Journal of Physical Activity and Health, 2009, 6, 289-298

Socioeconomic Position and Children's Physical Activity and Sedentary Behaviors: Longitudinal Findings From the CLAN Study

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Background: This study aimed to examine cross-sectional and longitudinal associations between socioeconomic position (SEP) and physical activity and sedentary behaviors among children and adolescents. ***Methods:*** Maternal education was reported by parents of 184 children 5 to 6 years old and 358 children 10 to 12 years old in 2001. In 2001 and 2004, physical activity was assessed by accelerometry. Older children self-reported and parents of younger children proxy-reported physical activity and TV-viewing behaviors. Linear regression was used to predict physical activity and sedentary behaviors, and changes in these behaviors, from maternal education. ***Results:*** Among all children, accelerometer-determined and self- or parent-reported moderate and vigorous physical activity declined over 3 years. Girls of higher SEP demonstrated greater decreases in TV-viewing behaviors than those of low SEP. In general, no prospective associations were evident between SEP and objectively assessed physical activity. A small number of prospective associations were noted between SEP and self-reported physical activity, but these were generally weak and inconsistent in direction. ***Conclusions:*** This study did not find strong evidence that maternal education was cross-sectionally or longitudinally predictive of children's physical activity or sedentary behaviors. Given the well-documented inverse relationship of SEP with physical activity levels in adult samples, the findings suggest that such disparities might emerge after adolescence.

Keywords: youth, prospective, accelerometer, inequality, behavioral science

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Regular physical activity during childhood plays an important role in promoting children's health and reducing risk of current and future disease.[1] Although epidemiological data of children's physical activity are equivocal,[2] large proportions spend substantial amounts of time engaged in sedentary pursuits such as television (TV) viewing.[3] Physical inactivity and sedentary lifestyles might be particularly common among certain population subgroups. In adults, socioeconomic position (SEP) is consistently inversely associated with physical activity,[4] and these inequalities might represent a key potential pathway by which socioeconomic disadvantage contributes to poor health.[5] Some data suggest that children from low socioeconomic backgrounds are less physically active than those of higher socioeconomic status, although the evidence is contentious.[6–18]

One review[13] concluded that SEP was not consistently associated with physical activity among children or adolescents, despite some studies included in that review showing an association.[7,8,12] More recently, several studies suggested lower rates of physical activity among children and adolescents of low SEP,[6,14–18] although evidence remains equivocal.[9–11] Socioeconomic differences in secular trends in children's active commuting to school, school physical education, and sport have also been observed.[18] These inconsistent findings do not appear to be attributable to differences in either measures of physical activity or SEP, because a variety of indicators have been used across studies. It is noteworthy, however, that few studies included objective measures of physical activity.[9] Furthermore, apart from TV viewing's being consistently inversely associated with maternal education,[19] few studies have established whether sedentary behavior is also differentially distributed by SEP, with the limited evidence suggesting that this might be the case.[20,21]

Most previous studies examining SEP and physical activity during childhood were cross-sectional. Given that the transition from childhood to adolescence represents a critical period in terms of declines in physical activity levels,[22,23] it is of interest to investigate whether these declines are more marked among children of low

SEP than those of high SEP. Inverse associations of SEP with physical activity, particularly during leisure time, are well established in adulthood.[4] Identifying the stage at which these inequalities begin to emerge might provide insights into optimal intervention points at which socioeconomic inequalities in physical activity might be prevented.

The aim of this study was to investigate associations of SEP with physical activity and sedentary behaviors and 3-year changes in these behaviors, during childhood and early adolescence, using reported and objective measures of physical activity and sedentary behaviors.

Methods

Analyses for this study were based on data collected in the Children Living in Active Neighborhoods (CLAN) Study. This study was approved by the Deakin University Human Ethics Committee, Department of Education and Training (Victoria), and the Victorian Catholic Education Office. Informed written consent was obtained from all parents and from older children (who completed their own surveys at the time of follow-up) participating in the study. Details of the CLAN study design, sample, and methods are described in full elsewhere.[24–26]

Sample

In 2001, families of all 5- to 6-year-old and 10- to 12-year-old children attending 19 public elementary schools (selected using stratified random sampling proportionate to school size; 5 schools that declined to participate were replaced with randomly selected schools) across high- and low-socioeconomic areas of Melbourne, Australia, were invited to participate in the CLAN study. Socioeconomic status was defined at the municipality level using the Socio-Economic Index for Areas, a measure constructed by the Australian Bureau of Statistics based on data gathered in the population census.[27] Of the 3189 children invited, active consent was received for 1215 (38% response rate). A total of 698 families agreed to be recontacted for future research and were invited to participate in a follow-up study in 2004. The current analyses are based on 542 children (184 were 5 to 6 years old, 358 were 10 to 12 years old; 47% boys) for whom maternal-education data were available at baseline and physical activity data were available at baseline and follow-up.

Measures

SEP. Maternal education was used as the indicator of SEP, consistent with some previous studies.[7,12,17,19] At baseline, parents reported their own and their partner's (defined as husband, wife, or partner who was living with them) sex and highest level of education. Maternal education was categorized as low (some high school or less), medium (completed high school, technical certificate or apprenticeship), or high (university/tertiary qualification).

Physical Activity and Sedentary Behaviors. Children's physical activity and sedentary time were objectively assessed using uniaxial accelerometers (Manufacturing Technology Inc [MTI], Actigraph Model, AM7164-2.2C, USA). The MTI accelerometer measures movement in the vertical plane and has been validated as an objective measure for assessing children's physical activity.[17,28] Children were asked to wear an accelerometer for an 8-day period during waking hours, except during bathing and aquatic activities. Data recorded on the first and last days were discarded for each child because of incompleteness and possible reactivity effects (day 1). Only children with at least 4 complete days of accelerometer data, including 1 weekend day, were included in the analyses, consistent with recommendations for the minimum acceptable amount to typify children's usual activity.[29] Days in which total accelerometer counts were less than 10,000 or exceeded 20,000,000 were excluded from the analyses (of the restricted sample for these analyses: n = 14 at baseline, n = 13 at follow-up), because this indicated a possible accelerometer malfunction.

Movement-count thresholds were applied using a specially designed QBASIC data-reduction program to calculate minutes in moderate- and vigorous-intensity physical activity. The thresholds were based on an age-specific energy-expenditure-prediction equation:

$$\text{METs} = 2.757 + (0.0015 \cdot \text{counts}^{-1} \cdot \text{min}^{-1}) - (0.08957 \cdot \text{age [years]}) - (0.000038 \cdot \text{counts}^{-1} \cdot \text{min}^{-1} \cdot \text{age [years]}^{-1})$$ [30]

and were defined in METs (metabolic equivalents of rest) as sedentary 1.0 to 1.9 METs, moderate 3.0 to 5.9 METs, and vigorous intensity 6.0+ METs. Minutes/day spent at each intensity were derived by summing total durations on each day and dividing the total by the number of days the accelerometer met the inclusion criteria. Average movement counts/day was computed using the same method.

To assess specific physical activity behaviors, questionnaire items were administered to parents (proxy-report for younger children) and older children using a survey based on existing questionnaires[31,32] and qualitative interviews conducted with 27 families.[24,33] Parents/children were asked: "Which of the following physical activities does your child/do you usually do during a typical week (since the start of the school year; do not include school holidays)?" A list of common activities relevant to the age group being assessed was provided, and participants indicated the total number of times their child/they did this activity for weekdays and weekends. For the younger children, the parent-reported frequency of 31 activities was summed to provide an overall estimate of the frequency of leisure-time physical activity in the past week (Table 1). An equivalent variable was created from 27 activities reported by older children. Participants were asked to report the frequency

of walking/cycling to and/or from school and of school sport and physical education classes. A previous study showed that the proxy-reported questionnaire provided a reliable measure of the type, frequency, and duration of children's physical activity, but it was recommended that the questionnaires be used in conjunction with objective measures to provide an accurate indicator of children's activity.[33] This approach was therefore adopted in the current study.

Parents/children were also asked about TV viewing: "Which of the following leisure activities does your child/do you usually do during a typical week?: TV/videos (total hours/minutes) Monday through Friday, and Saturday and Sunday." Mean daily TV-viewing minutes were calculated by summing total minutes for the week and dividing by 7. Reliability-study results showed that the test–retest intraclass correlation of children's proxy-reported TV viewing was .8, and the convergent validity between the parents' proxy-reported and their child's self-reported time spent watching TV was .61.[34]

Analyses

Results of 2-sample *t* tests indicated significant differences in physical activity and sedentary behaviors by age group and sex; results are therefore stratified by age group and sex. Descriptive statistics were used to characterize the sample (means [SD]; number [proportion]). Baseline physical activity and sedentary behavior were subtracted from corresponding follow-up variables to generate absolute change values. Differences between baseline and follow-up variables were tested using the Wilcoxon matched-pairs signed-ranks test. Linear regression was used to examine the association between maternal education (low maternal education is the referent group) and baseline, follow-up, and change in physical activity and sedentary behavior. Beta coefficients and 95% confidence intervals for medium and high versus low maternal education are presented; analyses of change variables include an additional adjustment for corresponding baseline values. To adjust for the effects of clustering by school attended, standard errors were computed using the Taylor-series approximation. All analyses were conducted using Stata Version 9.2 (Statacorp, TX, USA).

Results

Comparison of baseline maternal-education levels showed that those who participated in the follow-up study were more likely to have high maternal-education levels than those who did not participate in follow-up (41% vs 30%, $P < .01$). There was a marginally higher proportion of mothers with high than low education levels (Table 2).

Table 1 Intensity of Activities Reported by Parents and Older Children at Baseline and Follow-Up

Younger Children[a] (5–6 y at baseline)		Older Children[b] (10–12 y at baseline)	
Moderate-intensity activities	**Vigorous-intensity activities**	**Moderate-intensity activities**	**Vigorous-intensity activities**
Dance	Aerobics	Dance	Aerobics
Calisthenics/gymnastics	Tennis/Bat tennis	Calisthenics/gymnastics	Tennis/Bat tennis
Cricket	Australian Rules football	Cricket	Australian Rules football
Baseball/softball	Soccer	Baseball/softball	Soccer
Down ball/4 square	Basketball	Down ball/4 square	Basketball
Rollerblading	Netball	Rollerblading	Netball
Scooter	Swimming laps	Scooter	Swimming laps
Skateboarding	Swimming for fun	Skateboarding	Swimming for fun
Bike riding	Skipping rope	Bike riding	Skipping rope
Household chores	Jogging or running	Household chores	Jogging or running
Walk the dog	Tag/chase	Walk the dog	
Walk for exercise		Walk for exercise	
Physical education class		Physical education class	
Sport class at school		Sport class at school	
Travel by walking to school		Travel by walking to school	
Travel by cycling to school		Travel by cycling to school	
Other		Other	
Playground equipment			
Play in the cubby house			
Trampoline			

[a] Parent report. [b] Child report.

Accelerometer-determined time in moderate and vigorous physical activity decreased significantly among all children over follow-up (Table 3). Total accelerometer counts among older girls significantly decreased, and sedentary time significantly increased among all children. Survey-reported leisure-time physical activity significantly decreased for older children and younger girls, as did walking/cycling to school among older children. Frequency of walking/cycling to school increased significantly, and frequency of PE/school sport decreased significantly among younger boys but increased significantly among older boys. TV-viewing time significantly decreased in older girls, whose self-reported TV-viewing time decreased on average by 115 min/wk (SD = 568) over the follow-up period.

In general, few associations were noted between maternal education and accelerometer-determined or survey-reported physical activity and sedentary behavior, or changes in these behaviors between baseline and follow-up, in younger (Table 4) or older (Table 5) children. Some cross-sectional associations were observed between maternal education and children's physical activity and sedentary behavior at baseline. However, few associations were evident (6 of a total of 80 tests), most were weak (eg, confidence intervals close to zero), and there were inconsistencies across measures, age group, and sex. Similarly, weak and inconsistent findings were observed cross-sectionally at follow-up (data not shown). Although there were a small number of significant findings in longitudinal analyses, again, these were rare (5 of a total of 80 tests involving change scores), low in magnitude, and inconsistent across measures, age, and sex groups.

Discussion

This study sought to examine associations of SEP, indicated by maternal education, with physical activity and sedentary behavior, and changes in these behaviors, among children and young adolescents. In general, maternal education was not predictive of children's or young adolescents' objectively measured or survey-reported physical activity and sedentary behavior or changes in these behaviors over a 3-year period. Although some significant findings were evident, these were few in number, mostly weak in magnitude, and inconsistent across measures, age group, and sex. Thus, maternal education seems unlikely to be a key factor in explaining changes in children's physical activity and sedentary behavior over time.

A large and reasonably consistent literature demonstrates that SEP is inversely associated with physical activity among adults.[4] Given the inconsistency of our findings with those observed in adult samples, reasons for the lack of association between SEP and changes in children's physical activity and sedentary behavior require further investigation. One potential explanation is that socioeconomic differences in physical activity and sedentary behaviors become apparent later in adolescence or early adulthood—times of significant change and life transitions. It is plausible that older adolescents and young adults have increasing levels of autonomy over how they choose to spend their leisure time, and this might be a period during which socioeconomic influences on such decisions become more marked. This hypothesis is consistent with findings from the literature on socioeconomic influences on health outcomes generally, which suggests that socioeconomic inequalities in health tend to become more pronounced during the period from early adulthood through to middle age.[35] The association between SEP and changes in physical activity and sedentary behavior during later adolescence and early adulthood, which might represent important stages for intervention, requires further investigation.

An alternative explanation for the current findings is that the measure of SEP used in this study might not be the most appropriate indicator of SEP relevant to children. Although maternal education is often used to indicate childhood socioeconomic circumstances[3,7,12,17] and is a correlate of TV viewing,[19] other indicators of SEP might provide different insights into socioeconomic influences on children's health behaviors. For instance, paternal education or highest parental education level might be a more sensitive indicator of SEP variations in physical activity behaviors than maternal education. We tested this hypothesis by reanalyzing data using these measures as alternative indicators of SEP (data not shown) and found associations that were remarkably similar to those presented here. Nonetheless, we cannot rule out that a different SEP indicator altogether would show different associations with the behaviors examined. For example, according to a materialist explanation, family income (not assessed in this study) might be important for physical activity because financial resources might influence the types of physical activity and leisure-time pursuits that children can access (eg, children in low-income families might have more limited opportunities for involvement in sports

Table 2 Maternal Education Level of the Sample, by Age Group and Sex of the Child

	Younger Children (5–6 y at baseline)		Older Children (10–12 y at baseline)	
Maternal education level	Boys (n = 96)	Girls (n = 88)	Boys (n = 159)	Girls (n = 199)
Low (%)	15.6	21.6	20.1	28.6
Medium (%)	37.5	31.8	39.6	31.2
High (%)	46.9	46.6	40.3	37.2

Table 3 Physical Activity and Sedentary Behaviors of Children, by Time Point, Age Group, and Sex of Child

	Younger Children (5–6 y at baseline)		Older Children (10–12 y at baseline)	
Objective measure	**Boys**	**Girls**	**Boys**	**Girls**
Total counts/d (×1000)				
n	88	80	138	169
baseline, M (SD)	527.6 (112.8)	467.4 (111.0)	481.1 (133.9)	417.2 (146.3)
follow-up, M (SD)	568.3 (170.1)	489.5 (164.0)	491.8 (430.6)	362.3 (226.6)
change, M (SD)	40.7 (175.1)	22.1 (159.2)	10.7 (442.0)	–54.9 (233.3)**
Moderate min/d				
n	88	80	138	169
baseline, M (SD)	232.0 (41.2)	223.1 (42.1)	118.3 (27.9)	102.0 (29.1)
follow-up, M (SD)	145.1 (32.6)	137.9 (37.9)	76.7 (27.6)	58.1 (20.0)
change, M (SD)	–86.1 (43.8)**	–85.3 (39.2)**	–41.6 (35.9) **	–43.1 (28.9) **
Vigorous min/d				
n	88	80	138	169
baseline, M (SD)	45.6 (18.0)	33.6 (12.5)	23.2 (13.0)	16.2 (1.6)
follow-up, M (SD)	38.3 (19.1)	27.0 (15.3)	17.6 (26.2)	8.8 (9.2)
change, M (SD)	–7.3 (21.4)**	–6.7 (16.6)**	–5.5 (26.1)**	–7.5 (12.3)**
Sedentary min/d				
n	87	79	136	166
baseline, M (SD)	279.4 (92.8)	290.3 (82.8)	380.1 (92.2)	378.3 (86.3)
follow-up, M (SD)	326.2 (89.5)	352.7 (96.1)	465.4 (109.4)	515.3 (106.1)
change, M (SD)	46.9 (119.0)**	62.4 (91.2)**	85.3 (119.8)**	137.0 (106.8)**
Self-report measure				
Total LTPA times/wk				
n	96	88	159	199
baseline, M (SD)	35.2 (15.3)	36.9 (17.3)	38.6 (18.6)	31.8 (16.0)
follow-up, M (SD)	35.5 (21.0)	30.8 (17.1)	25.0 (12.1)	19.7 (11.2)
change, M (SD)	0.3 (25.3)	–6.1 (16.6)**	–13.6 (18.9)**	–12.1 (16.1)**
Moderate LTPA times/wk				
n	96	88	159	199
baseline, M (SD)	24.1 (12.1)	27.7 (14.4)	35.0 (19.3)	29.7 (15.4)
follow-up, M (SD)	23.0 (11.7)	23.9 (16.3)	18.1 (10.5)	14.9 (8.9)
change, M (SD)	–1.1 (11.4)	–3.7 (14.5)**	–17.0 (19.7)**	–14.8 (15.0)**
Vigorous LTPA times/wk				
n	96	88	157	197
baseline, M (SD)	11.1 (7.4)	9.2 (6.2)	10.9 (7.8)	8.1 (6.8)
follow-up, M (SD)	12.5 (17.9)	6.8 (4.9)	7.0 (5.8)	4.8 (5.1)
change, M (SD)	1.3 (18.9)	–2.4 (7.0)**	–3.9 (9.1)**	–3.2 (7.7)**
Walk/Cycle to school times/wk				
n	89	84	154	186
baseline, M (SD)	2.4 (3.5)	3.0 (4.0)	4.5 (4.2)	3.9 (4.0)
follow-up, M (SD)	3.6 (3.9)	2.9 (4.0)	3.6 (4.2)	2.7 (3.7)
change, M (SD)	1.1 (3.9)*	–0.1 (2.8)	–0.9 (5.8)*	–1.2 (4.7)**
PE/School sport times/wk				
n	89	85	150	194
baseline, M (SD)	2.0 (1.2)	2.1 (1.4)	2.4 (1.4)	2.4 (1.4)
follow-up, M (SD)	1.7 (0.8)	1.8 (1.4)	3.0 (2.0)	2.7 (1.8)

(continued)

Table 3 *(continued)*

Self-report measure				
change, M (SD)	−0.3 (1.4)*	−0.3 (2.0)	0.6 (2.2)**	0.3 (2.2)
TV/Video viewing min/wk				
n	91	85	154	193
baseline, M (SD)	763.4 (343.3)	732.5 (441.5)	796.4 (521.9)	879.2 (457.1)
follow-up, M (SD)	798.5 (382.9)	770.5 (367.2)	788.7 (459.0)	764.4 (456.4)
change, M (SD)	34.1 (365.2)	37.9 (397.1)	−7.6 (581.8)	−114.9 (567.6)**

Abbreviations: LTPA, leisure-time physical activity; PE, physical education; TV, television.

*$P < .05$, **$P < .01$, from Wilcoxon matched-pairs signed-ranks test for difference between baseline and follow-up.

involving fees, uniform, or equipment expenses). However, a review of correlates of TV viewing found that income was inconsistently associated with TV viewing among children.[19] A neighborhood-level indicator of SEP might have shown different associations than observed, but these measures tend to be crude proxies of individual-level SEP. For instance, some people of high SEP live in disadvantaged areas, and vice versa, and the potential for "ecological fallacy" arising from a reliance on an area-based indicator is well recognized.[36]

The findings of the current study suggesting little association of SEP with changes in physical activity among children and young adolescents are consistent with those of several previous studies, including the limited number that have incorporated objective measures of physical activity.[9] In addition, the findings of declines in physical activity, particularly moderate- and vigorous-intensity physical activities, across a large proportion of the sample are consistent with a body of literature suggesting this is a key risk period for decreasing activity levels.[13] These consistencies lend confidence to the current findings, suggesting that the lack of associations observed is not simply the result of using unreliable measures of children's activity. Indeed, the incorporation of both reported and objective measures of activity and sedentary time was a major strength of this study, as was its longitudinal design. However, several potential weaknesses should be acknowledged, including the restriction of the study sample to 1 geographical area only and the attrition rate, particularly among those with low maternal education, which could explain the null findings. It is plausible that the association between SEP (as measured by maternal education) and changes in children's physical activity and sedentary behavior might have been stronger among those who did not participate in follow-up because these participants might experience greater socioeconomic disadvantage. The relatively low sample size in certain cells might also have contributed to the general lack of statistically significant findings. The sample was initially well powered (98%) to detect differences of 0.2 or greater in the outcome of change in log(movement counts) between tertiles of predictor variables, such as maternal education, with an expected cell size of 50 participants. However, because there were fewer than 50 participants in certain categories in the current analyses, particularly among the younger cohort, the level of power to detect differences was lower. A further limitation is the proxy- or self-reported measures of physical activity that assessed frequency only. Assessment of duration might have provided a more sensitive measure of change in physical activity over time.

Acknowledging these limitations, the current findings do not provide support for SEP variations in changes in children's and young adolescents' physical activity or sedentary behaviors. Other key demographic, psychological, behavioral, social, and environmental factors identified previously[37] might be more important determinants of changes in children's and adolescents' physical activity. Possibly, the socioeconomic inequalities in these health behaviors frequently observed among adults might not yet have emerged at this life stage. Identification of the point at which socioeconomic inequalities in physical activity and sedentary behavior become established and widen might highlight important life stages for intervention. The current findings suggest that this might not occur until after early adolescence. Nonetheless, interventions to promote physical activity during childhood, particularly among those of low SEP, should not be considered unimportant, because some evidence suggests that low SEP in childhood might be associated with less physical activity in adulthood.[38] The additional evidence that this study provides of declining levels of objectively measured physical activity among many children and young adolescents suggests that initiatives to promote physical activity among children and young adolescents of all socioeconomic backgrounds are warranted.

Acknowledgments

This research was supported by grants from the Financial Markets Foundation for Children and the National Health and Medical Research Council (NHMRC, ID: 274309 and 374241). We wish to acknowledge Michelle Jackson and Sophie Thal-Janzen for coordinating follow-up data collection. David Crawford, Anna Timperio are supported by Public Health Research Fellowships from the Victorian Health Promotion Foundation. Jo Salmon is supported by a National Heart Foundation and sanofi-aventis Career Development Award. Kylie Ball is supported by a NHMRC Senior Research Fellowship (479513).

Table 4 Linear Regression Examining the Associations Between Maternal Education and the Physical Activity and Sedentary Behaviors of Younger Children, by Sex

		Boys		Girls	
Objective measure	**Maternal education**	β	**95% CI**	β	**95% CI**
Total counts/d (×1000; n = 168)					
baseline	medium	−57.4	−174.4, 59.5	24.7	−57.0, 106.3
	high	−38.8	−161.5, 83.9	−13.1	−92.4, 66.1
change	medium	−77.0	−192.9, 38.9	−15.2	−114.4, 84.1
	high	−92.9	−205.6, 19.7	−18.2	−99.8, 63.5
Sedentary min/d (n = 166)					
baseline	medium	23.4	−38.3, 85.1	2.4	−60.3, 65.1
	high	22.4	−15.9, 60.7	8.7	−37.8, 55.2
change	medium	−50.0	−94.0, −6.1*	−6.8	−75.7, 62.1
	high	−2.7	−48.9, 43.4	12.4	−46.7, 71.5
Moderate min/d (n = 168)					
baseline	medium	7.0	−22.1, 36.0	−13.3	−43.9, 17.3
	high	16.4	−12.9, 45.6	−13.6	−38.2, 11.0
change	medium	3.8	−19.4, 26.9	−4.2	−25.3, 17.0
	high	−8.6	−26.0, 8.7	−10.9	−28.5, 6.7
Vigorous min/d (n = 168)					
baseline	medium	−8.0	−26.6, 10.5	0.4	−8.7, 9.5
	high	−8.0	−25.4, 9.4	−2.0	−8.7, 4.7
change	medium	−5.1	−12.5, 2.3	−2.4	−12.9, 8.1
	high	−8.7	−17.9, 0.5	−1.7	−10.5, 7.2
Self-report measure					
Total LTPA times/wk (n = 184)					
baseline	medium	−8.7	−19.3, 1.8	−7.9	−17.6, 1.8
	high	−3.5	−13.4, 6.4	−5.8	−13.1, 1.5
change	medium	−4.7	−14.7, 5.3	−10.2	−17.7, −2.7*
	high	1.9	−9.3, 13.1	−7.9	−16.2, 0.3
Moderate LTPA times/wk (n = 184)					
baseline	medium	−8.0	−15.3, −0.8*	−6.3	−14.4, 1.8
	high	−1.5	−10.2, 7.2	−6.3	−11.9, −0.8*
change	medium	−0.9	−7.7, 5.9	−8.9	−14.2, −3.5**
	high	−2.9	−9.3, 3.4	−5.5	−11.7, 0.7
Vigorous LTPA times/wk (n = 184)					
baseline	medium	−0.7	−5.3, 3.9	−1.6	−4.6, 1.4
	high	−2.0	−5.5, 1.5	0.6	−2.2, 3.3
change	medium	−1.5	−5.2, 2.1	−1.3	−4.4, 1.9
	high	5.2	−3.4, 13.8	−1.6	−4.3, 1.2
Walk/Cycle to school times/wk (n = 173)					
baseline	medium	1.2	−0.5, 2.9	−1.6	−4.7, 1.6
	high	2.5	0.8, 4.2**	−1.1	−3.7, 1.4
change	medium	−1.6	−5.2, 2.0	−0.8	−2.0, 0.3
	high	−2.1	−5.3, 1.2	0.2	−1.2, 1.5
PE/School sport times/wk (n = 174)					
baseline	medium	−0.2	−1.1, 0.7	0.4	−0.4, 1.3
	high	−0.4	−1.2, 0.3	0.2	−0.7, 1.2
change	medium	−0.7	−1.2, −0.2**	−0.7	−2.2, 0.7
	high	−0.6	−1.0, −0.2**	−0.6	−1.7, 0.6

(continued)

Table 4 *(continued)*

Self-report measure					
TV/Video viewing min/wk (n = 176)					
baseline	medium	−53.3	−245.2, 138.5	−21.5	−255.3, 212.3
	high	−15.5	−211.8, 180.8	−320.1	−523.7, −116.6*
change	medium	−63.6	−300.5, 173.2	−42.5	−262.4, 177.4
	high	−193.8	−424.0, 36.4	−126.7	−336.7, 83.3

Abbreviations: LTPA, leisure-time physical activity; PE, physical education; TV, television.

Linear regression adjusted for school attended at recruitment; change variables adjusted for baseline value; reference value is low maternal education.

*$P < .05$. **$P < .01$.

Table 5 Linear Regression Examining the Associations Between Maternal Education and the Physical Activity and Sedentary Behaviors of Older Children, by Sex

		Boys		Girls	
Objective measure	**Maternal education**	β	**95% CI**	β	**95% CI**
Total counts/d (*1000; n = 307)					
baseline	medium	−9.2	−71.0, 52.5	−20.2	−73.2, 32.8
	high	−25.3	−86.4, 35.7	−26.8	−70.3, 16.8
change	medium	−18.9	−91.7, 53.8	−81.3	−182.7, 20.2
	high	67.7	−137.7, 273.1	−49.9	−145.3, 45.5
Sedentary min/d (n = 302)					
baseline	medium	−21.1	−73.6, 31.3	−16.6	−51.9, 18.8
	high	−8.9	−59.4, 41.6	16.3	−20.4, 52.9
change	medium	−30.5	−85.7, 24.5	26.8	−17.2, 70.7
	high	6.7	−45.2, 58.5	14.6	−27.9, 57.2
Moderate min/d (n = 307)					
baseline	medium	−1.3	−11.9, 9.3	−7.9	−18.3, 2.5
	high	−8.8	−19.8, 2.2	−12.0	−23.5, −0.5*
change	medium	−4.0	−17.0, 9.0	−4.9	−12.8, 3.0
	high	−6.5	−17.4, 4.4	−3.2	−12.2, 5.8
Vigorous min/d (n = 307)					
baseline	medium	−4.2	−10.2, 1.8	−2.4	−5.8, 1.1
	high	−4.3	−9.5, 1.0	−0.9	−4.5, 2.6
change	medium	−1.1	−5.1, 2.9	−3.3	−7.3, 0.8
	high	6.0	−7.2, 19.2	−1.0	−5.6, 3.6
Self-report measures					
Total LTPA frequency/wk (n = 358)					
baseline	medium	−3.3	−8.4, 1.7	4.6	−2.3, 11.6
	high	−5.1	−13.0, 2.8	−4.7	−9.6, 0.1
change	medium	−1.8	−5.5, 1.9	−0.2	−4.1, 3.6
	high	−0.6	−5.6, 4.4	−1.8	−5.4, 1.7
Moderate LTPA times/wk (n = 358)					
baseline	medium	−1.9	−8.3, 4.6	3.1	−2.7, 8.9
	high	−4.4	−12.3, 3.6	−6.6	−11.3, −1.9
change	medium	−1.4	−4.4, 1.7	−0.3	−3.3, 2.7
	high	0.2	−3.4, 3.7	−1.8	−5.3, 1.7
Vigorous LTPA times/wk (n = 354)					
baseline	medium	−1.3	−5.0, 2.4	1.3	−1.0, 3.5

(continued)

Table 5 *(continued)*

Self-report measures					
	high	−2.7	−6.2, 0.7	−0.2	−2.1, 1.6
change	medium	−0.8	−3.7, 2.2	0.3	−1.3, 1.8
	high	−0.8	−3.8, 2.3	0.0	−1.4, 1.4
Walk/Cycle to school times/wk (n = 340)					
baseline	medium	−0.3	−2.7, 2.1	0.3	−0.6, 1.2
	high	1.4	−1.1, 4.0	0.0	−1.0, 1.0
change	medium	−0.3	−2.5, 2.0	−0.4	−1.7, 0.9
	high	−0.2	−2.7, 2.3	0.3	−0.8, 1.3
PE/School sport times/wk (n = 344)					
baseline	medium	−0.4	−1.0, 0.2	0.5	0.1, 0.9*
	high	0.0	−0.6, 0.5	0.3	−0.2, 0.8
change	medium	0.0	−1.0, 0.9	−0.1	−0.5, 0.3
	high	−0.5	−1.2, 0.2	0.0	−0.6, 0.7
TV/Video viewing min/wk (n = 347)					
baseline	medium	131.8	−92.8, 356.4	−152.6	−320.5, 15.3
	high	63.9	−102.4, 230.2	−256.5	−495.9, −17.0*
change	medium	71.3	−127.1, 269.7	8.0	−161.8, 177.9
	high	−154.3	−355.6, 46.9	−39.6	−199.9, 120.7

Abbreviations: LTPA, leisure-time physical activity; PE, physical education; TV, television.

Values derived from linear regression adjusted for school attended at recruitment; change variables adjusted for baseline value; reference value is low maternal education.

*$P < .05$.

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