Published in final edited form as:
Pediatr Exerc Sci. 2009 May ; 21(2): 196–208.

Factors Related to Objectively Measured Physical Activity in Preschool Children

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Abstract

This study examined correlates of objectively measured physical activity (PA) in a diverse sample of preschool children (age 3–5 years; n=331). Accelerometer min·hr^{-1} of moderate-to-vigorous physical activity (MVPA) and non-sedentary activity (NSA) were the outcome measures. Correlations among potential correlates and PA ranged from r= − .12–0.26. Correlates in the final MVPA model were age, race, sex, BMI Z score, and parent perception of athletic competence, explaining 37% of the variance. The NSA model included the latter two variables, explaining 35% of the variance. Demographic factors were correlates of PA; parent perceptions of children's competence may be important regarding preschoolers' PA.

The prevalence of overweight among children and adolescents in the United States has increased over the past eight years, even among the 2–5 year-old population, specifically rising from 28% in 1999–2000 to 34% in 2003–2004 (14). There is evidence that school-age youth who participate in high levels of physical activity have lower levels of adiposity than their less active counterparts (24). Although less evidence is available for the preschool population, studies to date have indicated that there is an inverse correlation between children's body composition variables and physical activity (3,13,26). It is likely that physical activity interventions will need to be employed in order to address the increasing prevalence of obesity in the preschool-age population.

Prior to conducting physical activity intervention research, it is important to identify correlates of physical activity and adiposity-related variables, particularly in children from a wide range of population groups. Researchers have identified several potential correlates of physical activity in preschoolers; however, few variables are consistently related to activity across investigations. Some studies have shown that demographic variables, such as age, sex, and race/ethnicity, are related to physical activity in preschoolers (8,16). Others have focused on

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parent-related variables. For example, parent body mass index (BMI) and physical activity level have been identified as significant correlates of child physical activity (6,20). Environmental factors such as time spent outside, seasonality, and preschool attended have also been reported as correlates of activity (1,6,9,10,16,19). Even biological variables (e.g., pre-term birth) have been shown to be related to physical activity in preschool age children (6). Thus, a wide array of variables, from personal to environmental, could be related to physical activity in preschoolers, and the social ecological model of health behavior provides a framework for examining these variables. In fact, it was noted in a recent review of correlates of preschool children's physical activity that many studies have produced inconclusive results and further work should take place to enhance the understanding of potential correlates, particularly within the social ecological framework. (7)

Many existing studies on preschool children's activity have included children from homogenous backgrounds (6,17); this lack of diversity has limited the ability of researchers to examine race/ethnicity as a potential predictor of activity. In addition, most investigations have included small sample sizes and have used a variety of methods to measure physical activity. Many of the previously identified correlates need further investigation in larger, more diverse samples, in which physical activity is measured objectively. The purpose of this study was to determine correlates of physical activity in a large, diverse sample of preschool children using accelerometry as a measure of physical activity. The study was based on a social ecological model of health behavior (2); thus, potential correlates of activity included intrapersonal, interpersonal, and environmental factors.

METHODS

PARTICIPANTS

Participants in this study were part of the Children's Activity and Movement in Preschool Study (CHAMPS). In this project, all 3- to 5-year-old children attending participating preschools (N=22) were invited to participate in the study. Preschools were classified as one of three types: Commercial (n=11), Religious (n=7), or Head Start (n=4); preschools were selected from the greater Columbia, South Carolina, area and served children from a variety of different types of backgrounds, including urban, rural, low and high socioeconomic status. Although the sample came from diverse backgrounds, participants were volunteers and thus not necessarily a representative sample. Physical activity data and parent survey information were collected during two waves at each of the 22 preschools across a 28-month period (August 2003- January 2006); each wave of data collection occurred at a different time of year, reducing the potential influence of seasonal variation in physical activity. The current sample consisted of 331 children (51% male, 51% Black) for whom total-day accelerometer data, body mass index, and parent survey data were complete. Written informed consent was obtained from each child's primary guardian prior to collection of any data. The study was approved by the University of South Carolina Institutional Review Board.

MEASUREMENTS

Accelerometry

Total daily physical activity was measured with the ActiGraph accelerometer (ActiGraph model 7164; Pensacola, FL). The ActiGraph is a uniaxial accelerometer that measures acceleration in the vertical plane; it is small (2.0 × 1.6 × 0.6 inches), light (1.5 ounces), and unobtrusive. Its acceleration signal is filtered by an analog bandpass filter (0.1 – 3.6 Hz) and digitized by an 8-bit A/D converter at a sampling rate of 10 samples per second, storing data in user-defined intervals. For the present study, the monitors were initialized to save data in

15-second intervals (epochs) to detect the spontaneous physical activity of three- to five-year-old children.

Participants were instructed to wear the accelerometers on an elastic belt on the right hip (anterior to the iliac crest) during all waking hours, including naps at school, for 8–10 days and one weekend. For analyses, up to five days of weekday data and two days of weekend data were used (if more than five weekdays were considered compliant, the first five days were used for analyses; any weekend days that were compliant were used). Days on which total wear time was less than five hours or greater than 18 hours were considered noncompliant days, and were not used in the analyses. Additionally, weekdays on which the child did not attend school were not included in the analyses, since those days did not represent a typical day. Periods of sixty minutes or more of continuous zeroes were considered non-wear times and not considered in the calculation of total wear time. Participants with fewer than three days of monitor wear were excluded from the analyses.

Cutpoints developed specifically for the preschool age-group were used to categorize each minute of wear as sedentary (<37.5 counts/15-sec), light (38–419 counts/15-sec), moderate-to-vigorous (≥ 420 counts/15-sec) or vigorous physical activity (≥ 842 counts/15-sec) (15). Minutes per hour of moderate-to-vigorous (MVPA) and non-sedentary activity (NSA; light plus moderate plus vigorous) were calculated for the total group and for each gender separately.

Anthropometric Measures

Participants' height was measured to the nearest 0.1 cm using a portable stadiometer (Shorr Productions; Olney, MD). Weight was measured to the nearest 0.1 kg using an electronic scale (Seca, Model 770; Hamburg, Germany). The average of two measurements was used for both height and weight. Body Mass Index (BMI) was calculated and expressed as kg/m^2. For statistical analyses, BMI Z score was created by assessing the deviation of each participant's value from the mean values reported in the CDC growth charts (http://www.cdc.gov/growthcharts).

Parent Survey

One parent or guardian for each child completed a survey to assess demographic, family/home social and physical environment, and parental characteristics that were considered potential correlates of children's physical activity and were consistent with the social ecological framework for the study (Table 1). The survey was adapted from Sallis and colleagues (22, 25). Adults reported their child's age and race (African American, White, Other) and their own age category (under 25, 25–34, 35–44, etc.), education (as an indicator of socioeconomic status), height, weight, and racial/ethnic background. Adult BMI was calculated from the self-reported height and weight and expressed as kg/m^2. Adult participation in vigorous physical activity was assessed with the question: "On how many of the past seven days did you exercise or participate in sports activities for at least 20 minutes that made you sweat and breathe hard, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities?" (22). Family support for physical activity was calculated as the average of responses to five items each regarding the adult female, adult male, and siblings' frequency of encouragement of physical activity for the participating child, participation in PA with the child, provision of transportation to PA facilities, watching the child in activities, and telling the child that PA is good for them (22). Adults also indicated the number of the participating child's siblings living at home. Home equipment for physical activity was assessed using a checklist of items found in homes and outdoor play areas. Adults reported the items that were used by the participating child and a sum of items was calculated for each child. Park distance, park use, and park safety were assessed by asking the adult to indicate the distance from their home to the nearest park where their child could be physically active or play sports, how often

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the adult took his/her child to that park, and the parent's perception of the reputation of the closest park (22). Adults also reported their perception of their child's athletic competence compared to other children of the same age and sex (22). The participating child's birth weight was reported by the adult completing the survey.

STATISTICAL ANALYSES

Descriptive statistics for child and parent data were calculated for the total group and by sex. We used t-tests and ANOVA to examine physical activity differences by sex, race, and parent education. Pearson correlations between PA variables and potential correlates were calculated. Only variables that were potentially significant correlates ($p<0.10$ from correlation analysis) were placed into a random-coefficients (linear mixed model) analysis (SAS, PROC MIXED) with preschool as a random variable, and separate models were constructed for MVPA and NSA. Assigning preschool as a random variable in the models accounted for the known effects of preschool on children's physical activity noted in previous research, in essence controlling for the effect of preschool.(6,16) Intrapersonal variables were entered into the model first, followed by interpersonal and environmental variables. In addition, sex-specific analyses were conducted for both MVPA and NSA based on the fact that the literature indicates sex differences in preschool children's physical activity levels. For all regression analyses, alpha level was set at 0.05 to denote statistical significance. All analyses controlled for sex (when applicable), parent education, race, and BMI Z score.

RESULTS

Percents or means and standard deviations for the demographic and physical characteristics, physical activity variables, adult variables and child-related variables that parents reported for the 168 male and 163 female children are presented in Table 2. All variables are reported for total group and separately by sex. Boys were more active than girls in terms of MVPA ($p<0.001$) and NSA ($p<0.05$). African American children were more active (MVPA) than White children (7.9 vs. 7.3 min/hr, respectively; $p<0.05$), and African American males were significantly more active (MVPA) than White males (8.5 vs. 7.8 min/hr, respectively; $p=0.05$) and males in the other race group (7.1 min/hr; $p<0.05$). There were no significant differences for parent education or other correlates among groups.

Results of the correlation analysis showed that several variables were related to MVPA and NSA (Table 3). For the overall sample, child's age ($r = 0.12$, $p<0.05$), BMI Z score ($r = 0.18$, $p<0.001$), parent perception of child's athletic competence ($r = 0.16$, $p<0.01$), distance to the nearest park ($r = -0.10$, $p<0.10$), PA equipment at home ($r = 0.10$, $p<0.10$), and birth weight ($r = 0.12$, $p<0.05$) were associated with MVPA. With the exception of child's age and distance to the nearest park, the same variables were associated with NSA. In addition, family support for activity was associated with NSA ($r = 0.10$, $p<0.10$). In the sex-specific correlation analyses, no variables were significantly associated with MVPA in boys, while BMI Z score ($r = 0.14$, $p<0.10$), competence ($r = 0.13$, $p<0.10$), PA equipment at home ($r = 0.17$, $p<0.05$), and birth weight ($r = 0.16$, $p<0.05$) were associated with NSA. For girls, child's age ($r = 0.24$, $p<0.01$), child's BMI Z score ($r = 0.26$, $p<0.001$), competence ($r = 0.25$, $p<0.01$), and PA equipment at home ($r = 0.15$, $p<0.10$) were associated with MVPA. For NSA in girls, child's BMI Z score ($r = 0.18$, $p<0.05$), competence ($r = 0.26$, $p<0.001$), and PA equipment at home ($r = 0.16$, $p<0.05$) were again associated with activity; in addition, parent's vigorous physical activity ($r = 0.15$, $p<0.10$) and family support for activity ($r = 0.15$, $p<0.10$) were related to NSA.

All variables from the correlation analysis that were deemed to be related to physical activity ($p<0.10$) were placed into the regression analyses, which were conducted for the overall sample and separately by sex. For the overall (final) model predicting MVPA (Table 4), sex, age, race, BMI Z score, and parent perception of athletic competence were significant variables in the analysis ($R^2 = 0.37$). Distance to the nearest park showed a trend toward significance as a predictor of MVPA for the overall sample ($p<0.10$). For boys, no variables emerged as significant predictors of MVPA. For girls, age, BMI Z score, and athletic competence were significant correlates of MVPA ($R^2 = 0.36$), with race showing a trend toward significance. With regard to the final model for NSA (Table 4), BMI Z score and athletic competence were significant predictors, and sex and PA equipment at home showed trends toward significance for predicting activity for the overall sample ($R^2 = 0.35$). No variables were significant correlates of NSA for males, but BMI Z score and athletic competence were significant correlates of NSA for females ($R^2 = 0.30$).

DISCUSSION

This study identified several correlates of activity in preschool children, many of which were previously identified correlates of activity. Previously-identified variables related to MVPA in preschool children included age, race, and sex; parent perception of child's athletic competence was a newly-identified variable, and distance to the nearest park showed potential for being related to MVPA. In addition, BMI Z score was significantly related to MVPA (BMI has previously been reported as related to MVPA). Parent perception of athletic competence and BMI Z score were correlates of non-sedentary activity (NSA) for the overall sample, and home equipment for physical activity (trend towards significance) was a potential correlate of NSA. In the sex-specific analyses, no significant correlates of PA were found for boys. For girls, age (MVPA only), BMI Z score, and athletic competence were significant correlates of activity. Parent perception of child's athletic competence consistently displayed strong relationships to physical activity in the analyses and could be an important factor associated with preschool children's physical activity, particularly for girls.

To our knowledge, this study is the first to examine parent perception of child's athletic competence as a correlate of activity in preschool children. Several studies in elementary school children and adolescents have shown that child's perceived competence is related to physical activity (4,21,23,25), but the few that have examined the relationship of parents' perceptions of competence to children's physical activity have shown no relationship (22). Due to the cross-sectional nature of our data, we cannot make any conclusions regarding causality. It is possible that parents of preschool children may have a good sense of the competence and motor abilities of their children. However, it is also possible that parents may potentially provide (or withhold) physical activity opportunities based on their perceptions of their children's physical abilities. Regardless, the fact that competence showed consistently high coefficients in analyses points to its relevance and potentially suggests the need for parents to interact with physicians and child care providers regarding any concerns about motor skill development in their children. Further investigation of this concept using longitudinal data is warranted.

As previously noted and similar to prior research, demographic variables were shown to be related to preschool children's physical activity. In the current study, age was identified as a significant predictor of activity; older children were more likely to participate in MVPA, both for the overall sample and for girls. Although age has been previously examined as a predictor of activity, only two investigations reported an increase in physical activity with age within the preschool age group (8,17). Both reports examined non-sedentary activity and were part of the same longitudinal data set; one investigation reported change from age 3–4 years (8), while the other reported change from age 3–5 years (17). Others have examined age as a predictor of activity, but it was not a significant predictor variable in analyses (6). Based on available evidence, it appears that older preschool children may engage in more activity than younger preschool children.

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Due to known sex differences in MVPA, we performed sex-specific analyses. Results confirmed this and showed that boys were more active than girls, which is consistent with previous literature. Studies using both direct observation (1,12) and accelerometry (9,16) have shown this relationship for MVPA. Although some previous investigations showed that boys were more active than girls in terms of NSA (6,8,17), the results of the current investigation did not show a sex difference for NSA (but did show a trend toward significance). Although there were no significant predictors of activity for boys, the analyses for girls showed that BMI Z score and parent perception of athletic competence were significant variables for both MVPA and NSA, which highlights the potential importance of these two variables for girls.

The finding that BMI Z score was positively related to MVPA and NSA in girls (and the overall sample) was not expected, although some previous investigations have shown that intensity of PA was negatively associated with body weight (11) and that there was no difference in PA between normal weight and overweight preschool girls (26). Our results indicate that there may be a connection between BMI, athletic competence, and physical activity in preschool girls. These findings could signify a need to intervene earlier with physical activity promotion in girls than with boys.

Studies investigating racial/ethnic differences in physical activity behaviors in preschool children are limited. Results from the current investigation showed that race was a significant predictor of MVPA for the overall sample and showed a trend toward significance as a predictor of MVPA for girls. This relationship is consistent with our previous work using accelerometry (16), but one study using direct observation showed no race difference in MVPA (1). Our results showed that African American preschool children are more active than White preschool children, which potentially indicates that African American children may experience a decline (or less of an increase) in physical activity during the elementary school years, leading up to the race differences found in older age groups. Potential race differences in preschool children need to be addressed in further, longitudinal research prior to making any significant conclusions.

Two environmental variables, distance to the nearest park (MVPA) and presence of physical activity equipment at home (NSA), showed trends toward significance as correlates of activity for the overall sample. Although the presence of parks nearby has been associated with physical activity in young children (18), no other studies have found distance to parks per se to be a significant predictor of activity in young children. In another study that examined the relationship between the availability of active toys at home and at recess to physical activity, the authors did not find a significant relationship between the availability of toys and activity (12). A recent review that investigated environmental correlates of physical activity in youth did not identify distance to parks or home equipment for physical activity to be among the most consistent correlates of activity (5). The authors suggested that all environmental variables, including more consistent correlates such as time spent outdoors, should continue to be examined, as the field of environmental correlates is still relatively new. The presence of low associations between physical activity and distance to the nearest park and presence of activity equipment at home found in the current investigation highlights the need for further investigation of environmental correlates of physical activity in young children.

The current study had several strengths and some limitations. Strengths of this investigation included a large racially and socioeconomically diverse sample, use of an objective measure of physical activity, many days of assessment of physical activity, and inclusion of time spent in preschool and out-of-preschool. Limitations included use of parent-reported information regarding physical activity resources and location/use of parks, as only reliability information (not validity) was tested for these survey items. In addition, results showed that 27–37% of the variance in physical activity was explained by the variables included in the models. Although previous investigations have explained a similar amount of variance in physical activity behavior (6,16,19), it would be preferable to explain even more variance; as previously mentioned, conducting longitudinal investigations would assist in determining associations over time and potentially establishing causality.

In summary, mainly demographic (intrapersonal) were significant correlates of physical activity in preschool children, while the utility of environmental factors remains unclear. Parent perception of child's athletic competence was also an important correlate of physical activity, particularly for girls. Improvements in competence might be a contributing factor for increasing physical activity; however, more research is needed in this area. In addition, environmental factors that have been shown to be important correlates of activity in older children and adults might also be influential in preschool children's physical activity behaviors. More research is needed to understand the relationship between the physical environment and PA in this age group, including parks and other family and neighborhood resources for PA. Future research should also continue to investigate the relationship between racial/ethnic differences and PA in the preschool age group.

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ACKNOWLEDGMENT

The authors thank all participants, parents, and preschools who participated in this investigation. We also thank M. João Almeida, Janna Borden, Kristen Swaney, and Gaye Christmus for their valuable contributions to this project and manuscript. This research was supported by a grant from the National Institute for Child Health and Human Development (NICHD) of the National Institutes of Health (NIH), R01 HD043125.

Table 1

Variables from parent survey

Variable	Definition	Psychometrics
Child's age	Current age of child	N/A
Child's race/ ethnicity	African American, White, Other	ICC, R=1.00*
Adult VPA (days/week)	Number of days in the past 7 that s/he participated in vigorous exercise and/or sports for at least 20 minutes	ICC, R=0.78*
Adult age (age group, 1–7)	1=<25 years, 7=75+ years	N/A
Adult BMI (kg/m^2)	Self-reported height and weight used to calculate BMI (kg/m^2)	N/A
Parent education (1–6)	1=attends/has attended high school, 6=completed graduate school	ICC, R=0.77*
Number of siblings	Number of siblings living in the home	ICC, R=0.93*
Child's Competence (1–5)	Coordination of child compared to others the same age and sex (1=much less coordinated, 5=much more coordinated)	ICC, R=0.81*
Miles to nearest park (1–6)	Distance to nearest park (1=1–2 blocks, 6= >5 miles)	ICC, R=0.70*
Safety of park (1–5)	Reputation of nearest park (1=very unsafe, 5=very safe)	ICC, R=0.68*
Go to park (1–5)	1=never, 2=1–2 times per month, 3=3–7 times per month, 4=8–14 times per month, 5=14 or more times per month	N/A
PA equipment at home (# of items)	Number of items circled from list of 18 choices (plus, "other" choice was present)	N/A
Family support (1–5)	Average of responses to frequency with which family encouraged PA, participated in PA with the child, provided transportation to PA facilities, watched the child in activities, and told the child that PA is good (1=never, 5=daily)	ICC, R=0.81*; Cronbach's α = 0.78*
Birth weight (lbs)	Child's weight when s/he was born	N/A

*Values reported in Sallis et al., 2002 (22)

Table 2

Mean or percent for child and adult-reported variables.

Characteristics	***Total (n=331)***	***Males (n=168)***	***Females (n=163)***
Race			
African American	51.4%	50.0%	52.8%
White	40.2%	40.5%	39.9%
Other	8.5%	9.5%	7.4%
Parent education			
% > Some college or tech. school	57.7%	55.4%	60.1%
Adult Respondent			
Father	4.2%	4.8%	3.7%
Mother	94.0%	94.0%	93.9%
Other	1.8%	1.2%	2.4%
Other children in the home			
Yes	71.0%	66.1%	76.1%
Presence of outdoor play area			
Yes	88.8%	92.9%	84.7%
	Mean (SD)	Mean (SD)	Mean (SD)
Child Age (yrs)	4.3 (0.6)	4.3 (0.7)	4.2 (0.6)
BMI (kg/m^2)	16.5 (2.4)	16.7 (2.8)	16.2 (1.8)
BMI Z score	0.50 (1.19)	0.55 (1.28)	0.45 (1.08)
Child MVPA (min/hr)	7.6 (2.1)	8.1 (2.3)	7.0 (1.7)
Child non-sedentary activity (min/hr)	27.2 (3.9)	27.6 (4.0)	26.8 (3.8)
Adult VPA (days/week)	2.2 (1.9)	2.1 (1.9)	2.3 (1.9)
Adult age (age group, 1–7)	2.3 (0.8)	2.3 (0.8)	2.3 (0.8)
Adult BMI (kg/m^2)	27.3 (6.2)	27.0 (5.9)	27.6 (6.5)
Child’s Competence (1–5)	3.4 (0.8)	3.4 (0.8)	3.4 (0.7)
Miles to nearest park (1–6)	3.4 (4.0)	3.0 (3.2)	3.7 (4.6)
Safety of park (1–5)	4.2 (1.0)	4.2 (1.0)	4.1 (1.0)
Go to park (1–5)	2.2 (0.8)	2.2 (0.9)	2.2 (0.8)
PA equipment at home (# of items)	5.7 (2.3)	5.8 (2.2)	5.6 (2.4)
Family support (1–5)	3.3 (0.7)	3.4 (0.7)	3.3 (0.7)

Characteristics	***Total (n=331)***	***Males (n=168)***	***Females (n=163)***
Birth weight (lbs)*	7.2 (1.3)	7.4 (1.2)	7.0 (1.3)

*Range = 2.1 to 10.1

NOTE: MVPA = moderate-to-vigorous physical activity

Non-sedentary activity = light + moderate + vigorous physical activity

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Table 3

Correlations for minutes per hour of MVPA and minutes per hour of NSA with potential correlates.

	MVPA			Non-Sedentary Activity (NSA)		
	Total	**Males**	**Females**	**Total**	**Males**	**Females**
Adult's VPA	−0.04	−0.11	0.07	0.01	−0.10	0.15*
Adult's age	−0.01	0.03	−0.07	−0.005	0.07	−0.10
Adult's BMI	0.05	0.04	0.11	−0.004	−0.03	0.03
Child's age	0.12**	0.02	0.24***	0.06	0.02	0.10
Child's BMI Z score	0.18****	0.12	0.26****	0.16***	0.14*	0.18**
Child's competence	0.16***	0.10	0.25***	0.19****	0.13*	0.26****
Miles to park	−0.10*	−0.12	−0.05	−0.05	−0.05	−0.03
Park safety	0.05	0.05	0.02	0.06	0.10	0.02
Go to park	−0.01	−0.06	0.03	0.04	−0.03	0.12
PA equipment at home	0.10*	0.05	0.15*	0.17***	0.17**	0.16**
Family support	0.04	−0.03	0.08	0.10*	0.03	0.15*
Birth weight	0.12**	0.06	0.10	0.13**	0.16**	0.06

* $p \leq 0.10$

** $p \leq 0.05$

*** $p \leq 0.01$

**** $p \leq 0.001$

Table 4

Results of mixed model regression analysis.

Independent variables	Minutes/hr of MVPA			Minutes/hr of NSA		
	Total Coef. (SE)	Males Coef. (SE)	Females Coef. (SE)	Total Coef. (SE)	Males Coef. (SE)	Females Coef. (SE)
Sex, Males	0.96 (0.2)****	-	-	0.71 (0.4)*	-	-
Age	0.34 (0.2)**	0.08 (0.3)	0.52 (0.2)***	0.08 (0.3)	−0.003 (0.5)	0.29 (0.5)
Race						
Af. American	0.63 (0.3)**	0.79 (0.5)	0.55 (0.3)*	0.19 (0.6)	−0.10 (0.8)	0.42 (0.7)
Other	−0.18 (0.4)	−0.39 (0.6)	0.35 (0.5)	−0.30 (0.8)	−0.99 (1.1)	0.86 (1.2)
BMI Z-score	0.20 (0.1)**	0.08 (0.1)	0.36 (0.1)***	0.35 (0.2)**	0.27 (0.2)	0.53 (0.3)**
Parent education, No tech/ college	0.07 (0.2)	0.13 (0.4)	0.04 (0.3)	0.25 (0.4)	0.28 (0.6)	0.53 (0.6)
R^2 (MCCC)	**0.32**	**0.27**	**0.27**	**0.29**	**0.34**	**0.20**
Birth weight	0.12 (0.1)	-	-	0.22 (0.2)	0.37 (0.3)	-
Competence	0.39 (0.1)***	-	0.55 (0.2)***	0.80 (0.3)***	0.41 (0.4)	1.20 (0.4)***
Miles to park	−0.05 (0.03)*	-	-	-	-	-
Adult VPA	-	-	-	-	-	0.10 (0.2)
Equipment	0.04 (0.05)	-	0.06 (0.1)	0.16 (0.1)*	0.21 (0.1)	0.11 (0.1)
Family support	-	-	-	−0.08 (0.3)	-	0.33 (0.4)
R^2 (MCCC)	**0.37**	**0.27**	**0.36**	**0.35**	**0.37**	**0.30**

- Not entered

* p <0.10

** p≤0.05

*** p<0.01

**** p<0.001