periods in MVPA. This approximate inflection point exceeds the 30 minutes/day that is the recommended for adult MVPA.[47] It may be that parents spending more than 40 minutes/day in MVPA are engaging in activities that cannot be sustained by young children developmentally (such as running long distances), that parents are exercising without their young children present (such as exercising at the gym or exercising when children are at daycare), or in workplace-related PA, which is higher among African American and Latino adults than among white adults.[48,49] The present study was only able to examine the objective accelerometry results and not additional information about what type of activity and where the activity occurred for parents. Further examination of this complex association between parental MVPA and preschool child MVPA, using rigorous methods to assess the type and place of PA in this age group, is warranted given the importance of MVPA for obesity prevention/treatment and to improving health outcomes.[50,51]

Both parental sedentary behavior and light PA were also significantly associated with higher levels of these same types of behaviors in their young children. This suggests that one possible way to help young children be more physically active is to encourage their parents to reduce sedentary behavior. Given that light PA was common and associated between parent and child, perhaps beginning with shifting parental activity from sedentary behavior to light PA could be a point of initial focus. Including parent PA behaviors as part of child obesity prevention efforts could be a critical lever to improve PA patterns in children, as well as parental health outcomes. To date, there are limited interventions that target both parent and preschool child PA levels. Although most recommendations focus on MVPA and demonstrate strong associations with improved health gains, it remains unknown how decreasing sedentary behavior and increasing light PA could result in benefits for children, including obesity prevention. This is an area worthy of further study.

Limited research has examined the relationship between objectively measured parent and preschool child activity levels. However, this study's results can be compared with findings in older pediatric populations. For example, preliminary studies in older children have shown the relationships between parent and child activity vary based on time of day[52] and location of activity.[53] It has been shown that older children (aged 8–14 years) participated in

only 2 minutes of MVPA with their parents on school days and more than 90 minutes of sedentary behavior together on school days.[54] This could inform future research by examining the timing and location of PA and sedentary behavior in younger child–parent pairs.

Future research would benefit from the development of comprehensive PA guidelines for preschool-aged children (2–5 years), similar to the 2008 PA Guidelines for Americans aged 6 years and older.[55] Ambiguity in PA guidelines for preschool children makes it difficult to accurately monitor PA behaviors and to identify determinants of preschooler PA and health. For example, compliance with PA guidelines for preschool-aged children developed by the National Association for Sport and Physical Education varies considerably depending on guideline interpretations.[56] Similar concerns exist with a recent National Academy of Medicine recommendation that preschool children be provided with opportunities for light, moderate, and vigorous PA for at least 15 minutes/hour while in care,[57] as measurement of compliance depend on characteristics and patterns of accelerometer wear and assumptions of child wake time. Additionally, it does not consider how or if patterns of PA differ based on location of care, in the home or in a preschool program. The development of PA guidelines for preschoolers with clear interpretations would be valuable to this field.

Limitations

There were some limitations. First, though the analysis was constrained to the typical wake time of young children, 7:00AM–8:59PM, for some of these children, this may have included sleep or naptime and may have overestimated awake sedentary behavior. Additionally, this analysis utilized validated cut points for preschool-aged children and adults; however, because estimates of MVPA are impacted by differences in cut points and epoch length,[58-60] the results may not be comparable to other studies that used different cut points and epoch lengths. Also, children were aged between 2 and 5 years, and there is evidence of significant declines in PA within this age range[61]; but this cross-sectional analyses conducted on children aged 2–5 years showed no differential effects of parent PA on child PA according to child age. Finally, these data derive from a cross-sectional analysis and therefore temporality cannot be assessed.

There are also limits to the study's generalizability due to its focus on children who are of low income, largely Latino and African American, and preschool aged. However, BMI distributions in this study are similar to nationally representative data of U.S. preschool children[62] and adults.[63] Although the results may only generalize to Latino preschool children, Hispanic preschool children in the U.S. are an under-represented demographic with a greater prevalence of obesity (15.6%) than non-Hispanic white (5.2%), non-Hispanic black (10.4%), and non-Hispanic Asian (5.0%) U.S. preschoolers.[62] Further, improved understanding Latino preschooler PA is important for developing effective interventions. Although the provision of monetary incentives for participation could affect generalizability, these incentives were modest and the high response rate suggests that the study sample is reflective of the general population.

Conclusions

Parental sedentary behavior and light PA patterns are monotonically related to preschool-aged children's sedentary behavior and light PA patterns; however, high levels of MVPA in parents were not associated with high levels of MVPA in their preschooler. Considering how to reduce parental sedentary behavior and increase PA behaviors could be a powerful point of intervention. Further, helping families identify MVPA activities that are appealing to parents and developmentally appropriate for children may help to promote recommended levels of PA to all family members. Moreover, given that in this study's sample more than a third of child PA was spent in light intensity and this was associated with parent light PA, the most common type of parental PA, it would be important to study the potential health benefits of this type of PA.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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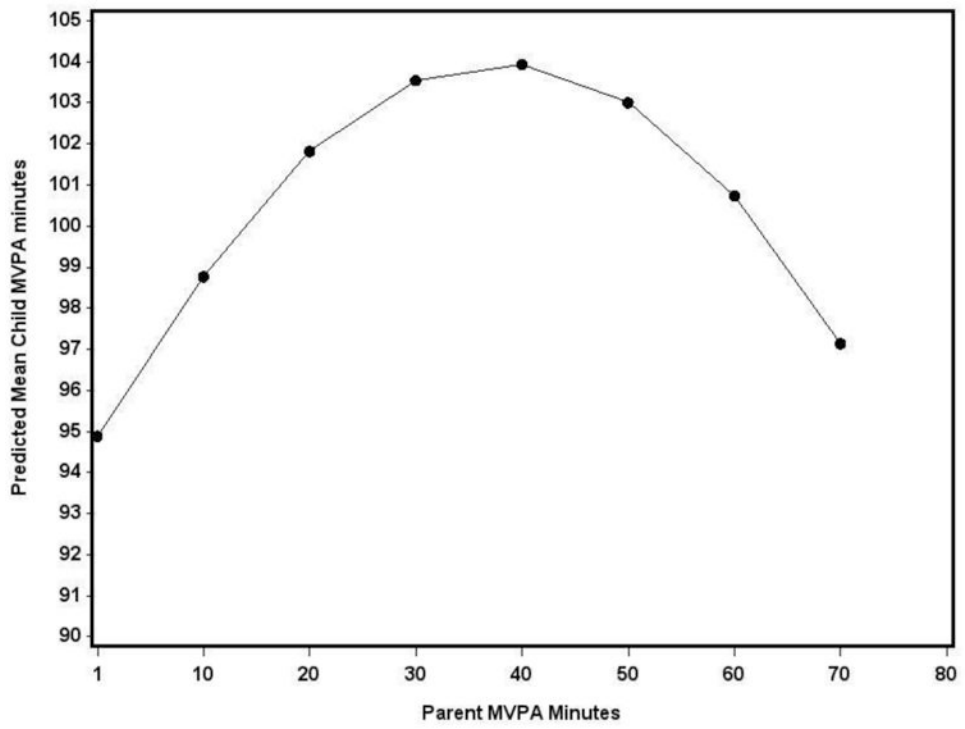
Figure 1.
Parent MVPA minutes and predicted child MVPA minutes.
MVPA, moderate to vigorous physical activity

Table 1

Characteristics of Index Children in the COPTR Study (N=1,003 Dyads)

Variables	Minnesota (N=451)[a]	Vanderbilt (N=552)[a]	*p*-value
Socio-demographic characteristics			
Age (years)	**3.3 (0.6)**	**4.3 (0.9)**	**<0.0001**
Gender (% Male)	48.3	48.4	0.9683
Race/ethnicity (%)			
Non-Hispanic white	**12.0**	**1.1**	**<0.0001**
Non-Hispanic black	18.4	6.0	
Hispanic	56.5	90.0	
Others	12.6	2.9	
Anthropometric measures			
Weight (kg)	**17.1 (3.1)**	**17.8 (2.6)**	**<0.0001**
Height (cm)	**98.2 (6.4)**	**103.3 (7.1)**	**<0.0001**
Waist circumference (cm)	52.9 (5.2)	53.0 (3.2)	0.5591
BMI (kg/m2)	**17.6 (1.8)**	**16.6 (0.8)**	**<0.0001**
BMI percentile	**81.8 (14.2)**	**76.9 (13.1)**	**<0.0001**
BMI categories (%)			
50th - <85th percentile	**51.7**	**65.2**	**<0.0001**
85th - <95th percentile	25.0	33.9	
95th percentile	23.1	0.9	

Note: Boldface indicates statistical significance (*p*<0.05)

[a]Values are either mean (SD) or %

COPTR, Childhood Obesity Prevention and Treatment Research

Table 2

A. Mean (SD) of Baseline Physical Activity Levels in Index Children in the COPTR Study

Variables	Minnesota (N=451)[a]	Vanderbilt (N=552)[a]	*p*-value
Total physical activity (all types of PA combined in mean minutes/day)			
Physical activity levels (minutes)			
Wear minutes	770.4 (81.1)	774.1 (87.4)	0.4942
Light physical activity (minutes)	261.1 (46.4)	265.7 (53.7)	0.1514
Vigorous physical activity (minutes)	26.4 (12.9)	28.7 (14.5)	0.0085
Moderate to vigorous physical activity (minutes)	96.9 (31.2)	99.3 (33.9)	0.2394
Sedentary (minutes)	412.4 (68.7)	409.1 (67.3)	0.4428
Physical activity levels (percent time)			
Light physical activity (% time)	33.9 (4.8)	34.1 (5.0)	0.3848
Vigorous physical activity (% time)	3.4 (1.6)	3.7 (1.8)	0.0088
Moderate to vigorous physical activity (% time)	12.6 (3.8)	12.8 (4.1)	0.3143
Sedentary (% time)	53.6 (7.1)	53.0 (7.6)	0.2617
Weekdays physical activity			
Physical activity levels (minutes)			
Wear minutes	771.5 (87.7)	777.7 (93.5)	0.2837
Light physical activity (minutes)	261.4 (49.7)	266.8 (56.2)	0.1016
Vigorous physical activity (minutes)	26.4 (13.7)	28.3 (14.6)	0.0309
Moderate to vigorous physical activity (minutes)	96.7 (33.6)	98.9 (34.3)	0.3161
Sedentary (minutes)	413.4 (72.4)	412.0 (71.8)	0.7511
Physical activity levels (percent time)			
Light physical activity (% time)	33.8 (5.1)	34.1 (5.3)	0.3634
Vigorous physical activity (% time)	3.4 (1.7)	3.6 (1.8)	0.0340
Moderate to vigorous physical activity (% time)	12.5 (4.0)	12.7 (4.2)	0.4571
Sedentary (% time)	53.6 (7.6)	53.2 (8.0)	0.3173
Weekend days physical activity			
Physical activity levels (minutes)			
Wear minutes	766.7 (107.4)	765.3 (115.7)	0.8467
Light physical activity (minutes)	260.2 (58.1)	263.2 (67.1)	0.4589
Vigorous physical activity (minutes)	26.5 (16.1)	29.7 (19.2)	0.0052
Moderate to vigorous physical activity (minutes)	97.1 (37.2)	100.3 (44.6)	0.2136
Sedentary (minutes)	409.4 (89.9)	401.9 (86.7)	0.1794
Physical activity levels (percent time)			
Light physical activity (% time)	33.9 (6.2)	34.1 (6.4)	0.6754
Vigorous physical activity (% time)	3.5 (2.3)	3.9 (2.4)	0.0102
Moderate to vigorous physical activity (% time)	12.7 (4.7)	13.0 (5.3)	0.2814

A. Mean (SD) of Baseline Physical Activity Levels in Index Children in the COPTR Study

Variables	Minnesota (N=451)[a]	Vanderbilt (N=552)[a]	*p*-value
Sedentary (% time)	53.4 (8.9)	52.8 (9.8)	0.3913

Notes: Sedentary activity is defined as <25/15 s epoch. Light activity is defined as 26-419/15s epoch. MVPA is defined as 420/15 s epoch. Vigorous activity is defined as 842/15 s epoch. Total physical activity includes light, moderate, and vigorous PA combined. Each day of accelerometer data was considered valid if data were obtained for at least 360 minutes between 5:00AM and 11:59PM. Participants PA data for this manuscript was considered valid if the parent-child dyad had 3 weekdays and 1 weekend day valid accelerometer data.

[a]Values are mean(SD)

COPTR, Childhood Obesity Prevention and Treatment Research; MVPA, moderate to vigorous physical activity; PA, physical activity

B. Mean (SD) of Baseline Physical Activity Levels in Index Parents in the COPTR Study

Variables	Minnesota (N=451)[a]	Vanderbilt (N=552)[a]	*p*-value
Total PA (all types of PA combined in mean/minutes/day)			
Physical activity levels (minutes)			
Wear minutes	767.1 (82.1)	774.1 (87.9)	0.1935
Light physical activity (minutes)	302.5 (77.6)	317.2 (81.3)	0.0037
Vigorous physical activity (minutes)	0.6 (2.5)	0.4 (1.5)	0.1949
Moderate to vigorous physical activity (minutes)	18.2 (16.0)	17.8 (18.0)	0.7396
Sedentary (minutes)	446.4 (96.3)	439.1 (93.4)	0.2257
Physical activity levels (percent time)			
Light physical activity (% time)	39.5 (9.5)	40.9 (9.2)	0.0215
Vigorous physical activity (% time)	0.07 (0.3)	0.05 (0.2)	0.1804
Moderate to vigorous physical activity (% time)	2.4 (2.1)	2.3 (2.3)	0.6097
Sedentary (% time)	58.1 (10.4)	56.8 (10.3)	0.0494
Weekdays PA			
Physical activity levels (minutes)			
Wear minutes	772.7 (84.0)	781.8 (93.2)	0.1038
Light physical activity (minutes)	307.8 (84.8)	326.1 (89.9)	0.0011
Vigorous physical activity (minutes)	0.6 (2.7)	0.4 (1.6)	0.1450
Moderate to vigorous physical activity (minutes)	18.9 (18.4)	18.9 (19.7)	0.9913
Sedentary (minutes)	445.9 (101.8)	436.8 (98.4)	0.1489
Physical activity levels (percent time)			
Light physical activity (% time)	39.9 (10.2)	41.5 (10.0)	0.0106
Vigorous physical activity (% time)	0.08 (0.3)	0.05 (0.2)	0.1279
Moderate to vigorous physical activity (% time)	2.4 (2.4)	2.4 (2.5)	0.8587
Sedentary (% time)	57.6 (11.2)	56.0 (11.1)	0.0232
Weekend days PA			
Physical activity levels (minutes)			
Wear minutes	750.1 (131.5)	754.9 (121.1)	0.5574
Light physical activity (minutes)	287.7 (94.8)	294.9 (95.1)	0.2284
Vigorous physical activity (minutes)	0.4 (2.5)	0.3 (2.5)	0.5938
Moderate to vigorous physical activity (minutes)	16.1 (17.5)	14.8 (20.9)	0.3005
Sedentary (minutes)	446.4 (118.2)	445.1 (112.4)	0.8614

B. Mean (SD) of Baseline Physical Activity Levels in Index Parents in the COPTR Study

Variables	Minnesota (N=451)[a]	Vanderbilt (N=552)[a]	*p*-value
Physical activity levels (percent time)			
Light physical activity (% time)	38.4 (11.1)	39.0 (10.8)	0.3971
Vigorous physical activity (% time)	0.05 (0.3)	0.04 (0.3)	0.5867
Moderate to vigorous physical activity (% time)	2.1 (2.3)	2.0 (2.7)	0.3192
Sedentary (% time)	59.5 (11.8)	59.0 (12.0)	0.5693

Notes: Sedentary is defined as <100 cpm; Light activity is defined as 101-2019 cpm; MVPA is defined as 2,020 cpm; Vigorous activity is defined as 5,999 cpm. Each day of accelerometer data was considered valid if data were obtained for at least 360 minutes between 5:00AM and 11:59PM. Participants PA data for this manuscript was considered valid if the parent-child dyad had 3 weekdays and 1 weekend day valid accelerometer data.

[a]Values are mean (SD)

COPTR, Childhood Obesity Prevention and Treatment Research; MVPA, moderate to vigorous physical activity; PA, physical activity

Table 3

Linear Associations of Parents' Daily Average Minutes Spent in Each PA Intensity Category With Child's

Child activity category/Models	Parent estimate	95% CI	*p*-value
Sedentary behavior			
Unadjusted	0.22	0.18, 0.27	**<0.001**
Adjusted	0.10	0.06, 0.15	**<0.001**
Light physical activity			
Unadjusted	0.17	0.13, 0.21	**<0.001**
Adjusted	0.06	0.03, 0.09	**<0.001**

Note: Boldface indicates statistical significance ($p<0.05$). Covariates in adjusted models include parent and child wear times; children's age, gender, race/ethnicity, and BMI; parent's age and BMI; and study location.