Minimum Instructional Hours at School and Childhood Weight

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Abstract

Increasing weight of children in the United States (U.S) has been a persistent public health issue for decades. According to the Center for Disease Control, in the 1963–1970 period, 4% of children between the ages of 6 and 11 were defined to be overweight; that level had more than tripled by 1999, reaching 13% and is even higher today. Childhood obesity is especially common among minority schoolchildren, with approximately 20% of whom are now overweight. Obesity in the U.S. currently cost close to \$200 billion a year and accounts for over 20% of all healthcare cost. In seeking explanations for the increase in childhood weight, it is unclear whether childhood obesity arises primarily from school or non-school influences and how school instructional hours can impact a child's overall health. Therefore, it is important to determine how instructional time at schools and educational institutions potentially impacts a children's physical health. In this study, we use state-level variations in the minimum amount of instructional time to study the effect of the amount of time spent at school on children's physical health. We find that an increase in the number of school hours reduces childhood obesity in African Americans by close to .13 percentage points.

Keywords: Childhood Obesity, School Instruction Hours

Childhood obesity and the overall increasing weight of children has been a persistent public health issue during the past four decades in the United States (U.S.). According to the Center for Disease Control, in the 1963–1970 period, 4% of children between the ages of 6 and 11 were defined to be overweight; by 1999 the level of obesity in children 6 to 11 more than tripled, reaching 13%. A study by Ogden, Carroll, Kit, & Flegal (2012) reveals that around 20 percent of children and adolescents were obese in 2012. Obesity in American is becoming an epidemic. Being overweight is especially common among young African American and Hispanic schoolchildren, with approximately 20 percent being overweight today.

Being overweight as a child has immediate and long-term implications for individuals, as well as for society and the economy as a whole. For example, the increase in overweight children has been accompanied by a marked increase in the number of children developing Type II Diabetes, which has serious health risks (Thompson, 1998). The increase in overweight children potentially increases the future population of overweight adults since overweight children and adolescents are more likely to be overweight as adults (Freedman, Kettel, Serdula, Dietz, Srinivasan, & Berenson, 2005; Freedman, Khan, Dietz, Srinivasan & Berenson 2001; Freedman, Wang, Thornton, Mei, Sopher, Pierson, Dietz, & Horlick (2009).

There are many concerns with the increase in the number of Americans being overweight. According to Power, Lake, & Cole (1997), being overweight may have serious health consequences for adults including diabetes, coronary heart disease, atherosclerosis, and colorectal cancer. Furthermore, being overweight may have social and economic consequences. For example, studies have shown that obesity is negatively related to education and earnings (Cawley and Meyerhoefer, 2012).

Cawley and Meyerhoefer (2012) estimate the health care cost of illnesses due to obesity to be over \$190 billion a year which accounts for 21 percent of annual medical expenses in the U.S. The health care cost of child obesity is around \$14 billion in 2006 U.S. dollars. The economic cost of obesity is expected to greatly increase in the future in the U.S.

Literature Review

In seeking explanations for childhood obesity, it is unclear whether childhood obesity arises primarily from school or non-school influences, and how school instructional hours can impact a child's overall health. While childhood obesity has both genetic and environmental roots, it is important to determine how instructional time at schools and education could potentially impact children's physical health. Previous research investigates the effect of several education-related factors and children's health. Given that children spend a large amount of time in school, many studies have focused on how schools may impact childhood obesity.

Some observers, including Schanzenbach (2009), and Anderson and Butcher (2006), point to schools as 'obesity zones', suggesting that schools have been faulted for serving fattening lunches, scheduling inadequate time for exercise, and allowing packaged-food and soft drink companies to install vending machines. For example, Schanzenbach (2009) studies the effect of the school lunch program on childhood obesity and finds that participating in the school lunch program increases the likelihood of child obesity by 2 percentage points. Schanzenbach (2009) also finds that close proximity of schools to fast food restaurants increases the likelihood

of children being overweight or obese by 7 percentage points. Similarly, Anderson and Butcher (2006) find a 10-percentage point increase in the likelihood of being exposed to junk food in school results in a 1 percent increase in the average student's BMI.

In contrast, Von Hippel, Powell, & Downey (2007), Singh, Siahpush, & Kogan (2010), and Durand, Andalib, Dunton, Wolch, & Pentz (2011), point to influences outside of school walls to be the root cause of childhood obesity. Von Hippel et al. (2002) find that childhood obesity results from children overconsuming fast food and energy-dense convenience foods, a lack of sidewalks or recreational areas in many housing developments, excessive television viewing, and reductions in parental supervision as more mothers enter the workforce. Von Hippel et al. (2002) suggest that non-school activities are the major cause of childhood obesity in the U.S.. Singh et al. (2010) suggest that minorities and poor children are more likely to be overweight or obese due to a higher proportion of African Americans living in more deprived and less safe neighborhoods. Singh et al. (2010) and Durand et al. (2011), show that poorly built environments in general and the lack of safety in neighborhoods likely result in physical inactivity which in turn could explain the high prevalence of obesity in less safe and walkable neighborhood.

More recent research typically considers how education and socioeconomic factors impact childhood obesity. Studies by Barrera (1990), Desai and Alva (1998), Peña, Wall, & Persson (2000), Currie and Stabile (2003), Bianchi, Cohen, Raley, & Nomaguchi (2004), and Currie, Shields, & Wheatley-Price (2007) suggest that the mother's education is extremely important and has long been observed to be negatively correlated with child mortality, and positively correlated with child health. Desai and Alva (1998), using data from 22 countries, conclude that the mother's education is positively correlated with child health. Desai and Alva (1998) suggest that a mother's education could affect child health through access to more information in the form of reading newspapers, watching television and listening to the radio. Bianchi et al. (2004) show that educated mothers spend a decent amount of time with their children and provide them with more beneficial inputs such as reading, as opposed to watching television. Barrera (1990) suggests other reasons for the maternal education-child health link, such as changing household preferences, and increasing the chance of marrying a wealthier husband. Barrera also concludes that well-educated mothers improve the health of children under 2 years old since their health has not yet stabilized. Currie and Stabile (2003) use the National Longitudinal Survey of Children and Youth (NLSCY) data to estimate the effect of family income and maternal education on health of children between ages 3 and 15 in Canada. Currie and Stabile (2003), along with Case, Lubotsky, Paxson (2002), Fertig, Glomm, & Tchernis (2006), and Chen and Li (2009), find that well-educated mothers have healthier children even after controlling for income. Khanam, Nghiem, & Connelly (2009), recently showed that the effect of family income diminishes when more maternal characteristics such as education are added to the model. Propper, Rigg, & Burgess (2007) also suggest that family income becomes ineffective on child health when maternal mental health is taken into account. Contrary to the above findings, Schultz (1984) suggests a well-educated mother has a higher opportunity cost, which limits the time she can spend with her child as she might intend to work more. This hints that there may be other pathways for mothers' characteristics to improve health.

While it is well understood that education and income increase childhood health and should help to reduce obesity, it is much less clear how schools play a direct part in childhood obesity. In this study, we investigate the effect of another school-related environmental factor on child health which is the amount of time children spent at school. Using state-level variations in the minimum amount of instructional time in this study is a unique way to measure the effect of the amount of time spent at school on a child's physical health. Given that students might have more physical activities at school, it is possible that students living in states with longer minimum number of instructional hours are less likely to be overweight or obese.

Data and Methodology

The primary data source in this study is the 2007 National Survey of Children's Health (NSCH) which is a nationally representative survey (National Center for Health Statistics, 2017). To test this hypothesis, this study estimates the linear probability regression model:

$$Y_{is} = \alpha + \gamma_s + \beta mininst_s + X_{is}\delta + \varepsilon_{is}.$$

where γ_s is a set of state dummies which control for unobservable factors varying at a state-level, $mininst_s$ is the minimum number of instructional hours required for each grade in each state. β is the coefficient of interest. X_{is} is the vector of other explanatory variables. As pointed out by several previously mentioned studies including Desai and Alva (1998), Peña et al. (2000), Currie and Stabile (2003), Currie et al. (2007), Bianchi (2004), Barrera (1990) Case et al. (2002) and Chen and Li (2009), a mother's education can greatly influence if her child is overweight or obese. Therefore, we include the mother and father's level of education as an explanatory variable. Similarly, since one might expect income and access to health insurance to impact childhood weight, we include varying levels of income and whether a child has health insurance as explanatory variables as well.

Estimation Results and Summary Statistics

As one might predict, our descriptive statistics in Table 1 presented below tell a similar story to that of previously stated research. Table 1 shows that blacks are more likely to be obese or overweight than white children or the overall general population. Similarly, blacks are less likely to have "Excellent" health. Black children are more likely to have lower incomes, more smokers in the households, and less likely to use a P.C for non-school purposes.

In contrast, Table 1 shows that white children are more likely to have mothers and fathers with higher education and incomes than blacks or the overall population, which might impact whether their children are overweight. While these are all issues that need to be addressed, they are beyond the scope of this paper and are simply being used as additional control variables.

Table 1: Summary statistics

VARIABLES	(1) Overall	(2) White	(3) Black
Obese	0.120 (0.324)	0.108 (0.311)	0.223 (0.416)
Overweight	0.267 (0.442)	0.250 (0.433)	0.408 (0.492)
Instructional hours	1,011 (84.52)	1,012 (82.96)	1,021 (85.87)
% change in education funding between 2006 & 2007	5.514 (2.727)	5.315 (2.611)	5.635 (2.699)
Age	13.80 (2.290)	13.83 (2.295)	13.74 (2.246)
Female	0.476 (0.499)	0.476 (0.499)	0.462 (0.499)
English is spoken at home	0.961 (0.193)	0.981 (0.138)	0.986 (0.116)
Health status dummies			
Excellent	0.668 (0.471)	0.689 (0.463)	0.565 (0.496)
Very good	0.232 (0.422)	0.226 (0.418)	0.265 (0.441)
Good	0.0818 (0.274)	0.0701 (0.255)	0.140 (0.347)
Fair	0.0158 (0.125)	0.0127 (0.112)	0.0240 (0.153)
Poor	0.00294 (0.0542)	0.00221 (0.0469)	0.00615 (0.0782)
Child with special healthcare needs	0.234 (0.424)	0.242 (0.429)	0.194 (0.396)
Health insurance coverage	0.934 (0.249)	0.942 (0.233)	0.926 (0.262)
Log # of times child use PC for non- school purposes per week	1.649 (1.295)	1.680 (1.300)	1.401 (1.165)
Mother's education			
High school	0.206 (0.405)	0.201 (0.401)	0.248 (0.432)
More than high school	0.736 (0.441)	0.752 (0.432)	0.683 (0.466)
Father's education			
High school	0.237 (0.425)	0.230 (0.421)	0.330 (0.470)
More than high school	0.696 (0.460)	0.713 (0.452)	0.589 (0.492)
Poverty levels			
<=100% FPL	0.0453 (0.208)	0.0329 (0.178)	0.108 (0.311)
100+%-133% FPL	0.0312 (0.174)	0.0252 (0.157)	0.0510 (0.220)
133+%-150% FPL	0.0218 (0.146)	0.0185 (0.135)	0.0320 (0.176)
150+%-185% FPL	0.0412 (0.199)	0.0367 (0.188)	0.0590 (0.236)
185+%-200% FPL	0.0237 (0.152)	0.0227 (0.149)	0.0313 (0.174)
200+%-300% FPL	0.178 (0.382)	0.174 (0.379)	0.203 (0.403)
300+%-400% FPL	0.180 (0.384)	0.186 (0.389)	0.154 (0.361)
400+% FPL	0.480 (0.500)	0.504 (0.500)	0.361 (0.480)
Smoker in the household	0.244 (0.430)	0.243 (0.429)	0.265 (0.441)
3+ adults in the household	0.285 (0.452)	0.276 (0.447)	0.348 (0.477)
Observations	27,533	22,638	1,627

Notes: Numbers in parentheses are standard deviations.

All Data is from the U.S. Department of Education, National Center for Education Statistics, Parent and Family Involvement in Education Survey (PFI:2007) of the National Household Education Surveys Program.

Minimum Instructional Hours And Childhood Weight

Linear Regression Estimation results can be seen in Tables 2 through 4 below. Table 2 presents the effect of minimum school hours on obesity, Table 3 presents the effect of minimum school hours on a child being overweight, and Table 4 presents the impacts that the percentage change in education funding between 2006-2007 has on a child being overweight.

Table 2: Effect of minimum instructional hours on childhood obesity

	(1)	(2)	(3)
Obesity	Overall	White	Black
Minimum instructional hours	0.00004 (0.00010)	-0.00008 (0.00010)	0.00078 (0.00055)
Age	-0.0137*** (0.00166)	-0.0127*** (0.00167)	-0.0158** (0.00778)
Female	-0.0592*** (0.00903)	-0.0773*** (0.01193)	-0.01372 (0.03940)
English is spoken at home	0.03780 (0.02666)	-0.02757 (0.04400)	0.13229 (0.09031)
Very good	0.08076*** (0.01331)	0.06979*** (0.01766)	0.05391 (0.05503)
Good	0.13587*** (0.01033)	0.13800*** (0.01503)	0.12798** (0.05465)
Fair	0.08359 (0.07288)	0.07506 (0.09080)	0.05554 (0.10704)
Poor	0.42422*** (0.10637)	0.28158 (0.17033)	0.15420 (0.21158)
Child with special healthcare needs	-0.00977 (0.00710)	-0.00095 (0.00984)	0.06396 (0.05909)
Health insurance coverage	0.02804 (0.02005)	0.02570 (0.02116)	-0.03777 (0.07796)
Log # of times child use PC per week	-0.00814** (0.00377)	-0.00631 (0.00380)	0.01906 (0.01378)
Mother's education high school	-0.08104 (0.05621)	-0.04520 (0.07335)	-0.07091 (0.11554)
Mother's education more than high school	-0.10298** (0.04548)	-0.05163 (0.07239)	-0.19466 (0.11794)
Father's education high school	-0.04665 (0.02881)	-0.05657 (0.06181)	-0.08416 (0.10057)
Father's education more than high school	-0.0677*** (0.02446)	-0.09058 (0.06383)	-0.00415 (0.10655)
100+%-133% FPL	-0.00302 (0.03424)	0.05152 (0.04268)	0.00082 (0.07235)
133+%-150% FPL	-0.04715** (0.02206)	-0.03560 (0.02926)	-0.12399 (0.08399)
150+%-185% FPL	-0.02853 (0.03004)	0.02979 (0.04465)	-0.03233 (0.10140)
185+%-200% FPL	-0.01731 (0.04531)	0.03976 (0.06096)	-0.07062 (0.08547)
200+%-300% FPL	-0.0410*** (0.01444)	-0.01628 (0.02635)	0.02469 (0.05639)

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300+%-400% FPL	-0.0593*** (0.01525)	-0.03413 (0.02823)	0.00555 (0.07354)
400+%-400% FPL	-0.0698*** (0.01650)	-0.05169** (0.02514)	-0.00553 (0.07476)
Smoker in the household	0.03139* (0.01732)	0.03902** (0.01587)	-0.00370 (0.04255)
3+ adults in the household	-0.00697 (0.01362)	-0.00725 (0.01165)	-0.04181 (0.02616)
Constant	0.40939*** (0.12998)	0.56343*** (0.11504)	-0.46465 (0.67110)
Observations	27,533	22,638	1,627
R-squared	0.08898	0.09775	0.13720

Notes: Each column represents a single linear probability regression model in all of which NSCH sample weights are used. In addition to the listed covariates, 47 state dummy variables are included in the model. Standard errors are clustered at a state-level to capture the non-independence of observations from the same state. *** is statistically significant at the 5% level and ** at the 10% level.

Table 3: Effect of Min. Instructional Hours on the likelihood of a child being overweight

Overweight	(1) Overall	(2) White	(3) Black
Minimum instructional hours	-0.00004 (0.00013)	-0.00007 (0.00012)	-0.00126** (0.00062)
Age	-0.02048*** (0.00348)	-0.01973*** (0.00336)	-0.02746*** (0.00634)
Female	-0.06500*** (0.01176)	-0.08148*** (0.01297)	0.00412 (0.03938)
English is spoken at home	0.03585 (0.04006)	-0.15806*** (0.05290)	0.03349 (0.18970)
Very good	0.09659*** (0.01337)	0.08917*** (0.01521)	0.11683*** (0.04349)
Good	0.13778*** (0.02074)	0.17886*** (0.01803)	0.15270** (0.05754)
Fair	-0.01261 (0.08986)	0.00844 (0.09833)	0.00694 (0.13914)
Poor	0.26775*** (0.08295)	0.17804 (0.15689)	0.21270 (0.19140)
Child with special healthcare needs	0.03122 (0.02734)	0.01646 (0.01101)	0.04815 (0.05181)
Health insurance coverage	0.07082** (0.03155)	0.06941* (0.03755)	-0.04048 (0.07333)
Log # of times child use PC per week	-0.00913* (0.00457)	-0.00508 (0.00385)	0.01147 (0.01446)
Mother's education high school	-0.06689* (0.03690)	-0.02243 (0.05971)	0.01282 (0.11110)
Mother's education more than high school	-0.10431*** (0.03403)	-0.05711 (0.05203)	-0.10641 (0.11103)
Father's education high school	-0.07657*** (0.02763)	-0.07237 (0.05413)	-0.14563 (0.09479)
Father's education more than high school	-0.10951*** (0.02252)	-0.11947** (0.05865)	-0.03802 (0.11953)

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100+%-133% FPL	0.01150 (0.04852)	0.05132 (0.04169)	0.20006** (0.07695)
133+%-150% FPL	-0.10119** (0.04491)	-0.04498 (0.04661)	-0.06564 (0.10235)
150+%-185% FPL	-0.06276 (0.07123)	-0.01675 (0.04264)	0.15837 (0.11927)
185+%-200% FPL	0.02335 (0.05478)	0.09209 (0.08614)	-0.05184 (0.15634)
200+%-300% FPL	-0.07717** (0.03822)	-0.04196 (0.03082)	0.02194 (0.05700)
300+%-400% FPL	-0.07818** (0.03003)	-0.04986* (0.02921)	-0.00082 (0.07984)
400+% FPL	-0.12643*** (0.04277)	-0.08040** (0.03066)	-0.02077 (0.08367)
Smoker in the household	0.04232** (0.02076)	0.05821** (0.02195)	-0.02394 (0.05273)
3+ adults in the household	-0.03421* (0.02025)	-0.03594* (0.01884)	-0.04124 (0.04705)
Constant	0.82426*** (0.11975)	0.95637*** (0.12811)	2.15036*** (0.68536)
Observations	27,533	22,638	1,627
R-squared	0.08529	0.10481	0.13415

Notes: Each column represents a single linear probability regression model in all of which NSCH sample weights are used. In addition to the listed covariates, 47 state dummy variables are included in the model. Standard errors are clustered at a state-level to capture the non-independence of observations from the same state. *** is statistically significant at the 5% level and ** at the 10% level.

Table 4: Results including % change in education funding

	(1) Overall	(2) White	(3) Black
Overweight			
Minimum instructional hours	-0.00004 (0.00013)	-0.00007 (0.00012)	-0.00126** (0.00062)
% change in education funding 2006-2007	0.01227*** (0.00118)	0.01468*** (0.00097)	-0.05196*** (0.00712)
Age	-0.02048*** (0.00348)	-0.01973*** (0.00336)	-0.02746*** (0.00634)
Female	-0.06500*** (0.01176)	-0.08148*** (0.01297)	0.00412 (0.03938)
English is spoken at home	0.03585 (0.04006)	-0.15806*** (0.05290)	0.03349 (0.18970)
Very good	0.09659*** (0.01337)	0.08917*** (0.01521)	0.11683*** (0.04349)
Good	0.13778*** (0.02074)	0.17886*** (0.01803)	0.15270** (0.05754)
Fair	-0.01261 (0.08986)	0.00844 (0.09833)	0.00694 (0.13914)
Poor	0.26775*** (0.08295)	0.17804 (0.15689)	0.21270 (0.19140)
Child with special healthcare needs	0.03122 (0.02734)	0.01646 (0.01101)	0.04815 (0.05181)

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Health insurance coverage	0.07082** (0.03155)	0.06941* (0.03755)	-0.04048 (0.07333)
Log # of times child use PC per week	-0.00913* (0.00457)	-0.00508 (0.00385)	0.01147 (0.01446)
Mother's education high school	-0.06689* (0.03690)	-0.02243 (0.05971)	0.01282 (0.11110)
Mother's education more than high school	-0.10431*** (0.03403)	-0.05711 (0.05203)	-0.10641 (0.11103)
Father's education high school	-0.07657*** (0.02763)	-0.07237 (0.05413)	-0.14563 (0.09479)
Father's education more than high school	-0.10951*** (0.02252)	-0.11947** (0.05865)	-0.03802 (0.11953)
100+%-133% FPL	0.01150 (0.04852)	0.05132 (0.04169)	0.20006** (0.07695)
133+%-150% FPL	-0.10119** (0.04491)	-0.04498 (0.04661)	-0.06564 (0.10235)
150+%-185% FPL	-0.06276 (0.07123)	-0.01675 (0.04264)	0.15837 (0.11927)
185+%-200% FPL	0.02335 (0.05478)	0.09209 (0.08614)	-0.05184 (0.15634)
200+%-300% FPL	-0.07717** (0.03822)	-0.04196 (0.03082)	0.02194 (0.05700)
300+%-400% FPL	-0.07818** (0.03003)	-0.04986* (0.02921)	-0.00082 (0.07984)
400+% FPL	-0.12643*** (0.04277)	-0.08040** (0.03066)	-0.02077 (0.08367)
Smoker in the household	0.04232** (0.02076)	0.05821** (0.02195)	-0.02394 (0.05273)
3+ adults in the household	-0.03421* (0.02025)	-0.03594* (0.01884)	-0.04124 (0.04705)
Constant	0.71009*** (0.12869)	0.81982*** (0.13562)	2.63384*** (0.72620)
R-squared	0.08529	0.10481	0.13415

Notes: Each column represents a single linear probability regression model in all of which NSCH sample weights are used. In addition to the listed covariates, 47 state dummy variables are included in the model. Standard errors are clustered at a state-level to capture the non-independence of observations from the same state. *** is statistically significant at the 5% level and ** at the 10% level.

As expected, an important factor that stands out is the mother's and father's education. Tables 2 through 4 show that greater education for both parents reduces the risk of a child overall being overweight. While previous research on child obesity has shown mixed effects of maternal education on child weight, there are some studies reporting favorable effects, at least for a sub-population of children (Anderson, Butcher, & Levine, 2003; Fertig et al., 2009). Similarly, our results in Tables 2 through 4 show that higher incomes, even when controlling for education, help reduce childhood obesity in children for the overall population. Our results also suggest that a father's education is also an important determinant.

Income may indirectly impact childhood weight through its impact on access to health care, better more nutritious food, and personal computers (P.C.). Results show that the more children have access to health care and to P.C outside of school related activities, the more it reduces the likelihood that they are overweight or obese.

The novelty of this research is that it introduces the impact of school hours itself as another determinant of child health. While our results show no effect on whites and the overall population, it does show school hours can have significant effects on black children. Table 4 above shows that every additional hour spent at school reduces the likelihood of a black child being overweight by 0.13 percentage point. Given that every additional hour spent at school reduces the likelihood of being overweight by 0.13 percentage point, increasing the annual instructional hours by 10 hours would reduce the prevalence of being overweight among African Americans. These results support those of Anderson et al. (2003) and Von Hippel et al. (2007), and suggest that an increase in school hours helps to improve weight outcomes for black children. As Von Hippel et al. (2007) suggests, this may be caused by the change in the structure of a child's day when they enter elementary school, implying that more school hours will help to improve weight outcomes. These racial/ethnic patterns suggest that schools are not primarily responsible for the excess of overweight black children, and schools actually help to reduce childhood obesity. As mentioned previously, Singh et al. (2010) and Durand et al. (2011) suggest that this may be due to a higher proportion of minorities living in less safe non-walkable neighborhoods, reducing children's physical activity outside of school.

The other explanatory variables predict the risk of a child being overweight as expected; the likelihood of being overweight increases by age and boys are less likely to be overweight compared to that of girls assuming all other factors to be constant. In addition, the risk of being overweight is higher among black children.

Results in Table 4 above also show that an increase in funding for education also reduces childhood obesity and weight. These results have strong policy implications, supporting the idea of expanding education funding, healthcare and computer access to children would greater reduce childhood obesity, especially for black children.

Conclusions

Do instructional hours at school impact childhood weight? Yes, additional school hours help to reduce childhood obesity and weight in black children. Our results show that for black children, who are at higher risk of being overweight, an additional hour of school a year helps to reduce the likelihood of them being overweight by .13 percentage points. Although schools may not provide ideal environments for healthy weight, it appears that they are healthier than most children's non-school environments.

How do additional school hours help reduce childhood weight? While our data cannot answer this question directly, we conjecture that the structured nature of the school day, with its scheduled exercise periods during gym, limited opportunities to eat and snack, and better access to computers helps students to reduce their weight. By contrast, we speculate that many home environments might allow children to indulge in sedentary activities and excessive snacking.

These patterns have important implications for policy researchers interested in reducing childhood obesity. Implications of our study suggest that policies that increase black children's school hours (e.g., after-school programs), increase school funding, and access to healthcare and computers outside the school environment may have the potential to reduce childhood obesity.

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